

# RESEARCH REPORT

“CULTURAL, SOCIAL AND NUTRITIONAL VALUE OF SEA TURTLES IN CUBA”

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# **“CULTURAL, SOCIAL AND NUTRITIONAL VALUE OF SEA TURTLES IN CUBA”**

## *Executive Summary*

The study on the cultural, social and nutritional value of sea turtles in Cuba conducted in two fishing communities of the nation has been carried out using a multi-disciplinary approach for its proposed methodology and the results allowed the drawing of general conclusions that addressed desired objectives.

The calculation of the nutritional value of sea turtle meat and its comparison with other sources of animal protein yielded interesting results with a view toward proposing different food alternatives for the populations studied. The field work revealed that the preference for sea turtle meat is based fundamentally on the flavor of the meat and on the nutritional value that the fishermen attribute to it; therefore tradition was not as significant as expected from the working hypothesis.

Fishermen of the Nuevitas and Cocodrilo zones have sources of animal protein other than turtle meat available, such as fin fish, pigs and chickens. Comparison of turtle meat with these sources indicates that all have high quality protein, so stopping the turtle fishery would not affect the fishermen's nutritional situation.

Meat from fish (jack and snapper), chickens and pigs can be considered as substitutes or alternative protein sources for turtle meat based on their percent composition as well as their protein quality, as determined from chemical evaluation methods; therefore, their consumption is not essential for people with special food regimens.

A high percentage of sea turtle fishermen and their families eat fish meat almost every day and they often eat fish and turtle. Raising animals guarantees the consumption of chicken and pork, which are two substitute foods for sea turtle meat, according to the people interviewed.

All the fishermen agreed that sea turtle fishing is a tradition, but they do not report earnings; they are paid very little for captured turtles and prefer to catch other species that bring better prices.

On the other hand, sea turtle fishing in these communities has tended to diminish somewhat due to loss of interest and fishing effort is reduced because of the artisanal methods used for capture.

It should be noted that along with all of the above, the education of the population about the conservation of natural resources and the protection of different species, including sea turtles, is essential, especially for youth and children.

## **General Introduction:**

This report is the result of a study on the cultural, social and nutritional value of sea turtles in Cuba, carried out at the request of the World Wildlife Fund (WWF), as a complement to research being carried out by the Universidad de la Habana and the Ministry of Fisheries. This study can be an effective tool for correctly estimating beforehand the implications of an eventual suspension of the fishing of these species.

In its first part, the study revealed the nutritional value of sea turtle meat and other alternative protein sources, from an analysis of the available databases and the comparison of a group of indicators of protein quality that are described in the text of the report; the consultation of sources that provide data about the composition of selected foods was essential for this.

The second part characterizes the socio-economic and cultural context of the two communities, Nuevitas on the northeast coast, and Cocodrilo on the southwest coast of Cuba, where turtle species are fished, principally the green turtle (*Chelonia mydas*) and the hawksbill (*Eretmochelys imbricata*). It also gives an analysis of the data compiled from the application of a survey about food consumption habits and preferences, specifically regarding the kinds of meats used in these two populations. The consultation of documents and the testimonies of the people of the communities where the study was carried out were fundamental for this.

### **1. Nutritional value of sea turtle meat – a comparative study.**

#### **Introduction.**

The nutritional quality of a food is determined by its composition. To evaluate meats as sources of protein, their concentration of proteins, digestibility and the quantity and proportion of essential amino acids must be known.

The meats can also be a source of nicotinic acid and cyanocobalamin vitamins; zinc, copper and other minerals; and hematinic iron, which is better assimilated than the iron present in vegetables.

Evaluation of the quality of the meats with respect to their nutritional value can be carried out by knowing the concentration of these nutrients, the digestibility of the protein, and the chemical composition that reveals the first limiting amino acid of that protein source.

The daily diet of an individual or a population is affected by the availability of food products as well as by culture, culinary experience and sometimes by religion. Food has important cultural significance that sometimes imposes criteria on the quality of the food consumed.

#### **Brief review of the capture and use of sea turtles in Cuba.**

Sea turtle fishing has occurred for more than 500 years in Cuba. This practice was carried out by the first inhabitants of the island who used their meat and eggs as food and the selling of hawksbill tortoiseshell has occurred since the 1500s. The traditional fishery of this species used remoras (Baisre 1987) and handmade nets (Carrillo, et al. 1998).

In 1525, the Doce Leguas zone was specifically qualified as good for turtles (Fray Bartolomé de las Casas en “La Historia de las Indias” 1525, cited in Baisre 1987) and reference was made in the chronicles about the era of sea turtle abundance in Cuban waters, especially on the southern coast of the island (Pérez de Oliva 1528) (Carrillo et al. 1998).

In 1635, sea turtles and their products were identified as important articles that could be acquired in Cuba at prices set through the valuation of products for the region (Depeñalver Angulo 1635).

From 1700 to 1800, a rise in the demand for tortoiseshell in Europe was satisfied by increased trade (Pearson 1981; Fosdick & Fosdick 1994) and the Cayería de las Doce Leguas was identified as one of the first commercial capture zones (Pearson 1972, taken from Groomsbridge & Luxmoore, 1989). Captured sea turtles were used to provide food for poor people, particularly slaves. Live turtles were transported by boat from northeastern Cuba to the markets of Havana (Le Riverend 1971).

In 1936, the General Fisheries Law No. 704 was passed that established a ban on sea turtles during the reproduction period, and 20 years later in 1956, Decree No. 2724 set regulations on the use of marine resources.

In 1960 and 1961, resolutions 31-V and 16-VI of the Ministry of Industrial Fisheries established closed seasons on sea turtles for the period from June 15 to August 10 and a permanent ban on the collection and consumption of sea turtle eggs. The disturbance of female turtles nesting during the night was also prohibited.

In 1968, fishing expanded significantly, coinciding with an increase and systematization of fisheries regulations and the introduction of new research and conservation initiatives (*República de Cuba 1998*).

In the Constitution of the Republic of Cuba approved in 1976, policy concerning the use of natural resources was established. That same year the Ministry of Industrial Fisheries authorized the capture of sea turtles for research purposes.

In 1977, Resolution 134 of the Ministry of Industrial Fisheries prohibited the destruction of sea turtle nests on the nesting beaches, and the capture of female sea turtles prior to the nesting season was prohibited one year later in 1978.

In 1980, the Direction of Fisheries Regulations was created, as the Organizational Unit of the Central Apparatus of the Ministry of Industrial Fisheries (MIF) in charge of controlling compliance with MIF policy regarding fishery regulations.

In the 1980s, important measures were taken, such as Law No. 33 that detailed the nation’s policy regarding the environment to a greater degree, as well as the sound use of natural resources, including marine ones. Monitoring of sea turtle captures was improved by a sampling program. In 1981, Decree No. 103 regulated the taking of sea turtles for non-

commercial interests, limiting this specific use to state entities only and directing that the capture and possession of sea turtles for research would be subject to permits that would be issued by MIF's direction of fisheries regulations. The Fisheries Administration Committee was also created, in charge of analyzing the annual plan for fisheries regulations. In 1987, closed seasons were changed based on new reproduction data.

In 1990, Cuba reduced its capture of sea turtles so that it could redirect its fishing effort mainly toward export fisheries. The traditional capture of sea turtles was reduced 10% over prior levels and occurred in the fishing communities of Nuevitas and Cocodrilo only. Cuba had no intention of expanding captures or the number of sites over the short or medium term. International trade of tortoiseshell ceased in 1992 (República de Cuba 1998).

In 1994, a permanent ban on sea turtles was passed in MIF Resolution 298, which also regulated the sea turtle fishery in the traditional capture zone of Isla de Pinos. A year later, in 1995, the same occurred with respect to the traditional capture zone of Nuevitas.

In 1996, Decree-Law No. 164 unified aspects from Decree-Law No. 704 (1936), Decree-Law No. 2724 (1956) and Decree-Law No. 103 (1982), updating the fishery legislation, creating the Consultative Commission of Fisheries and intensifying even more the restrictions regarding the taking of hawksbill (*E. imbricata*) examples or eggs, and establishing severe sanctions for those who violated the law (fines, confiscation of fishing gear and vessels, suspension of fishing licenses, etc.).

Currently, the strategies have not changed and sea turtle fishing occurs only in the communities of the study, Nuevitas and Cocodrilo.

**Materials and Methods:** To evaluate the nutritional quality of green turtles and hawksbills the following indicators were used: concentrations of proteins; fats; energy; minerals Fe, Ca, and Zn; cyanocobalamin and nicotinic acid vitamins in the edible fraction; amino acid composition; and *in vitro* protein digestibility. The Tablas de Composición de Alimentos para América Latina y el Caribe (FAO / LATINFOODS 2002), Nutrition Data (2004) and the Technical Report "Características Nutricionales de los Quelonios Marinos" (Lezcano, 1999 unpublished data) were the databases used for the percent composition of macronutrients and micronutrients. The *in vitro* digestibility of proteins and chemical composition, the databases from Narayana and Polacchi (1972), the Web site [www.doh.gov.2a/docs/regulations/2002/reg1055/annex.html](http://www.doh.gov.2a/docs/regulations/2002/reg1055/annex.html), the technical report of Lezcano (1999), the amino acid composition analyzed by Pelegrín (1999), and Nutrition Data (2004) were used for the chemical indices of protein quality. The food composition tables included in the book by Shils *et al.* (1994) were also used for data on lipids by class.

## Results:

Table 1 shows the percent composition of hawksbill, green turtle and loggerhead muscle, the meat from two kinds of fish, and chicken and pig as two alternative sources. It can be seen that protein levels range from 15.7-19.01% for the hawksbill while different institutions report a range of 16 – 20% for the green turtle. The other protein sources range from 19 to 20.2 % protein while the only data reported for the loggerhead was 17.75%.

Lipid levels for hawksbills ranged from 0.65 to 1.0% and those of green turtles from 0.4 to 1.0%. The alternative protein sources have higher lipid values ranging from 2.1 to 10.2. The loggerhead had 1.1% lipids.

The energy contribution of each 100 g edible portion is 90.37 kcal for hawksbill and a range of 84 to 89 kcal for green turtle. The other meats contributed from 103 to 173 kcal and loggerhead had the lowest value at 81.79 kcal.

Table 1. Percent composition of hawksbill (*Eretmochelys imbricata*), green turtle (*Chelonia mydas*), and loggerhead (*Caretta caretta*) muscle, and other alternative protein sources for the fishing populations of Nuevitas and Cocodrilo.

Composition (%)	Hawksbill		Green turtle				Loggerhead	Jack	Snapper	Chicken	Pig
	A	B	a	b	C	d	A	c	c	c	c
Moisture	77.05	82.0	78.12	81.4	78.5		80.07	71.5	75.6	68.6	73.1
Total protein	19.01	15.7	18.66	16.0	19.8	20	17.75	19	21.1	20.2	19.8
Lipids	0.65	1.0	0.53	0.4	0.5	1	1.11	8	2.1	10.2	6.2
Carbohydrates						0.0		0.2	0	0	0
Ash	1.17	1.0	0.97	1.1	1.2		0.87	1.3	1.2	1.0	0.9
Energy (kcal/100g)	90.37		86.29		84	89	81.79	149	103	173	135

- a) Cuba, Lezcano (1999)
- b) Cuba, Pelegrin (1999)
- c) FAO (2002)
- d) Nutrition Data (2004)

Table 2. Concentration of iron, zinc and calcium minerals and nicotinic acid and cyanocobalamin vitamins in hawksbill (*Eretmochelys imbricata*), green turtle (*Chelonia mydas*), and loggerhead (*Caretta caretta*) muscle and from other alternative protein sources for the fishing populations of Nuevitas and Cocodrilo.

Mineral (mg/100g)	Hawksbill	Green turtle			Loggerhead	Snapper	Chicken	Pig
	a	a	C	D	A	c	c	c
Fe	1.512	1.613	1.3	1.4	1.53	0.8	1.5	1.2
Zn	0.660	0.609	1.0	1.0 (d)	0.610	0.7		2.9
Ca			18.0	12.0		17.0	14.0	6.0
Nicotinic acid (mg/100 g)				5.4 1(d)		2.5		4.6 4.0 (d)
Cyanocobalamin <sup>1</sup> µg/100g				1(d)			0.32 (e)	1(d)

- a) Cuba, Lezcano (1999)
- b) -
- c) FAO (2002)
- d) Nutrition data (2004)
- e) Shils et al (1994)

Table 2 presents the concentration of minerals in turtle muscle and alternative protein sources. The values for iron range from 1.3 to 1.6 mg/100 g equivalents in the meats from pigs and chickens, and are slightly higher than those for snapper. The iron requirement for humans ranges from 18 mg per day for women over 12 years old to 30 mg for pregnant women (Porrata *et al.* 1994).

The highest zinc values are found in pork at 2.9 mg/100g, while the turtles and snapper range from 0.61 to 1.0 mg/100g. The recommended requirements for zinc for people over 10 years of age are 15 mg/day, with an additional 5-10 mg/day during pregnancy and lactation.

The concentration of calcium reported for green turtles is equivalent to that in the meats of snapper and chicken while pork has the lowest values. The recommendations for calcium are 800 mg/day for adults, with an additional 400 mg recommended for pregnant and lactating mothers. For adolescents the recommendation may reach 1200 mg/day.

Turtle meat and pork have higher nicotinic acid values than snapper. Seven niacin equivalents (NE) are recommended for every 1000 kcal ingested in the diet for children

<sup>1</sup> Loggerheads are carnivorous, while hawksbills and green turtles are herbivorous but along with sponges and sea grasses they may ingest microorganisms and small mollusks that can be sources of cyanocobalamin.

over the age of six months, adolescents and adults. During pregnancy and lactation an additional 2 to 5 NE per day are recommended, respectively.

Table 3 shows the analysis of amino acids in muscle from hawksbills (*Eretmochelys imbricata*) and green turtles (*Chelonia mydas*) captured in Cocodrilo, Isla de Pinos by Pelegrín (1999, unpublished data). It can be seen that the concentration of amino acids is very close in both species. The way in which the results were expressed did not allow the calculation of the chemical composition.

Table 3. Amino acid composition of muscle from hawksbills (*Eretmochelys imbricata*) and green turtles (*Chelonia mydas*) captured in Cocodrilo, Isla de Pinos.\*

Amino acid (g/100 g of lyophilized sample)	Hawksbill	Green turtle
Lysine	4.14	3.70
Leucine	3.95	3.99
Arginine	2.95	2.80
Valine	2.76	2.77
Isoleucine	2.57	2.56
Histidine	2.43	1.86
Threonine	1.77	1.60
Methionine+cysteine	2.07	2.09
Phenylalanine+tyrosine	1.53	1.17

\*Pelegrín (1999).

Table 4. Digestibility of protein from the muscle of hawksbill (*Eretmochelys imbricata*), green turtle (*Chelonia mydas*) and loggerhead (*Caretta caretta*), and digestibility and chemical composition of other alternative protein sources for the fishing populations of Nuevitas and Cocodrilo.

Protein Quality Index	Hawksbill	Green turtle	Loggerhead	Chicken	Pig
<i>In vitro</i> digestibility of protein (%)	99.83(a)	99.83(a)	99.81(a)	100 (b)	98 (b)
Chemical composition				98 (Val)	105

(a) Lezcano, 1999

(b) [www.gov.2a/docs/regulations/2002/reg1055annex.html](http://www.gov.2a/docs/regulations/2002/reg1055annex.html)

(c) Nutrition data (2004)

Tables 3 and 4 present indicators of protein quality of the meats under study. It can be seen that all the meats analyzed are highly digestible. The chemical composition values for chicken meat and pork classify them as high quality proteins. The only data available on the

amino acid composition for hawksbill and green turtles are those reported by Pelegrín (1999).

Table 5. Values of total lipids, fatty acids and cholesterol for the green turtle and the alternative protein sources accessible to fishers from Nuevitas and Cocodrilo

Lipids (per 100 grams of edible portion)	Green turtle raw meat (b)	Fish* (c)	Chicken with the skin removed before cooking (c)	Pork with 25% fat, cooked (c)	Pork, lean meat, leg or loin (d)
Saturated fatty acids (g)	0.13	0.36-4.50	1.15	9.08	2.1
Mono-unsaturated fatty acids	0.08	0.31-3.31	1.05	11.52	2.5
Poly-unsaturated fatty acids	0.17	0.63-2.20	0.92	2.84	0.5
Eicosapentaenoic acid (20:5 $\omega$ -3)	0.023	0.13-0.41	0.0	0.0	
Docosahexaenoic acid (22:6 $\omega$ -3)	0.033	0.03-0.62	0.03	0.0	
Cholesterol (mg)	50	49-73	77	82	65
Lipids (g)	0.4-0.53 (a)	1.53-12.14	3.87 10.2 (d) whole animal	25.13	6.2

\*Data from fatty and dried fish were used.

- (a) Lezcano (1999) and Pelegrin (1999)
- (b) Nutrition Data (2004)
- (c) Shils et al (1994)
- (d) FAO (2002)

Table 5 presents data related to the quality of the fats in green turtle meat and alternative protein sources. No data were found for hawksbills and loggerheads. It can be seen that all the sources have relatively high cholesterol values but the green turtle has the lowest values of saturated fats. Fish have docosahexaenoic and eicosapentaenoic fatty acids of the omega 3 series, which is not found in birds and mammals but is found in a very low quantity in the green turtle.

## Discussion

The analysis of the available literature on the composition of the sea turtles *Eretmochelys imbricata*, *Chelonia mydas* and *Caretta caretta*, as well as the *in vitro* digestibility of their proteins indicates that these species possess high quality proteins, and that they also contribute essential micro-elements and the B complex vitamins nicotinic acid and cyanocobalamin that mainly come from food sources of animal origin. These meats are also low in saturated fats although they have relatively high levels of cholesterol (Nutrition data, 2004).

The available data indicate that the nutritional quality of the meat from the three turtle species is very similar.

<sup>2</sup>As alternatives to turtle meat, the fishers of the Nuevitas and Cocodrilo zones have fin fish, pig and chicken protein sources available. Comparison of these sources indicates that all have high quality protein. Even though the chemical composition values for snapper and jack that were used in the comparison were not included in Table 4, a study of the chemical composition of various species of fish indicate that these are almost always higher than 90 (Narayana and Polacchi, 1972).



Project investigators visit the cabin of one of the fishermen of Cayo Romano. Photo: Olimpia Carrillo

The concentrations of micronutrients (Fe, Zn and Ca) were also similar for turtles and other protein sources such as fish and pork.

Vitamin B12 is found in equal concentrations in pork and green turtle meat, whereas nicotinic acid is found at a slightly higher value in the latter.

Turtles present total lipids and energy densities at levels lower than those for the alternative protein sources. Although the main sources of fat in the diet are the “visible fats” from lard, oil and butter, the meats also raise the level of total fat in the diet because they are indirect sources of “invisible fats”; the composition of these fats is important for assessing the nutritional quality of the meat.

The energy density of a food is important data for the fulfillment of nutritional recommendations, and generally it is highly related to the quantity of fat that the food contains because these are the macronutrients that contribute the largest quantity of kilocalories per gram.

Regarding the quality of the fat, fin fish present a very good composition of polyunsaturated fatty acids of the  $\omega$ -3 series such as docosahexaenoic acid and eicosapentaenoic acid, which are very valuable for human health for their hypocholesterolemic effects (Feldman, 1994). Green turtle meat, fish, pork and chicken

present relatively high cholesterol values but green turtle has a lower amount of saturated fat than the other sources.

The percent composition and the protein quality of sea turtle meat do not make it essential in the diet of pregnant women and small children. To prevent and control the absence of some nutrients, other strategies can be used such as the consumption of fish, chicken and pork and dairy products, increasing the quantity of fruits and vegetables in the diet, food diversification and fortification of foods.

### **Conclusions:**

1. The chemical composition of meats from hawksbills, green turtles and loggerheads are equivalent in macronutrient concentrations, iron and zinc minerals, energy contribution for each 100 grams of edible fraction, and essential amino acids for hawksbill and green turtles.
2. The *in vitro* digestibility of the protein from turtles and from alternative protein sources is high, as is the chemical composition of the alternative sources, which is an indicator of the availability of the amino acids and protein quality.
3. The meats from fish (jack and snapper), chicken and pig can be considered as substitutes or alternative protein sources to turtle meats for their percent composition as well as the protein quality based on chemical methods of evaluation.
4. The quality of the fat of fish is superior to that of the other protein sources studied. Green turtle presents low values of saturated fatty acids but high levels of cholesterol.

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## 2. Cultural and social value of sea turtle fishing in two communities of Cuba.

### A brief review of historic fishing in the city of Nuevitas and the community of Cocodrilo.

The city of Nuevitas is situated around the bay of the same name, in northern Camagüey province, and it is currently celebrating the 500<sup>th</sup> anniversary of the Villa de Santa María del Puerto del Príncipe, the name of the area when it was founded in a place very near the modern city of Nuevitas.

This city has an area of 361 square kilometers representing 2.5% of Camagüey province and a population of 44, 000 inhabitants.

It is an extraordinary site with the sea visible from its streets because they run perpendicular to the bay.

According to museologist Daris Castro Malpica, there are various legends surrounding the name that this village received when it was founded on February 28, 1828, but undoubtedly it was because it was identified as a new town or as a village of enterprising people. The bay is a symbol for the people of the city and the most important economic activities of the entire zone are developed around it.

Sea turtle fishing in Nuevitas began when the first people created their settlements in the zone, due to the existence of the resource in this area and the natural conditions of the region that provided turtle habitat and allowed the development of the first economic activities, agriculture and fishing. But the city known today as Nuevitas would not be founded until 1828.



View of a group of fishermen from Nuevitas at work. Photo: Ariel Urquiola

The village of Cocodrilo, which is the southernmost community of Cuba, is situated in the southwest part of Isla de la Juventud; it is one of the zones where sea turtle fishing came to stay approximately 119 years ago. One hundred years ago in May 1904, the village was founded by turtle fishermen from the Cayman Islands who settled here, and the descendents of the founding families are still called *caimaneros* (Cayman Islanders) today.

According to data obtained in an interview with professor Wilber Vázquez Maceo, historian of the community, the first settler of this zone was fisherman William Jackson, who lived on Playa Simeón very near the community. Later, other members of the Jackson family arrived and settled on Playa Caleta Grande, known as Playa la Americana, very near where the Fishing Cooperative Cristóbal Labra is found today.

The community was baptized Jacksonville by the families that founded it and lived by turtle fishing, agriculture for self-sustenance and wood cutting. The turtles and the wood were exchanged for other products with people from settlements that were established further north on the island.

Little by little the place was populated, until it reached the 5 km area that it occupies today. It consists of the site where the houses are located in a 3 km strip along the coast on a central street parallel to the sea with houses on both sides and a width of about 100 meters. At one end is the site known as “the 10 little houses” and at the other end is the house of the fisherman Fico. The community includes the Fishing Cooperative Cristóbal Labra and the MIP turtle nursery, which occupy an area of approximately 2 km.

### **Cultural and social value of turtle fishing in these communities**

To characterize what the sea turtle represents as a valuable economic, social and cultural resource in these two regions, we must point out that values are properties of material objects and the phenomenon of social awareness gives them meaning for society and mankind. Social awareness or ideas constitute values through which humans express their interests.

There are material, economic, ethical, legal, political, cultural and historic values. The representations of value reflect a determined reality or constitute knowledge about something, and they also orient human activity, which is to say they have a practical nature.

To define the social and cultural value of a natural resource, in this case sea turtles, it is known that each nation, each region, each village, has its own beliefs, traditions, customs and superstitions about animals, plants, objects, colors, and specific events that have occurred. These take on a transcendental meaning in the popular imagination that is transmitted from generation to generation, independently of changes that occur with the passage of time. Credit has even been given to certain facts supposedly related to some of the powers attributed to these elements that feed ideas that border on the unknowable and give



A turtle after capture, Nuevitás. Photo: Ariel Urquiola.

rise to amulets, fetishes, charms, talismans and other objects for good luck or for the protection of the person or of nature itself.

On the other hand, the cultural value of a natural resource can express not only the spiritual meaning, but also the material, economic, or social meanings, because culture, in its broadest definition, includes all the material and spiritual creation of humankind over the course of history.

Therefore, the social and cultural value of sea turtles can be verified from the meaning assigned by the diverse historic uses that have been made of them, and this will also include the contributions made to the community through economic, social and cultural impacts.

**Methodology:** The methods used during the investigation were: consultation of documents and results of research related to the topic; a survey of representative fishers from the two populations, encompassing almost all the fishermen hired by the companies and a good representation of those who fish illegally, for the objective of obtaining a good socio-demographic characterization and data about food consumption habits and preferences; interviews with key informants from both communities to obtain information about operations in the localities with special regard to sea turtle fishing; scientific observation for the acquisition of direct information about the characteristics of each place during field work that took a total of 10 days (five in Nuevitas and 5 in Cocodrilo); and a discussion group used in the community of Cocodrilo with various stakeholders including party and government leaders, and community decision-makers.

## **Results:**

### **Socio-economic characterization of the communities of Cocodrilo and Nuevitas.**

#### **a) Socio-economic characterization of the City of Nuevitas.**

Nuevitas is the city with the most industrial development in Camagüey Province. Basic economic activities include maritime commerce, because the bay has magnificent protection and depth and capacity for port tasks; a thermoelectric plant that supplies electricity to most of the central zone of the nation; a nitrogenous fertilizer and herbicide industry; a cement plant; a wire and electrode factory; and fisheries, because the coasts and the cays that surround the bay have a very rich flora and fauna with autochthonous species and varieties that make it an optimal zone for fishing, due to its proximity to the Canal Viejo de Bahamas.

In recent years tourism has become one of the most important economic activities, because the natural beauty of the coasts and cays that surround the city is a strong tourism attraction with undisputable economic potential.

It is important to note that this entire region constitutes an important ecological reserve. The Cinturón Híbrido de Holguín is found in the Bay of Nuevas Grandes, where alterations occur in the color, size and behavior of the area's birds; roseate spoonbills, cormorants and flamingos nest there, and manatees, which are nearly extinct in Cuba, also occur.

The bay of Nuevitas has three islands known as the *Ballenatos*, because when seen from the high part of the city they look small whales (*ballena* means whale in Spanish).

The Cuban Iguana (*Cyclura nubila nubile*) and the Cuban Coast Anole (*Anolis jubar ballaenarum*) are strictly endemic varieties that live on the Ballenatos.

The Ballenatos have been declared a protected area in the wildlife refuge category, for the values that they possess, among them, a local sub-species called *Anolis jubar ballaenarum*, a strange, showy lizard with a crest. Their populations of iguanas, insects and the migratory waterbirds that nest there are also outstanding.



View of the Ballenatos in the Bay of Nuevitas. Photo: Orlando Durán.

They are considered to be a highly fragile ecological zone with rich biodiversity, due to geological, wind and coastal processes that affect them. These small islands are the pride of the people of Nuevitas because of their natural beauty. They are known as Ballenato Grande, Ballenato Chiquito and Ballenato del Medio. The latter has the highest elevation at 54 meters above sea level.

The coastal strand of Sabinal has unique stratification, with various typical plants and it houses the westernmost population of Cuban land snails (*Polymita picta cubensis*). There are abundant animals such as hutias (large rodents), freshwater turtles (*Trachemys* spp.), deer, wild pigs and cows, and birds.

Cayo Guajaba has crocodiles and queen conchs, as well as the largest number of free-living stump-tailed macaques *Macaca arctoides* in Latin America, with new, conditioned responses.

On Cayo Romano – the second largest cay of the Cuban archipelago and the only territory of Sabana-Camagüey where the Royal Palm grows – lives a special breed of wild horses, descended from a herd that arrived around 1700 and which, in the struggle to survive, has endured changes in its diet, phenotype and genotype.

Black and Indian antelopes and a population of Cuban Sandhill Cranes (*Grus canadensis nesiotis*), a sub-species of the North American species, are also found in this area.

The Sabinal peninsula is the northern part of Nuevitas that is separated from the city by estuaries, bays and coves, and it owes its name to the “*sabina*”, a species of juniper<sup>3</sup> that grows there. It is an irregularly-shaped peninsula comprised of marshes and large lagoons

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<sup>3</sup> Note by the translator: Probably *Juniperus lucayana*, the West Indies Juniper.

that are connected to one another and with the sea by long estuaries. It is an area rich in timber trees such as the *ateje*<sup>4</sup>, the *llana*, the *sabina* or juniper (used especially for furniture-making due to its aroma, rosy color and insect resistance); the *sabicú*<sup>5</sup>, the *roble*, the *ácano*<sup>6</sup>, the *yaya*, the *jiquí*, the *brasilete* (*Caesalpinia* sp.), the *cedro* or Spanish cedar, and the *guayacán* or lignum vitae (*Guaiacum officinale*).

Farming activity includes cultivation of sugar cane, tobacco, corn, plantains, melons, squash, cassava, and forage for cattle.

Polimita land snails, hutias, painted turtles, deer, wild pigs and cows, songbirds commonly known as *negritos* (Cuban Bullfinches) and *tocororos* (Cuban Trogons), the national bird of Cuba live in this zone.

Socio-demographic characteristics of the fishermen surveyed in the city of Nuevitas according to data collected in the survey (see annex).

No.	Age	Sex	Originally from	Years in Nuevitas	Schooling completed	Profession	Ailments
1	45	M	Nuevitas	20	9 <sup>th</sup> year	Cooperative fisherman	Obesity, gout
2	61	F	Nuevitas	61	6 <sup>th</sup> year	Housewife, wife of turtle fisherman	Angina, hypertension
3	45	F	Nuevitas	45	9 <sup>th</sup> year	Housewife, wife of turtle fisherman	Obesity
4	56	M	Nuevitas	56	6 <sup>th</sup> year	Cooperative fisherman	None
5	50	M	Nuevitas	50	9 <sup>th</sup> year	Vessel owner	Obesity
6	68	M	Nuevitas	68	6 <sup>th</sup> year	Cooperative fisherman	None
7	52	M	Nuevitas	52	7 <sup>th</sup> year	Cooperative fisherman	Obesity
8	37	M	Nuevitas	37	9 <sup>th</sup> year	Cooperative fisherman	None
9	35	M	Nuevitas	35	7 <sup>th</sup> year	Cooperative fisherman	None
10	37	M	Nuevitas	37	Semi-technical	Cooperative fisherman	None
11	34	M	Nuevitas	34	12 <sup>th</sup> year	Cooperative cook	None
12	23	F	Nuevitas	23	12 <sup>th</sup> year	Housewife, daughter of	Obesity

<sup>4</sup> Note by the translator: Possibly *Cordia colocca*.

<sup>5</sup> Note by the translator: Possibly *Lysiloma latisiliqua*.

<sup>6</sup> Note by the translator: Possibly *Manilkara albescens*.

						<i>turtle fisherman</i>	
13	26	M	Nuevitas	26	9 <sup>th</sup> year	<i>Compressor operator at diving center, son of turtle fisherman, occasionally fishes turtles</i>	None
14	48	M	Holguín	25	9 <sup>th</sup> year	Machinist	None
15	44	M	Nuevitas	44	7 <sup>th</sup> year	Cooperative fisherman	None
16	25	M	Nuevitas	25	Semi-technical	Machinist	None
17	30	M	Nuevitas	30	8 <sup>th</sup> year	Cooperative fisherman	None
18	37	M	Nuevitas	37	12 <sup>th</sup> year	Vessel owner	None
19	60	M	Nuevitas	60	6 <sup>th</sup> year	<i>Cooperative fisherman</i>	None
20	44	M	Nuevitas	44	8 <sup>th</sup> year	<i>Cooperative fisherman</i>	None
21	28	M	Nuevitas	28	9 <sup>th</sup> year	Vessel owner	None
22	50	M	Nuevitas	50	3 <sup>rd</sup> year	<i>Cooperative fisherman</i>	None
23	52	M	Nuevitas	52	9 <sup>th</sup> year	Vessel owner	Bone disease
24	40	M	Nuevitas	40	6 <sup>th</sup> year	Cooperative fisherman	None

Population of fishermen of Nuevitas: 110, turtle fishermen: 8; 15 active vessels with 2 dedicated to turtle fishing.

Total people surveyed: 24 (20 fishermen that are workers in the cooperative and include the 8 who fish turtles and 4 family members of the turtle fishermen directly related with this activity).

The ages of the people surveyed ranged from 23 to 68 years, the most frequent ages were 37, 44, 45, 50 and 52 years, and the average age was 43 years.

These calculations show that the population that lives from fishing in the region studies represents various age groups, although there is less representation of the young population under 30 years of age.

Most of those surveyed (85%) were working men (n=21) and three women who are connected to fishing tasks.

Almost everyone in the sample was born in this city or in sites very near it, because they all came from the municipality of Nuevitas in Camagüey Province, with the exception of one fisherman who came from the municipality of Banes in Holguín Province and had lived in the zone for 25 years.

In the sample, 17 residents (70.8%) have lived in the same place in the city of Nuevitas since birth. Four residents (16.7%) have lived in different villages near this city since birth. Two residents (8.3%) have lived in different places that are still in the municipality of Nuevitas. And one resident (4.2 %) came from the nearby province of Holguín, but had been living in the city of Nuevitas for 25 years.

It should be pointed out that three fishermen go for long periods of time to habitual fishing spots where they have cabins, at Punta de Ganado, Santa Lucía (one fisherman) and at Punta de Mangle, Cayo Romano (two fishermen) in northern Camagüey Province. There used to be more fishing spots in prior years but they were closed by the Ministry of Industrial Fisheries.

This population is characterized by having different levels of schooling, closely related to the activity that each worker carries out.

The level of schooling obtained is distributed as follows:

Incomplete primary schooling: 1 interviewee (4.16% of the sample).

Completed primary schooling: 5 interviewees (20.83% of the sample).

Completed basic secondary schooling: 13 interviewees (54.17% of the sample).

Technical-professional training: 2 interviewees (8.33% of the sample).

Completed pre-university training: 3 interviewees (12.5% of the sample).

Of those interviewed, 25% did not go beyond primary education, and two cases were educated as adults; 50% completed basic secondary studies, and included four cases who received education for workers; and only five (20.83%) of the interviewees continued their studies to the technical-professional or pre-university level. At present none of the workers and none of the three women study.

Of the 24 interviewees, 20 have been hired by the fisheries industry and of these, 10 are contracted specifically as fishermen; the other 10 work as vessel and one fishery extractions technician, but all of them



View of one of the fishing vessels in the City of Nuevitas. Photo: Ariel Urquiola.



Interview conducted with the wife of a fisherman at Punta de Mangle, Cayo Romano. Photo: Olimpia Carrillo

interviewees is the compressor operator at the diving center who comes from a family with a strong fishing tradition and he fishes frequently.

The three women selected for the sample are housewives, but two support fishing by their husbands and one supports her father (the youngest of all the interviewees, a young woman who finished pre-university schooling and has not found employment).

The men carry out a large variety of domestic tasks, notably food preparation, searching for foods, mopping the floor, house cleaning, and laundering clothes, in that order of priority. They carry out tasks such as taking care of children and the elderly less often, as these fall to other members of the family, especially the women.

This indicator is essential for knowing how the fishermen take responsibility for the capture of fish and turtles, and also how they become involved in the search for and preparation of foods, contributing a food culture to the home that has been inherited from their families of origin and from the food consumption traditions of different places of the zone.

All the workers carry out some kind of activity in the home, and the distribution of tasks is as follows:

22 of the interviewees (3 women and 19 men) participate in the search for and preparation of foods in the home.

21 of the interviewees (3 women and 18 men) participate in mopping the floor.

19 of the interviewees (3 women and 16 men) clean house.

15 of the interviewees (3 women and 12 men) participate in laundering clothes.

13 of the interviewees (3 women and 10 men) participate in taking care of children and attending to the elderly.

The basic diet of these residents concentrates on fish for two fundamental reasons: family preference, and easy access to this source of protein. Only two of those interviewed (8.33%) said that although fish is cooked in their homes, they do not prefer foods from the sea.



Interview conducted with a fisherman in Punta de Mangle, Cayo Romano.  
Photo: Olimpia Carrillo

It should be noted that the population of fishermen of Nuevitas is originally from this place, an aspect that substantially differentiates it from the community of Cocodrilo.

Table 1.<sup>7</sup> Kind of meat consumed preferentially by the fishermen of Nuevitas

Kind of meat	Frequently	Occasionally
Fish	16 (66.6%)	
Turtle	4 (16.6%)	9 (37.5%)
Pork	2	2
Chicken	2	2
Beef		
Shellfish		1

As can be seen in Table 1, 66.6% of the surveyed population eats fish almost every day, and 83% (20 interviewees) frequently eat fish and turtle. The consumption of turtle meat occupied second place, with more than 50% of the interviewees (13 residents) including this meat as a frequent or occasional food in their daily diet. Pork is also consumed frequently as are chicken and eggs. Shellfish and beef are almost never eaten.

The meats are usually combined with rice and beans, according to responses from 22 residents representing 91% of the interviewees. Black beans are consumed more often than red or white beans, and on occasion peas, depending on their presence among basic household staples. Garbanzos and lentils are almost never cooked, the former because they are very expensive and the latter because the people do not have a habit of eating them.

Pastas are almost never eaten. The staple foods that are eaten, in order of frequency, are plantain (always fried), sweet potato, squash, potato (when it is available in the market) and *malanga* (a kind of tuber called dasheen). Vegetables are not frequently eaten except for tomatoes and sometimes cabbage, lettuce and cucumber; the rest (beets, carrots, chard, watercress, spinach and others) are almost never incorporated into the diet. The reasons for this deficit are the lack of vegetables during the fishing season, the absence of some vegetables in the market, and the people are not in the habit of eating them.

Papaya, guayaba and plantain are the fruits that are most frequently incorporated into the diet, while mango, pineapple and mamey are almost never eaten, according to the interviewees.

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<sup>7</sup> There was no question for gathering this information directly. This title was used because these data were taken from the table about food consumption for lunch and dinner which stated the kind of meat, the frequency and the approximate quantity that the fishermen of Nuevitas consume. There is a question that asks what kind of meat they prefer, but this is not the case.

Fruit beverages, ice creams and milkshakes are rarely consumed and wines and liquors never accompany meals.

There is no concern about having a balanced diet or variety according to availability, without even considering the difficulties encountered in acquiring some vegetables, staple foods, and fruits in general.

The basic means of acquiring protein sources according to 17 (70.08%) of the 24 interviewees are products from the sea including fish, turtles, shellfish, and others; and eight of the interviewees (33.3%) raise animals to supply the family with protein.

In characterizing the daily breakfast diet, the consumption of infusions is common, such as coffee or tea from the leaves of plants obtained at Cayo Confite in northern Camagüey Province. All the interviewees drink coffee and sometimes milk, usually powdered or evaporated milk. Although they like yogurt it is rarely consumed because it is difficult to acquire. A small part of the sample drinks fruit beverages and juices, preferably guayaba and orange.

Beverages are usually accompanied by bread, while crackers are eaten less often and fruits, butter, margarine, marmalades and other sweets are almost never eaten.

Taking vitamin and mineral tablets as supplements is rare; Vitamins C, E and B complex are only consumed as part of a medical treatment.

Table 2. Reasons why the fishermen of Nuevitas feel it is important to include sea turtles in their diet.\*

Reason	Number	%
Tradition	14 (4)**	58 (16.6)
Nutritional value	13 (2)	54.1 (8.3)
Taste of the meat	21 (2)	87.5 (8.3)
Ease of preparation		
Ease of acquisition	13 (2)	54.1 (8.3)
Do not consider it important	2	8.3

\*Multiple answers were accepted.

\*\*Data in parentheses indicate that this response was their first option.

As can be seen in the table, the interviewees feel that turtle consumption is important (mainly those from the Punta de Ganado fishing spot), arguing that it is a family tradition, it is a very complete food, and it is chosen for its flavor. They also feel that it is a dish that has many kinds of preparation. Another argument the fishermen use is that it is easy for

them to acquire.

To the question about what kind of meat do they feel could substitute turtle meat, various fishermen and their families answered that they did not think it could be (Table 3); but in the event it had to be substituted, they usually answered with beef, pork and chicken. Many said that this meat cannot be substituted, that it is very nutritive, and it does not damage health.

Table 4. Kind of meat that the fishermen of Nuevitas feel is a possible substitute for sea turtles in their diet. \*

Kind of meat	Number	%
Cannot substitute	7	29.2
Beef	9	37.5
Pork	8	33.3
Chicken	7	29.2
Lamb	2	8.3
Fish	2	8.3
Venison	1	4.2
Any meat	1	4.2
Egg	1	4.2

\*Multiple answers were accepted.

Table 5 shows results from the survey about the food habits of the fishermen from Nuevitas. Analysis of the results shows that they mainly eat fish, pork and chicken and they also eat sea turtle meat frequently.

Table 6. Kind of meat included in lunch and dinner of the fishermen of Nuevitas, organized according to frequency of ingestion.

Kind of meat	Every day		Frequently*		Occasionally**		Never		Other responses	
	Number	%	Number	%	Number	%	Number	%	Number	%
Beef					3	12.5	10	41.7	11	45.8
Pork			11	45.8	7	29.2	4	16.7	2	8.3
Lamb					6	25.0	15	62.5	3	12.5
Chicken	1	4.2	13	54.2	9	37.5	1	4.17		
Fish	14	58.3	9	37.5					1	4.17
Shellfish	4	16.7	5	20.8	10	41.7	5	20.0		
Sea products			1	4.17	4	16.7	15	62.5	4	16.7
Turtle	3	12.5	11	45.8	6	25.0	4	16.7		

\*Two or more times per week.

\*\*Once every two weeks.

Multiple uses are made of the turtles; their meat, viscera, fat, eggs and skin are very valuable.

The ways of preparing turtle meat are varied and have much to do with family traditions of this region. The meat is eaten fried, breaded, in sauce, salted, and grilled. The viscera are boiled and eaten with condiments. The skin is fried for consumption and to obtain the fat, and the eggs are eaten boiled and with sweets.

Almost all (20) of the interviewees in Nuevitas said that turtle meat is not harmful to the health, while the remaining four did not know what kind of impact this meat could have on health.

## b) Cocodrilo

The economic and social development strategy for the territory is based on a search for local alternatives for self-sufficiency, because this place is far from the city of Nueva Gerona, among other reasons, and because of the socio-economic potential of this community from a natural and human resource point of view.

The fundamental economic activities are fishing, farming, and forestry. Fishing includes turtles and a great variety of fin fish and shellfish that are highly prized for the flavor of their meats and nutritional value, such as snapper, *cherna*, *cupera*<sup>8</sup>, *pez perro*<sup>9</sup>, *ronco*<sup>10</sup>, *rubia*<sup>11</sup>, among others. It is organized through the state fishing cooperative. Farming is carried out through the Unión Básica de Producción Cooperativa (UBPC). La Sigüanea is a farm and ranch where grains, staple foods, vegetables and pork are produced, and in the short term it will start breeding chickens and cattle and produce chicken and fresh milk for consumption in the territory. It will also have a small *organipónico* or organic hydroponic garden (intensive container gardening) located behind the school. Forestry activities coordinated by the forestry company used to be located very near the community and had an important economic affect on the area, but several years ago they were moved to Cayo Piedra approximately 10 kilometers from the village. These economic activities employ most of the economically active population, which works mainly in the community.



view of sea turtle shells on one of the beaches of the cays in northern Camaguey Province.

<sup>8</sup> Note from translator: Possibly “cupera snapper”

<sup>9</sup> Note from translator: Possibly “hogfish” (*Lachnolaimus maximus*)

<sup>10</sup> Note from translator: Possibly “Sailor’s grunt” (*Haemulon parra*)

<sup>11</sup> Note from translator: Possibly ‘lane snapper’ (*Lutjanus synagris*)

Other activities that provide employment for residents are traditional occupations in the service realm, such as the electric plant that supplies energy to the economic sector, homes, and public lighting for the community; the warehouse; the restaurant; the cafeteria; the family medical center where the doctor and two nurses work; the Máximo Caintet primary school where 42 children from 5 to 13 years of age study; and the Los Marineritos Círculo Infantil with 11 children enrolled. Other jobs are in construction and maintenance of roads, green areas and other works.

It was possible to verify that legal fishing in this zone is only carried out through the state cooperative, which is directed and controlled by the Ministry of Fisheries. The cooperative has five vessels and only two are authorized to capture turtles. It has a total of 11 fishermen, six who capture fin fish and five who capture turtles.

A maximum volume of 25 tons of turtle and 40 tons of fin fish can be captured annually. In 2003, only 17 tons of turtle were captured. According to calculations from the fishermen, one ton of green turtle equals approximately 240 kg of meat; one ton of hawksbill equals approximately 240 kg of meat; whereas one ton of loggerhead equals approximately 170 kg of meat.

The cooperative has established a monthly distribution of 5 to 10 kg of turtle meat to the Círculo Infantil and from 35 to 40 kg for the restaurant. The restaurant is run for the people of Cocodrilo and visitors to the village. Turtle meat is not always available, so it offers other dishes that cost the same as those made with turtle meat, at modest prices paid with national currency. Income from this is for the gastronomic services company. On a monthly basis the fishermen of the cooperative receive 8 kg of fin fish and sometimes turtle meat, and 45 kg of fin fish are sent to the school.

All the fishermen agree that turtles are fished traditionally, but they do not report their earnings. Very little is paid for capturing turtles so they prefer to capture other, more valuable species.

According to opinions of some of the interviewees, “Historically, 250 to 300 hawksbill, 50 to 70 loggerheads and 70 to 90 green turtles were fished annually, using 17 to 20 nets of the best quality.” “Today the fishing is not what it was; there were captures of 60 to 100 tons, but interest in capturing turtles has diminished and only 8 or 9 nets are used now.” “All the meat from fishing should be distributed here.” “Submarine fishing has impacted the turtle and other species a lot; there are around 17 or 18 illegal fishermen and there are no inspectors to control these activities.” “The turtles should not be fished.” “The fishermen have always been in agreement with established closed season mechanisms and their lifting during the reproductive season.”

Fishing gear is hand-made in the community. The mesh of the nets does not have the same quality as those that were imported. There are few nets which mean fewer captures. The vessels used have been repaired many times by the fishermen who say that on occasion they themselves have had to turn worn parts on a lathe. The resource has not diminished in the area; the capture is reduced but this is because the fishing effort is lower.

## **Socio-cultural characterization of the community of Cocodrilo.**

The community has a population of 327 inhabitants in 82 families.

The composition of age groups is as follows:

40 children from 0 to 6 years old.

83 children from 7 to 13 years old.

185 people from 14 to 64 years old

19 elderly people older than 65 years.

85-90 women older than 14 years.

Currently there are 12 men of working age who are unemployed and very few women have been incorporated into job activity, so government leaders from the party and the FMC in the territory are seeking solutions for employing women. There used to be a handicraft workshop in the community but it closed because it was not profitable.

In this community there is a monthly plan for supplying foods and personal cleanliness products that are offered to the people at prices higher than those of the basic household staples.

Most of the difficulties encountered are due to inadequacies in the economic and social infrastructure for the community, despite the transformations and progress made in production and service spheres, and in the cultural and educational sphere at the local level. Housing construction, service installations, access roads and public transport are deficient. Sporting, cultural and recreational installations are inadequate; there are no playgrounds or parks for the children who seldom leave the community boundaries, given that the main cities of Santa Fé and Nueva Gerona are far away.

The doctor used interviews with families and data from the family medical center to characterize the health status of the community as good. Of a population of 320 people, 27 have hypertension (high blood pressure), two have diabetes *mellitus*, five have cardiopathy, 10 are obese, five children are underweight, one is overweight, two have leprosy<sup>12</sup> and three are pregnant. One of the most common ailments is bronchial asthma; however, the number of asthmatics is not reported in the document on health status. Pregnant women are attended in the medical center until they reach 38 weeks of gestation, then they are confined at the maternal home in Gerona. The ailments that occur most frequently in children are parasites and skin diseases.

The oldest families of the community still remember and conserve some traits of the Cayman cultural tradition in typical festivals with violin playing and music, culinary arts and wine on the table, but these traditions have given way to the establishment of other habits and lifestyles related to the strong migration of the population from other parts of Cuba, mainly the eastern regions.

There are many difficulties for carrying out recreational, sport and cultural activities, because there are no socio-cultural programs organized by specialists trained for this

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<sup>12</sup> Note from the translator: uncertain whether “Lepra” = leprosy or “lepra de monte” = leishmaniasis.

purpose, and there is no infrastructure for these activities. There is only a radio station, a small library with few materials, and an informal group that sings Cuban *repentista* (improvised verse) folk songs. Socio-cultural activities are mainly promoted by the school through contests, children’s festivals and excursions, but these are carried out infrequently due to a lack of resources and means of transportation. There are no groups for those who love dance, fine arts, theatre and music.

Cocodrilo has a tradition of celebrating natural events every May, through popular “nature lovers” festivals, where the people celebrate the arrival of spring, the beginning of the sea turtle nesting season, and the runs of snappers and other marine species.

The School runs a Circle of Interest about sea turtle conservation where many activities are carried out to become aware of, preserve and promote the development of these species.

One manifestation of the social and cultural value assigned to this resource is the existence of a turtle nursery, the only one in the nation, which is an experimentation and exhibit center that is a symbol for the community; however, this center needs personnel with more training and a larger budget for the maintenance and feeding of the species so that it can fulfill the objectives for which it was created.

The turtle has economic value for these communities, because besides the consumption of the meat for food, sub-products are obtained from hawksbill shells. These shells are sold to particular artisans who make various tortoiseshell objects for personal use and decoration. The skins and the shells are used to make bracelets, rings, belts, hatbands and hair clasps. The skin has been used to make shoes, and dried shells and heads are displayed in the homes. These are still made to some extent and they produce income for the fishermen or intermediaries who sell the raw material illegally to artisans.

The green turtle plastron is used as glue for wood and the claws are used to lengthen the spurs on fighting cocks. There is an old belief about the aphrodisiac power of dried hawksbill penis and some people still use it today.

Report on food consumption habits and preferences in Cocodrilo from an analysis of survey data (see annex). The turtle fishermen (4) are indicated in italics. Only one could not be surveyed because he was not in the community.

No.	Age	Sex	Originally from	Years in Cocodrilo	Schooling completed	Profession	Ailments
1	26	M	Cocodrilo	26	8 <sup>th</sup> year	Turtle nurseryman	None
2	40	M	Tunas	35	6 <sup>th</sup> year	Turtle nurseryman	Sacro-lumbalgia
3	36	<i>M</i>	<i>Cocodrilo</i>	36	<i>7<sup>th</sup> year</i>	Cooperative fisherman	<i>Gallbladder, sacro-lumbalgia</i>

4	44	M	Tunas	20	12 <sup>th</sup> year	Cooperative fisherman	None
5	49	M	Gerona	41	9 <sup>th</sup> year	Cooperative fisherman	Obesity, rheumatoid arthritis
6	51	M	Cocodrilo	51	5 <sup>th</sup> year	Cooperative fisherman	Gastric ulcers
7	28	M	Santiago de Cuba	27	9 <sup>th</sup> year	Illegal fisherman	Dermatitis
8	25	M	Cocodrilo	25	9 <sup>th</sup> year	Illegal fisherman	None
9	72	M	Pinar del Río	19	6 <sup>th</sup> year	Cooperative fisherman, retired	None
10	62	M	Cocodrilo	62	6 <sup>th</sup> year	Cooperative fisherman, retired	Cardiopathy
11	45	M	Tunas	35	1 <sup>st</sup> year	Illegal fisherman	None
12	59	M	Pinar del Río	15	2 <sup>nd</sup> year	Cooperative fisherman	None
13	39	M	Gerona	18	9 <sup>th</sup> year	Cooperative fisherman	Obesity
14	63	M	Cocodrilo	63	6 <sup>th</sup> year	Cooperative fisherman, retired	Cardiopathy, generalized arthritis
15	56	M	Ciego de Avila	35	4 <sup>th</sup> year	Illegal fisherman	Bronchial asthma
16	42	M	Tunas	38	9 <sup>th</sup> year	Cooperative fisherman	None
17	46	M	Pinar del Río	37	9 <sup>th</sup> year	Illegal fisherman	None
18	39	M	Cocodrilo	39	9 <sup>th</sup> year	Cooperative fisherman	Rheumatoid arthritis
19	24	M	Granma	4	12 <sup>th</sup> year	Illegal fisherman	None
20	33	M	Cocodrilo	33	12 <sup>th</sup> year	Illegal fisherman	None
21	33	M	Cocodrilo	33	6 <sup>th</sup> year	Illegal fisherman	None
22	36	M	Santa Fe	5	8 <sup>th</sup> year	Illegal fisherman	None
23	27	M	Pinar del Río	21	12 <sup>th</sup> year	Illegal fisherman	None

24	35	M	Holguín	8	12 <sup>th</sup> year	Illegal fisherman	Rheumatic fever
25	28	M	Tunas	25	9 <sup>th</sup> year	Illegal fisherman	None

A total of 25 fishermen were interviewed, and the sample was distributed as follows: Eight of the nine fishermen who now work in the Cristóbal Labra cooperative company were interviewed, representing 88.8% of the total. This included the four fishermen who capture turtles. Two fishermen who now work at the turtle nursery and three fishermen retired from the cooperative company were also surveyed.

Twelve illegal fishermen were surveyed:

- 2 who once worked for the cooperative but now work on the roads and in the electric plant.
- 3 are road workers.
- 1 ices fish or the cooperative.
- 1 manages supply stocks in the cooperative.
- 1 works in the gastronomy company (restaurant).
- 1 works in the electric plant.
- 1 works in the forestry company as a woodcutter.
- 1 works in the National Flora and Fauna company as a forest ranger.
- 1 is unemployed.

All those studied were men, because in Cocodrilo legal fishing occurs only at spots where the cooperative works and wives and daughters are not involved. The same thing happens in Nuevitas, with fishing spots where the fishermen live or move to with their families during the fishing season.

The ages 28, 33, and 36 years were repeated three times each.

The average age was 41.5 years; the oldest person was a 72 year-old retired fisherman who was a vessel owner and the youngest was a 25 year-old who works on the roads and submarine fishing. These data show that the population of fishermen in Cocodrilo is relatively young, and those who fish illegally are even younger.

A large part of the young male population carries out fishing illegally. They do this for two fundamental reasons: to feeding the family and to sale. The exact number of illegal fishermen is unknown, and not all live in Cocodrilo. Of the 12 interviewees, only one is unemployed; the rest perform other jobs in the locality. Nevertheless, according to the criteria of the interviewees, some unemployed young men work in this illicit activity. They capture fin fish, shellfish and turtles.

Of all those surveyed, only nine (36%) were born in the community of Cocodrilo. This shows that there has been strong migration to this community, mainly from the eastern provinces (8). This has been a trend in the special municipality of Isla de la Juventud where this village is located. Four emigrated from the nearest province, Pinar del Río, and only three were born in other parts of the special municipality. Two emigrated 4, 5 and 8 years

ago; the rest arrived in the community more than 15 years ago, all of them after the triumph of the revolution, mainly after the 1970s.

With respect to the level of schooling the data showed that four fishermen (16%), two of them from the cooperative, did not finish primary schooling. Another five (20% of the total number of fishermen surveyed) finished primary school: the three who are retired from the cooperative, one who works in the turtle nursery, and one illegal fisherman.

A third group made up of three interviewees did not complete basic secondary schooling, representing 12% of the total. They are the other worker at the nursery, one fisherman from the cooperative, and one who fishes illegally.

Secondary education was completed by eight fishermen (32%): four from the cooperative, three who fish illegally, and one who fishes illegally but used to work in the cooperative. The remaining five (20%) finished pre-university education: one fisherman from the cooperative, 3 illegal fishermen and one who fishes illegally but used to work in the cooperative.

Fourteen fishermen (56%) do not suffer from any ailment, while the rest have one or more ailments and receive medical attention. There are two fishermen of 39 and 49 years of age who are obese, and one of them has rheumatoid arthritis. Two others have cardiovascular ailments; both are fishermen retired from the cooperative and one also suffers from generalized arthritis. Another two suffer from sacrolumbalgia and one also is undergoing treatment of the gallbladder.

There are two who also have rheumatic arthritis, one fisherman suffers from bronchial asthma, one from a skin disease and another has gastric ulcers.

They were asked about the activities they carry out on a daily basis in the home with the objective of knowing to what degree they are involved in different activities that have been traditionally undertaken by women and how these are related to the search for and preparation of foods. It was possible to verify that all of them participate in the search for foods and all except one also prepare those foods.

It should be emphasized that 15 of them (60% of the total) participate in cleaning the home, 11 (44%) wash clothes and mop the floor, eight (32%) care for children at home, while only four (16%) iron clothes and one (4%) cares for one or more elderly people.

Data from the surveys regarding food consumption habits and preferences are given below.

Table 1. Kind of meat preferred by the fishermen of Cocodrilo, grouped according to stage of life when they arrived in Isla de Pinos.\*

Kind of meat	Born on Isla de Pinos (n = 12)		Came to Isla de Pinos as children (n = 7)		Arrived as adults (n= 6)		Total interviewees (n = 25)	
	Number	%	Number	%	Number	%	Number	%
Turtle	6	50	0	-	4	66.6	10	40.0

Beef	2	16.6	2	28.5	1	16.7	5	20.0
Pork	2	16.6	4	57.1	2	33.3	8	32.0
Chicken	3	25	1	14.2	2	33.3	6	24.0
Venison					1	16.7	1	4.0
Lamb					1	16.7	1	4.0

\*More than one response was accepted.

As can be seen in Table 1, the kind of meat preferred by the fishermen of Cocodrilo varied according to stage of life when they began to live in Isla de Pinos. Those who were born on the Island as well as those who arrived as adults preferred turtle meat while those who came as children from other provinces preferred pork, among those who have access to it.

Table 2. Reasons why the fishermen of Cocodrilo believe it important to include sea turtles in their diet.\*

\*First priority responses were selected.

Group	Born on Isla de Pinos (n=12)		Came to Isla de Pinos as children (n=7)		Came as adults (n=6)		Total (n=25)	
	Number	%	Number	%	Number	%	Number	%
Tradition	1	8.3			1	16.6	2	8.0
Nutritional value	2	16.7	3	42.8	3	50	8	32.0
Taste of the meat	6	50	1	14.3	1	16.6	8	32.0
Ease of preparation								
Ease of acquisition								
Multiple responses	3	25	3	42.8	1	16.6	7	28.0

The preference for sea turtle meat is based mainly on the flavor of the meat and on the nutritional value the fishermen attribute to it. Tradition was not as significant as expected according to the hypothesis of this work, although it did appear in the multiple responses as an important element. Only two of the interviewed fishermen said they knew that turtle meat is high in cholesterol.

Table 3. Kind of turtle meat preferred by the fishermen of Cocodrilo

Kind of turtle	1st option		2nd option		3rd option	
	number	%	number	%	Number	%
Hawksbill	3	12	5	20	1	4
Green	21	84				
Loggerhead	2	8	2	8	2	8

The preferred turtle meat is that of green turtle, and many fishermen said they do not eat hawksbill or loggerhead.

Table 4. Kind of meat that the fishermen of Cocodrilo believe can be a possible substitute for sea turtles in their diet.\*

Group	Born on Isla de Pinos (n=12)		Came to Isla de Pinos as children (n=7)		Came as adults (n=6)	
	number	%	number	%	number	%
Beef	5	41.6	3	42.8	5	83.3
Pork	3	25	2	28.5	1	16.6
Chicken	4	33.3	2	28.5	3	59
Horse	2	16.6				
Venison	1	8.3	2	28.5	2	33.3
Fish					1	16.6

\*More than one response was accepted.

	Total (n=25)	
	Number	%
Beef	13	52
Pork	6	24
Chicken	9	36
Horsemeat	2	8
Venison	5	20
Fish	1	4

Table 4 presents results for the question regarding the meat the fishermen believe can substitute turtle meat. Most of the fishermen answered beef, although the fishermen who arrived at Isla de la Juventud as adults also saw chicken as an alternative.

The results of the survey on food consumption habits at breakfast, lunch and dinner are shown in Tables 5, 6 and 7. Most of the fishermen eat breakfast, although three said they do not eat anything and just drink coffee. Four of them eat large breakfasts. The basic components are milk, bread and coffee, as shown in Table 5.

Table 5. Breakfast components for the fishermen of Cocodrilo, organized by frequency of ingestion.

Component	Every day		Frequently*		Occasionally**		Never		Other responses	
	number	%	number	%	number	%	number	%	number	%
Milk	8	32			4	16	13	62		
Yogurt					4	16	18	72	3	12

Coffee	13	52			3	12	8	32	1	4
Juices	1	4	6	24	5	20	11	44	2	8
Bread	20	60	2	8	3	12				
Fresh fruit			3	12	4	16	17	68	1	4

\* Two or more times per week.

\*\* Once every two weeks.

Table 6 shows the kinds of meat that the fishermen of Cocodrilo include in lunch and dinner. The selection is based mainly on the availability of the product. Pork is the most common meat in the diet, along with fish and chicken. However, 20 (80%) of those surveyed said they eat turtle meat at least once every two weeks; seven of them eat it two or more times per week.

Table 6. Kinds of meat included in lunch and dinner of the fishermen of Cocodrilo, organized by frequency of ingestion.

Kind of meat	Every day		Frequently*		Occasionally**		Never		Other responses	
	number	%	Number	%	number	%	number	%	number	%
Beef					2	8	17	68	6	24
Pork	1	4	22	88					2	8
Lamb							24	96	1	4
Chicken			15	60	8	32	1	4	1	4
Fish	6	24	10	40	6	24			3	12
Shellfish			2	8	12	48	6	24	5	20
Sea products				8		44		32	4	
Turtle			2	8	11	44	8	32	4	5
			7	28	13	52	2	8	3	

\*Two or more times per week.

\*\*Once every two weeks.

Table 7. Components of lunch and dinner of the fishermen of Cocodrilo, organized by frequency of ingestion.

Components	Every day		Frequently*		Occasionally**		Never		Other responses	
	number	%	number	%	number	%	number	%	number	%
Eggs	1	4	16	64	4	16	3	12	1	4
Beans			24	96					1	4
Rice	24	96			1	4				
Staple foods			19	76	6	24				4
Greens and other vegetables			22	88	2	8			1	
Fruits			9	36	9	36	3	12	3	12

\*Two or more times per week.

\*\* Once every two weeks.

Table 7 presents the other lunch and dinner components for the fishermen. The table shows that rice and beans are important components in the daily diet. In the survey they said that the use of greens and fruits depended on their availability in the market and the season of the year. Although the survey included different kinds of beans, staple foods, greens and other vegetables and fruits, the table only includes the term that shows the greatest frequency independent of the kind of component. For example, for beans, the black bean is the one most frequently ingested, which is shown in the table. In the case of staple foods it was the potato and in the case of vegetables it was cabbage and tomato.

As can be seen, the diet is varied with the greatest ingestion of energy for the day distributed between lunch and dinner. Few ailments of nutritional origin occur, according to the report provided by the medical personnel who attend to this population, which corresponds to the results from the survey on food consumption habits.

### **Conclusions:**

1. Sea turtle fishing in the communities of Nuevitas and Cocodrilo is carried out mainly by tradition because it does not have a significant economic value, but it does possess cultural and social values as shown from the different uses that have been made historically of this resource in the two communities that capture turtles today.
2. In the populations of Nuevitas and Cocodrilo there are nuclei of fishermen who base their diet on sea turtle meat due to family tradition, preferentially the green turtle.
3. The populations of these communities have access to alternative protein sources such that a possible halt to sea turtle fishing would not affect their nutritional situation.
4. Sea turtle fisheries in these communities show a diminishing trend because of a loss of interest and a reduction of effort due to the artisanal methods used for capture.
5. The education of the population about the conservation of natural resources is insufficient, especially for youth and children, since this is one of the elements that can contribute progressively to the protection of this resource.
6. Illegal fishing produces a negative impact on the fishing areas and makes it difficult to control the volumes of turtles captured. There is consumption of sea turtle meat acquired from illegal sale because the control mechanisms on this activity are still inadequate.

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**Annex 1**

**SURVEY ABOUT FOOD CONSUMPTION HABITS.**

**Request for cooperation**

The Centro de Investigaciones Marinas and the Sociology Department of the Universidad de La Habana are carrying out a study about the food habits of different populations of the country. For this objective, we are asking for your collaboration in filling out this survey.

You were selected completely at random and the opinions and criteria that you provide us in this survey will be used for this research only.

The team of investigators appreciates your collaboration.

1. Age \_\_\_\_\_

2. Sex F \_\_\_ M \_\_\_

3. Place of birth \_\_\_\_\_

4. Number of years you have lived in this place \_\_\_\_\_

5. Studies completed:

Primary schooling \_\_\_ Basic secondary \_\_\_ Technical-professional level \_\_\_

Pre-university \_\_\_\_\_ University \_\_\_\_\_

6. Your profession \_\_\_\_\_

7. Ailments you suffer that are related to poor nutrition.

Obesity \_\_\_ cardiovascular \_\_\_ gout \_\_\_ allergies \_\_\_

Arterial hypertension \_\_\_ dermatological \_\_\_ gastro-intestinal \_\_\_ other \_\_\_

8. What kind of activities do you carry out at home? (mark with an X all that apply).

House cleaning \_\_\_ laundering clothes \_\_\_ preparing foods \_\_\_

Ironing clothes \_\_\_ mopping floors \_\_\_ seeking foods \_\_\_

Child care \_\_\_ attending the elderly \_\_\_

9. How do you balance foods in your daily diet, distributed between breakfast, lunch and dinner?

Breakfast: large \_\_\_ medium \_\_\_ small \_\_\_ none \_\_\_

Lunch: large \_\_\_ medium \_\_\_ small \_\_\_ none \_\_\_

Dinner: large \_\_\_ medium \_\_\_ small \_\_\_ none \_\_\_

**BREAKFAST**

Food	Kind	Frequency	Approximate
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			<b>quantity</b>
Milk			Glass or cup
Yogurt			Glass or cup
Coffee			Small cup
Infusions (teas)			Glass or cup
Juices			Glass
Other			
Bread			Unit slice
Crackers			Unit
Sweets			unit
Marmalades			
Fresh fruits			number portions
Butter			portions
Margarine			portions
Oil			portions

**LUNCH AND DINNER.**

<b>Food</b>	<b>Kind</b>	<b>Frequency</b>	<b>Approximate quantity</b>
Carne	Beef		grams
	Pork		grams
	Lamb		grams
	Turtle		grams

Chicken			grams
Fish			grams
Shellfish			grams
Other sea products			grams
Eggs			units
Beans	Black		Plates
	Red		plates
	White		plates
	Other		
Rice			plates
Pastas			plates
Soups and broths			plates
Staple foods	Potato		portions
	Malanga (dasheen)		Portions
	Sweet potato		Portions
	Squash		Portions
	Plantain		Units
	Other		
Greens	Cabbage		Plate
	Lettuce		Plate
	Watercress		plate
	Chard		Plate
	Spinach		Plate
Other vegetables	Tomato		units
	Carrot		Plate

	Beet		Plate
Fruits			Plate
			Plate
Other foods			
Vitamin or mineral supplements			tablet

10. Which meat do you prefer to include in your diet?

11. Why do you think turtle meat is important in your diet?

- a) Because it is a tradition in your family
- b) Because it has great nutritional value
  - Provides vitamins
  - Provides protein
  - Provides minerals
- c) Because you like the flavor of the meat
- d) Because it is easy to prepare
- e) Because it is easier to acquire than other sources of protein.

12. What species of turtle meat do you prefer, in order of preference?

Green turtle \_\_\_\_\_ Loggerhead \_\_\_\_\_ Hawksbill \_\_\_\_\_

13. What other foods do you think could substitute sea turtle meat in your diet?

14. Do you believe that turtle meat has some component that could harm health?

15. Recipes you use to prepare turtle.

16. What other uses are made of the turtle in this community?

17. What are your opinions about this survey?

18. Is there anything you would like to add that might be of interest to this work?

## **Annex 2**

### **Interview script**

Director of the Cristóbal Labra Fishing Cooperative, Mirta Hernández.  
Lic. Ana María Rodríguez, specialist from the Centro de Investigaciones Pesqueras del Establecimiento Nuevimar.

1. How many fishermen work in the cooperative?
2. How many vessels does the cooperative have, and how many are used for turtle fishing?
3. Historically, what have been the fishing volumes of the cooperative?
4. What is your opinion about the context of current turtle fishing by the cooperative?
5. How is turtle meat distributed in the community?
6. What uses have been made of turtles in this community historically?
7. What is your opinion about the illegal capture of sea turtles and about protection measures to preserve this resource?

### **Annex 3.**

Interview script for the family physician Dr. Jorge Luis Gómez.

1. What population do you attend in this medical center?
2. What is the health status of this population?
3. What are the most common diseases related to poor nutrition that you see in your patients?
4. What kinds of diseases predominate in different age groups in the community?
5. What kind of medical attention is given to children, pregnant women, and the elderly?

## **Annex 4**

Interview script for the Director of the Círculo Infantil “Los Marineritos” and the “Máximo Cainet” primary school  
Lic. Yaima Tejeda López.

1. How many children are enrolled in the Círculo Infantil and in the School, and how many are in each grade?
2. What is the daily diet that is offered to children in the Círculo Infantil and the School?
3. What kinds of meat and what quantities are assigned to the Círculo Infantil and the School each month?
4. What is the status of health and hygiene of the children of the community?
5. As president of the local women’s organization, how do you see the participation of men and women in local economic activities?
6. What environmental education activities are carried out in the School?
7. What uses have people of this community made of sea turtles historically?
8. How would you characterize the socio-cultural profile of this locality?

## **Annex 5**

### Discussion group

#### Participants:

1. Manuel Jerez Rodríguez, Delegate from Poder Popular in the locality of Cocodrilo.
2. Alexis Meneses Parra, fisherman & former director of the Cristóbal Labra Cooperative.
3. Wilber Vázquez Maceo, Secretary of the PCC nucleus of the community.
4. Jorge Rodríguez Cruz, Coordinator of the CDR in the zone of Cocodrilo.
5. Mirta Hernández Cruz, Administrator of the Cristóbal Labra Cooperative.

- What are your opinions about the number of various sea turtle species that have inhabited the seas of this zone? Has there been a reduction in the resource?
- What has turtle meat consumption been like in this community, over the years?

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