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# PRESENT-DAY IMPACTS OF HISTORIC FISHING IN THE CARIBBEAN NETHERLANDS

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The importance of assessing historic baselines  
regarding marine resource exploitation



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# SUMMARY

The Caribbean Netherlands is comprised of the islands of Bonaire, Saba and St. Eustatius. Ever since the first people arrived on these islands, seafood has played an important role in their subsistence and economy.

Today, the marine ecosystem surrounding the islands is under threat from various anthropogenic factors, including overfishing, pollution and habitat destruction. The impacts are exacerbated by climate change and major natural phenomena, such as; catastrophes (tsunamis, current change, etc.) which would have significantly affected the resources baseline, apart from human activity (Scheffers et al. 2009).

When drawing up policies and management plans for these ecosystems, we need to consider not just their current status, but also the complexity of the full exploitation history. Such policies and plans often take relatively recent situations as a baseline for the richness and diversity of ecosystems in the past. The aim is then to restore these ecosystems to that baseline status. However, research often shows that even at those historic reference points, ecosystems were already significantly degraded compared to their state when humans first arrived. This phenomenon is called 'shifting baselines': every generation has a new frame of reference, a new image of what they consider as normal, resulting in suboptimal conservation targets and an overall loss of biodiversity over time.

This report aims to assess historical fisheries in the Caribbean Netherlands since the first inhabitants started exploiting the sea around them. In doing so, WWF-The Netherlands seeks to understand how fisheries and fishing traditions have influenced the marine ecosystem in the past, and hence what this ecosystem may have looked like before the start of marine resource exploitation. We hope that this will provide a more realistic view of the variations and impacts on baseline perspectives, and thus more effective targets to aim for in policies and plans for the future.

The historical data presented in this report, although fragmented and largely non-quantifiable, confirm that many marine animal populations have decreased significantly since the very start of marine resource exploitation. This conclusion is in line with historical studies in other locations in the Caribbean, notably Curaçao and Jamaica. Even in more recent times, numbers of fish and marine reptiles have been decreasing. For some species there is a clear correlation between fishing intensity and a decrease in abundance or size, such as in the case of sea turtles in the Caribbean Netherlands. For other species, this correlation is again established, as in the case of dramatic size reduction for the mollusc species *Melongena melongena* and *Pecten ziczac*, from archaeological contexts on Bonaire and Curacao, which changed in the time period between the earliest human contact on the islands (ca. 1600 BC) to the later agriculturalists at ca. 800 AD (Haviser 1991a). Although we cannot draw strong conclusions on the basis of the current findings alone, we do note the decrease in easy target species such as sea turtles, manatees, and seals, and the decrease in overall fish and shellfish abundance in historical and more recent times. Based on these findings, in combination with those of others, we can assume that the fish stocks in the Caribbean Netherlands have followed a similar pattern, and levels were much higher than is currently considered as baseline for management purposes.

However, we must as well be cautious to recognize that there are an array of variables in determining the presence of marine resources in the past, considering that pelagic and coastal exploitation activities have variable effects through time. The combined historical evidence from this and other studies makes clear that there is a high potential for the presence of more and larger fish in the Caribbean. Policies and conservation and management efforts could, in theory, restore populations to a level much higher than what current inhabitants, and even their parents and grandparents, were used to in their childhood.

However, we must not forget other influences, such as natural disasters, habitat destruction and climate change, which have affected Caribbean ecosystems in the past and will continue to do so in the future. In addition, pressures resulting from growth in population and tourism have increased and will most likely continue to increase. This strengthens the need for ambitious new targets in policies, conservation and management.

In conclusion, to approach the true ecological potential of the Caribbean waters, and thus strengthen the basis for tourism as well as sustainable livelihoods of the island inhabitants, we must not take recent history as our baseline. Rather, we should realize how bountiful these waters have been in the past, and can be in the future, when developing sustainable ways of using and protecting the natural world.

# INTRODUCTION

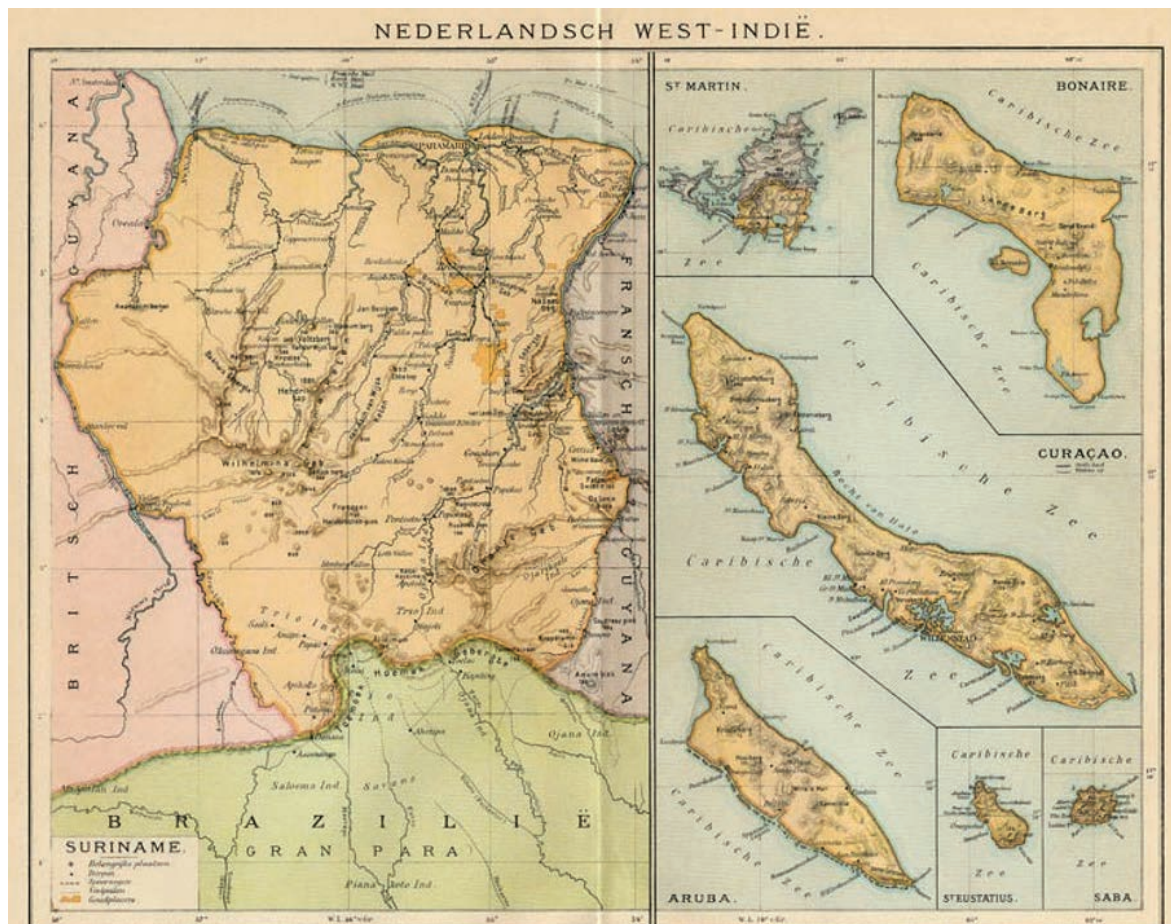
The marine environment plays a vital role in the Caribbean Netherlands, comprised of the islands of Bonaire, St. Eustatius (Statia) and Saba. Perhaps most obviously, these islands are economically largely dependent on tourism, as the waters surrounding the island draw many diving and snorkeling tourists. In addition, traditional fishing practices represent a significant cultural value, and most marine resources found around the islands are consumed locally.

However, these vital ecosystem services are increasingly under threat. The quality and cover of coral reefs is decreasing (Johnson, 2015), fish stocks have been decimated (Johnson, 2015) which indicates that as a result, their role in local food consumption and diving tourism is dwindling. Efficient management of marine resources has proved to be difficult as island inhabitants as well as tourists lack knowledge about why these resources are declining. Moreover, due to a shifting baseline between generations, there is little knowledge about the historic status of marine resources, little understanding of the processes that have led to changes in resource abundance, and hence, little sense of urgency with regard to changing the current situation. It is important to understand how historical fishing practices have changed the ecosystem in the past, in order to realize how current practices can influence the system today. Also, without knowing previous states of the system, it is hard to determine which state we should and are able to strive for.

WWF therefore asked historian Ruud Stelten of the Terramar Museum to dive into the fisheries history of the Caribbean Netherlands, in order to enlarge our understanding of the impact of fisheries on these important ecosystems. Historic fisheries data can be found in books and archival documents all over the world and can be used to inform the general public, policy makers, and local fishermen about historic fish stocks and past consumption of marine resources. Through a connection with present-day fisheries, this can result in more awareness, which might contribute to the support for a sustainable fisheries management policy in the Caribbean Netherlands.

This report, prepared for WWF Netherlands, describes the history of marine resource exploitation on Bonaire, St. Eustatius, and Saba based on extensive documentary and archaeological research, from the islands' earliest Amerindian inhabitants to the late colonial period. The historical data will be discussed in the light of other studies on historical fisheries in the Caribbean in order to identify whether the islands in the Caribbean Netherlands have followed a similar path compared to other areas in the region.





**Figure 1** Historical map "Nederlandsch West-Indië", the Dutch colonies in South-America and the Caribbean, produced in 1910 by Winkler Prins

# OUTCOMES

Amerindians have occupied the islands in the Caribbean Netherlands since around 1600 BC. During this time, people had fishing equipment and boats which represented their level of technological development through time, from non-agriculturalists to agriculturalists. There were essentially two groups of Amerindians to inhabit the islands, the earliest called the Archaic Age and the later group just prior to the European arrival, are of the Ceramic Age technological stage. Their main targets were variable shellfish species, such as Queen Conch. On Bonaire and St. Eustatius, turtles were also targeted, as these animals were easy prey when nesting on the beach.

In later Ceramic Age archeological findings, reef fish and even pelagic fish have been discovered as being an important part of local diets, together with shellfish species. People used lines and hooks as well as nets and traps to catch fish. In terms of biomass, grouper, tuna and scad played an important role for food provisioning. It should as well be mentioned that marine bird species were also exploited in the Amerindian period, such as at Booby bird nesting grounds on Saba.

It is important to remember that different cultural approaches, played as great a role as the equipment used, to realize their resource exploitation goals. Exemplifying that it is the intention of the user that determines what resources, and to what degree those resources, are exploited (Haviser 1994). For the Ceramic Age Amerindian group, some approaches from the mainland, were abandoned, such as the use of plant poisoning for fish stunning in rivers.

In the sixteenth century, the Spanish colonizers introduced livestock on the islands. Due to the production of meat, seafood was no longer the most important food source, but fishing continued nonetheless. Turtles seem to have become scarce in this period, as sources indicate that soldiers from Bonaire needed to go to Klein Bonaire to find them. Shellfish and bony fish, manatees and Caribbean monk seals were also harvested during the Spanish and Dutch colonization. Caribbean monk seals have gone extinct.

Reports on the fisheries on St. Eustatius mention the presence of many reef fish, but also the poisoning of fish due to ciguatera, a toxin released by dinoflagellates. In Saba, shellfish were mainly consumed by the lower class, while the upper class had access to reef and pelagic fish. These had to be caught from boats that were large enough to fish offshore.

Towards the end of the colonial period, between 1800 and 1850, fishing had ceased to provide a livelihood for many people on Bonaire and Saba. This might have been related to a decrease in fish stocks. Another sign of decreased fish stocks is the fact that fishing permits were used by the Dutch government in 1867 to manage fisheries on Bonaire. Starting with 67 permits, five years later there were only 48 permits, which suggests reduced fish availability. Later accounts, however, state that Bonaire had a thriving fishing industry in 1907, using only one net shared by all fishermen.

On Saba and St. Eustatius, the number of full-time fishermen decreased to a level at which the demand for fresh fish on the islands could not be met. However, it should be considered that fish exploited for commercial sale, are a different calculation than fish caught for strictly personal use. Records indicate that on all islands, turtles decreased heavily in number during the colonial era and modern history.



# DISCUSSION

The historical overview of fisheries in the Caribbean Netherlands shows that fisheries have been important for Bonaire, St. Eustatius and Saba throughout the history of human settlement. The species targeted differed between islands and periods. As the findings are sometimes very specific and information of some periods is lacking, it is difficult to make a general statement on the impact of historical fisheries on marine life in the Caribbean Netherlands in the past and present. However, based on the extensive anecdotal evidence presented, combined with the scarce quantitative data on certain species, it is very likely that there has been overfishing in the past. A poignant example is the case of large marine turtle species. Many sources indicate a decline around the Caribbean Netherlands. Interestingly, there was a sense of fisheries management already in the colonial period, as fisheries permits were used on Bonaire in 1867.

Thus, to understand the influence of historical fishing on current challenges within the marine environment, we need additional sources and studies.

Within the scientific field of historical ecology, there are ongoing discussions on whether anthropogenic influences in the past significantly altered today's marine system. Archeological research of Wing and Wing (2001) showed that at Puerto Rico, St. Thomas, St. Martin, Saba and Nevis there have been significant changes in reef fish biomass and assemblage composition between 1,850 and 560 years before present. Fish biomass and size distribution decreased between older and more recent excavations and the contribution of reef fish to total aquatic vertebrate biomass has also decreased during these periods. Furthermore, the mean trophic level of the different reef systems declined over the years. This study suggests overexploitation by native Americans in the Caribbean, but cannot establish a certain cause-effect relationship between fishing and changes in the reef fish community.

The difficulty with historical ecological research is that it is often based on anecdotes, of which the reliability is hard to judge. There may be archeological findings, but these often show gaps in time, which makes it hard to understand overall trends (Baisre, 2016). Furthermore, although archeological data can always be used for correlational analyses, it will remain a challenge to establish clear relationships between exploitation and changes in the marine system. However, this does not mean that we cannot use historical ecological research to increase our understanding of the marine system and the impacts of our different forms of use of this system. As well, issues of both temporal and cultural preferences create complications for a singular baseline determination. This includes the clear distinction in food exploitation in the broader Eastern Caribbean, from the Early Ceramic to Late Ceramic age (often called the 'Crab-Shell dichotomy'). The Earliest Ceramic Age migrants into the region, maintained many of their original Orinoco riverine-adapted subsistence strategies, that focused heavily on land resources (land crabs, hutia, etc.) and included occupation at primarily inland sites. Whereas, the Late Ceramic Age folk shifted their focus to subsistence via marine resources, and then primarily occupied coastal sites (Haviser 1991b-c; 1997). Through historical evidence of how marine populations have thrived before we started to exploit them, we can counteract the process of the shifting baseline syndrome, in which we forget the potential of our ecosystems and fish populations because we use already degraded ecosystems as our reference point (Pauly, 1995).

Combining paleoecological, archeological, historical and recent ecological records, we can create a more complete image of the effects of historical fisheries on coral reefs. In the Caribbean, artisanal fishing has taken place for 40.000 years already, but it appears that in this long period

there were not many changes. Only in the last 150 years, fishing appears to have led to phase shifts in coral systems. Historical fisheries reports show that herbivorous fish have been rare since 1900, which is one of the reasons that corals suffer from macroalgae overgrowth (Jackson et al., 2001). Additional considerations require discussion on the significantly different impacts of pelagic-commercial vs. coastal-personal fishing results. Such that in the 1960s at the Windward Islands, deep sea areas were massively exploited by large Japanese and Korean trollers for over a decade, and to some extent still until today! What did this do to, and how can we scale within our baseline, when the deep-sea resources are massively depleted, yet the coastal resources have been significantly less impacted?

While quantitative data on historical marine population sizes and catches may be limited for the Caribbean Netherlands, very detailed information is available for several other areas in the Caribbean. Those quantitative data that are available are strikingly unambiguous when it comes to the effects of overfishing. This is particularly the case for the marine ecosystem surrounding the island of Curaçao, the neighboring island of Bonaire (Vermeij et al., 2019), and for Jamaica (Hardt, 2009). It is important to take these quantitative results into account, as the ecosystems as well as their fishery histories are very similar, which warrants careful extrapolation.

For instance, the study by Vermeij et al. (2019), on more recent historical fisheries (1905–present) in Curaçao, shows that overall catches decreased by 90% since 1905, that fishermen shifted from demersal to pelagic target species, and that large predatory fishes have disappeared from the reefs altogether. This study points out that many of these changes were already very significant in 1955. Large fish species such as king mackerel (*Scomberomorus cavalla*) that were commonly landed in 1905, were rare or absent in 1955, which underlines the danger of using the relatively recent year of 1955 as a baseline for comparing current to historical catch levels. This research also suggests that fisheries were not the only factor influencing the current status of fish populations in Curaçao, but that habitat loss also played an important role in the decrease of reef fish abundance. This is very likely to be the case in the Caribbean Netherlands as well.

The Jamaica study by Hardt (2009) shows that depletion of reef fish populations occurred with a precipitous decline from the 1850s to the 1940s. The final shift from relatively abundant to overfished marine fauna corresponded to subtle changes in fish trap design as well as development of recreational fishing. Government subsidies throughout the second half of the 20th century exacerbated the declines. Hardt's analysis shows that local artisanal fisheries with relatively low levels of effort and seemingly subtle shifts in technology can significantly impact the coral reef ecosystem and that declines occurred decades to centuries before modern ecological studies began. However, this research also suggests that that recovery is possible and historical analysis can inform realistic time frames for this recovery.

Studies on groupers in Southern Florida have shown that there has been a dramatic decrease in grouper length and abundance since 1900 and that the current population increase is still insignificant relative to the historical population size (McClenachan, 2009). Lastly, the Caribbean monk seal is the most clear example of how populations that were once abundant can go extinct (partly) due to human exploitation (McClenachan and Cooper, 2008).

It is important that we realize the wide array of both physical and cultural factors that must be considered when creating a realistic baseline for ancient marine resource populations, and their exploitation through time. Our goal here is to identify the variables within that array of factors, and to assemble a broad approach to understanding the changes that have occurred and continue to occur in the Caribbean sea. Where specific case examples are available, they are included, yet broader historical aspects of social, cultural, environmental, and even political

actions, are also important elements of our baseline concept for more effective policy planning.

In conclusion, our research on historical fishing in the Caribbean Netherlands is in line with similar research in the Caribbean. We show that for some species there is a clear correlation between fishing intensity and a decrease in abundance or size, as for instance for sea turtles in the Caribbean Netherlands. Historical evidence makes clear that there is a high potential for the presence of more and larger fish in the Caribbean, although we must not forget other influences like habitat destruction and climate change.

The lack of quantitative data available in the current analysis and in similar reports on historical fishing in the Caribbean underline the importance of effective monitoring, control and surveillance of present-day fishing activities, including fishing effort, bycatch and landing statistics.

Importantly, using our knowledge of historical fisheries in the Caribbean Netherlands can help to mitigate the shifting baselines syndrome, making policy makers, ecosystem managers as well as local people aware of the high potential of sustainable fisheries and nature conservation in Caribbean waters.

# 1. BONAIRE

## AMERINDIANS

The first evidence of human occupation of Bonaire dates to around 1600 BC, when people from the South American mainland moved to the island (Haviser 1991). What drove these people to leave their ancestral lands is not completely clear, but scholars generally distinguish between two phenomena: push and pull factors. The former are circumstances that cause people to move away from the place where they live, such as climate change, rising sea levels, or increased population density, which can cause conflicts. Pull factors, on the other hand, are circumstances that attract people to a particular place. On Bonaire perhaps the strongest pull factor was its abundance of food. The island was surrounded by coral reefs that supported a wide variety of fish and invertebrates. Lac Bay, on the island's east coast, was home to thousands of queen conch (*Lobatus gigas*) and most likely manatees (*Trichechus manatus*) as well. Bonaire also housed a large population of turtles, which were easy to catch once they came up to the beach at night to lay eggs. As these first settlers lived a hunter-gatherer lifestyle, there was plenty of food available to them on Bonaire, and this might have been the main reason for people to start living on the island.

Archaeological excavations have produced some data regarding marine resource consumption by the island's Amerindian population. In the 1980s, Jay Haviser carried out archaeological excavations on prehistoric sites all over the island. Marine shellfish constituted the greatest bulk of faunal remains encountered, but there appear to be certain changes in species exploitation distinguishing the early from the later prehistoric people. At the earliest prehistoric sites (Slagbaai, Lagun, Gotomeer; 1300 BC – 450 AD), marine shell species exploited were largely bivalves, including *Crassostrea rhizophora*, *Pinctada radiata*, *Ostrea* sp., *Isognomon alatus*, and *Chama macrophylla*. The primary gastropods from these sites include queen conch (*Lobatus gigas*), *Murex brevifrons*, and *Melongena melongena*.

The later prehistoric people on Bonaire, of which evidence is found at the sites of Wanapa, Amboina, North Lac, Den Bon, and Sorobon (450-1499 AD), exploited far fewer bivalves, but rather focused on the larger gastropods such as queen conch (*Lobatus gigas*), *Cittarium pica*, and the smaller gastropod *Nerita* sp. The few bivalves exploited in later prehistoric times were mostly the oysters *Pinctada radiata* and *Isognomon alatus*, and another bivalve, *Codakia* sp. This specialization in particular shellfish species exploitation may, in part, be explained by a subsistence shift in the diet of the later prehistoric peoples. In the first millennium BC,



**Figure 2** Extracting conch (Nationaal Archief Den Haag, Fotocollectie Rijksvoorlichtingsdienst, 2.23.10.02, 121-0906).

**DEVELOPMENT OF AGRICULTURE, AN INCREASE IN BRACKISH AREAS AND MANGROVES AND OVEREXPLOITATION ARE THOUGHT TO HAVE INFLUENCED SHELLFISH CONSUMPTION OVER TIME**

as new people moved into the Caribbean archipelago, new ways of life were introduced, the most important of which was the practice of agriculture. People started to grow crops such as cassava, sweet potato, and maize. In addition, they started to produce ceramics and began to lead a more sedentary lifestyle. On Bonaire, these developments only occurred around 470 AD. The change in the presence of shell species in archaeological contexts on Bonaire could be attributed to increased precipitation during the period 5,000 – 3,000 years ago, creating more inland brackish tidal areas for mangroves and bivalves; and/or it could also be attributed to human over-exploitation or changes in preference between the early and late prehistoric periods (Haviser 1991:17).

Fish bones constitute the most significant vertebrate faunal remains found in archaeological sites on Bonaire. Analysis of fish remains from the Wanapa (< 1200 AD) site indicates that reef fish are predominant at this site. Deeper reef fishes, such as snappers (Lutjanidae), are present, but fewer in number than the shallow reef fishes. The continental pelagic fishes, such as mackerels (Scombridae) and jacks (Carangidae), are present but very rare. This general pattern of fish exploitation is rather typical of the Antilles as well as northwestern Venezuela and Goajira. The fish identified at the Wanapa site include sharks, rays, spotted eagle ray (*Aetobatis narinari*), ladyfish (*Elops saurus*), crevalle jack (*Caranx hippos*), snappers (*Lutjanus* sp.), grunts (*Haemulon* sp.), parrotfish (*Sparisoma* sp.), surgeonfish (*Acanthurus* sp.), barracuda (*Sphyræna* sp.), mullet (*Mugil* sp.), and other indeterminate fish. These were caught using weighted lines with baited hooks. Another faunal group available to the prehistoric peoples of this region is reptiles, with the green sea turtle (*Chelonia mydas*) dominating among this group (Haviser 1991:22).

The North Lac site excavation yielded turtle bones and shells (*Lobatus gigas*, *Murex* sp., *Cittarium* sp., several large specimens of *Melongena melongena*). This site seems to have been a bay resource exploitation site for the Wanapa settlement. The remains from Sorobon are almost exclusively queen conch shells, however a slight presence of other species was noted, including *Cittarium pica* as a distant second most common shell exploited. Fish and turtle bones were predominant in the faunal assemblage (Haviser 1991:162). Queen conch remains make up between 72 and 98 percent of the shell assemblage at the sites surrounding Lac Bay (Den Bon, North Cai, Sorobon).

These sites contain shell middens (refuse heaps). As people extract shellfish in a particular area for many years, the shells are discarded on a large pile. Other trash, such as fish bones and broken pieces of ceramics, are often also added to the pile. Many of these shell middens are now barely visible, as over the years they have been flattened by erosional processes on the one hand and buried by depositional processes on the other.

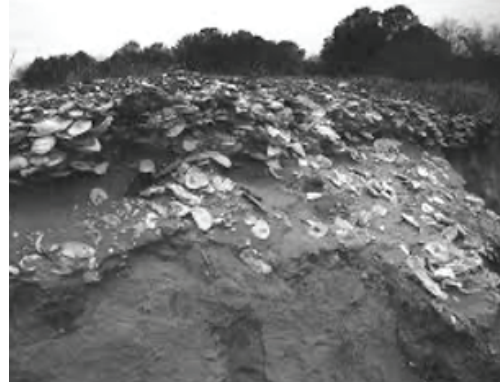
## BEFORE 1200 AD THE MOST FOUND VERTEBRATE REMAINS FOUND IN EXCAVATIONS ARE SHALLOW REEF FISH BONES



**Figure 3** Commerce de l'Amérique par Marseille (Chambon, M. (1764)). John Carter Brown Library, 15101-3.



It is interesting to note that in some places in the Caribbean, such as on the island of Hispaniola, shell middens seem to have had a very special function, as people were buried inside them. The body of the deceased would be placed in an open pit inside the midden and left to decompose. When just the bones remained, the skull of the deceased was taken out and hung in the house. This practice existed at the dawn of European contact. Today one can still see large shell middens at Lac Cai, but these shells have been deposited there in modern times. Over time, these piles will suffer the same fate as their Amerindian counterparts.



**Figure 4** Left: Piles of conch shells in the water off the coral island of Anegada in the British Virgin Islands (<https://www.atlasobscura.com/articles/anegada-conch-british-virgin-islands>). Right: Shell midden fishing bay, Maryland (USA) (Rick et al. 2011)

Queen conch was one of the most important species exploited by Amerindians on Bonaire and throughout the Caribbean archipelago. The animal was extracted by hammering a shell with the tip of another, with the objective of making a hole through which the muscle that holds the animal in its shell could be cut. The shell itself was used for various purposes. Oftentimes it was used to make body adornments such as disks (pectorals), pendants, and beads. Spanish documentary sources mention shell beads and pendants being used as a form of monetary system by the Ceramic Age peoples. The smaller the bead and the more detailed the craftsmanship, the higher its value. There were three names for shell beads in the Amerindian vocabulary: boroyda, mamas, and quitero. Some of the icons used in the decoration of these beads, such as the jaguar, could be a link to ancestral origins in Amazonia. Pendants were often shaped after birds and frogs as well (Haviser 1991:41).

**QUEEN CONCH WAS ONE OF THE MOST IMPORTANT SPECIES EXPLOITED BY AMERINDIANS ON BONAIRE**

**SHELL BEADS AND PENDANTS WERE MADE OUT OF CONCH SHELLS AND USED AS A FORM OF MONETARY SYSTEM BY THE CERAMIC AGE PEOPLES**



**Figure 5** Extracting conch 1947/48 (Boi Antoin collection).

## THE LIP OF THE CONCH SHELLS WAS USED TO MAKE AXE AND ADZE HEADS

In addition to these uses, the lip of the conch shell was used to make axe and adze heads. The shell's lip is extremely hard and when ground down to have a sharp edge, it makes for a very good axe head that can be used, for example, to cut down trees, or an adze for the manufacture of a dugout canoe. An ax is placed on the handle shaft vertically, while the adze blade is placed on the shaft horizontally. The strength of the Queen Conch shell outer lip, is the basis for use in tool manufacture, while other conch species are less suitable, and thus less likely to be selected by the craftsmen.

## COLONIAL ERA

In 1499, Amerigo Vespucci was the first European to record setting foot on Bonaire, however it was very evident that European slavers were throughout the area before Vespucci, and they were likely the first to visit the island (Haviser 1991:165). In the ensuing years, Spain focused most of its attention on the Greater Antilles and the American mainland during the initial stages of colonization. In 1513, several islands, including Bonaire, were deemed *Islas Inútiles* – or ‘useless islands’ – by the Spanish, for they did not possess any gold or silver. Slave hunters were allowed to capture Amerindians from these islands for the purpose of forcing them to work in the cane fields and gold mines of Hispaniola. An estimated 200 Amerindians were taken from Bonaire to Hispaniola by these *Indieros*. It was not the first time this had happened; in 1501, Christobal Guerra captured native Bonaireans and sold them as slaves in Spain.

The Spanish also introduced European livestock to the islands. Not much is known about the early days of Bonaire as a Spanish colony. The population consisted mainly of Amerindians, accompanied by a small number of Spanish settlers who were mostly exiled criminals from the mainland. They were ruled by a Spanish Governor. People lived in a valley in the highlands, where the town Rincón was founded. Besides its favorable location in a fertile valley, a major advantage must have been the fact that the town was not in sight of the sea, and thus less vulnerable to pirates. As time progressed, the livestock that roamed the island multiplied and numbered in the thousands by the early seventeenth century. As a result, Bonaire became an important supplier of meat to neighboring Curaçao. It is likely that the introduction of livestock on the island caused a decline in the consumption of seafood. As well, another factor in the reduced need for locally acquired seafood for the colonists, was the extensive importation of salted fish from Europe. When determining a baseline model for marine resources usage, these significant salted-fish imports, during the colonial period are an important factor.

Bonaire was colonized by the Dutch in 1636 and the Spanish who had been living there since the 1520s were expelled. Many documents from the early years of Dutch colonization are preserved in the New York State Archives. These provide a glimpse into the fishing activities that were carried out at this time. In a letter dated January 6, 1654, it is said that the yacht *De Paroquet* was sent to Klein Curaçao in order to fetch some seals (NYSA\_A1883-78\_V17\_002c). These were Caribbean monk seals (*Monachus tropicalis*) that are currently extinct due to overhunting of the seals for oil, overfishing of their food sources, and habitat loss. If these seals were present on Klein Curaçao, it is highly likely they were present on Bonaire as well (<http://www.dcnanature.org/species-of-the-week-caribbean-monk-seal>).

A letter dated April 14, 1643, describes a situation of food shortage for the enslaved workers at the salt pans. It was decided to send a sloop with soldiers to the islands of Las Aves and Los Roques to catch turtles for the salt rakers. A follow-up letter dated May 19, 1643 states that it is necessary to send even more soldiers to these islands as the first group apparently did not succeed in finding enough food (NYSA\_A1883-78\_V17\_005a+b).

The instructions that Peter Stuyvesant (director of Nieuw Nederland) gave to Matthias Beck (vice-director of Curaçao and subordinate islands) on June 8, 1655 state that any turtle catchers and those who ship manatee or sea cow meat, ought to be charged no less than 5 to 6 pounds Flemish for a last of salt, as well as those who intend to ship it to Nieuw Nederland or the Virginies (NYSA\_A1883-78\_V17\_019). Apparently, West Indian manatees (*Trichechus manatus*) were present on the ABC islands (Aruba, Bonaire and Curaçao) at this time. Shallow water of no more than 6 meters deep is their preferred habitat, and Lac Bay on Bonaire fits that description ([https://animaldiversity.org/accounts/Trichechus\\_manatus](https://animaldiversity.org/accounts/Trichechus_manatus)).

## IN 1655 WEST INDIAN MANATEES WERE PRESENT ON ARUBA, BONAIRE AND CURAÇAO

## IN THE MID-20TH CENTURY THE CARIBBEAN MONK SEALS HAVE BECOME EXTINCT DUE TO HUMAN OVEREXPLOITATION



**Figure 6** A drawing of the West Indian or Caribbean monk seal based on a specimen collected in Matanzas, Cuba. (Henry W. Elliott/U.S. National Museum)

## IN THE 17TH CENTURY, TURTLES NUMBERS DROPPED UNTIL THE LOCAL PEOPLE COULD NO LONGER SUSTAIN THEMSELVES WITH LOCAL TURTLE MEAT

From these letters it appears that turtles, seals, and manatees were all harvested during the early days of Dutch occupation. The fact that people were repeatedly sent over to Las Aves and Los Roques to catch turtles indicates that these animals' population numbers on Bonaire had dropped to the extent that they could no longer sustain the local population.

## **TURTLES, SEALS AND MANATEES WERE ALL HARVESTED DURING THE EARLY DAYS OF DUTCH OCCUPATION**

The Dutch wanted to make the salt trade the focus of the island's economy. To harvest the salt, African slaves were imported. Throughout the seventeenth century, around 100 slaves were living on Bonaire, together with the Dutch commander, a handful of Dutch soldiers, and a few Amerindian families. In the early eighteenth century, the number of slaves grew steadily to 220 in 1721. In 1806, Bonaire had 945 inhabitants, of whom 364 were slaves. One year later, the total population size had reached 1135, growing further to 1476 in 1828, to 2647 by 1857, and to 3833 in 1867.

Throughout the colonial period, various sources comment on the catching of turtles. Marten Douwes Teenstra, an early nineteenth-century visitor to Bonaire, notes that hawksbill turtles are caught on Bonaire and at the neighboring Aves Islands (Teenstra 1837:193). Gerardus Balthazar Bosch, a

## **IN 1816 THERE WERE NO COMMERCIAL FISHERMEN ON BONAIRE**

contemporary of Teenstra, remarks that he encountered a Bonairean fisherman at Los Roques who was extremely good at catching turtles. Bosch mentions that meat of the hawksbill turtle is not very tasty and is rarely eaten, but the meat of the green turtle is delicious (Bosch 1829:305). This once again illustrates the taste variability factors, in exploitation practices. It seems that around this time, fishing was not a common activity on Bonaire, as a report from 1816 mentions that the fishing industry provides no livelihood for anyone (Hartog 1954:124; De Hulu 1923). However, clearly personal family fishing was consistent throughout, for subsistence and as a cultural expression. Fishing around this time was somewhat regulated. A law issued on August 22, 1804 stated that all

## **IN 1804 NO CANOES WERE ALLOWED TO GO OUT FISHING WITHOUT THE COMMANDOR'S PERMISSION**

small vessels and canoes had to be left at the fort at night, and no canoes were allowed to go out fishing without the Commander's permission (Schiltkamp & Smidt 1978:558). One wonders if this 1804 restriction was directed at safety of night boating and/or contraband control only, or was it a culturally specific directive to limit certain marginal groups from fishing, those who use canoes?

Recent 2019 archaeological excavations at the Amerindian village site of Amboina, on Bonaire (ARCHOL final report pending), have revealed the contexts and associations of numerous house structures, burials, hearths, and trash middens for the Ceramic Age on Bonaire. Evidence that will allow us to further understand the complex relationships among all these factors, to assist in calculating a marine resource exploitation baseline.

## MODERN HISTORY

In the 1860s, fishing at Los Roques, which provided work for many Bonaireans, dwindled. The Venezuelan government had leased the island to Lodewyk Christoffel Boyé, who did not restrict access to the islands, but taxed the fishermen on their catch.

## THE NUMBER OF FISHING PERMITS WAS LOWERED BETWEEN 1867 AND 1872



**Figure 7** Bonairean fisherman (Fraters van Tilburg foto collection , 405964)

This tax was prohibitive for many Bonairean fishermen (Verslag van het beheer en den staat der Nederlandsche kolonien in West Indie, en van de bezittingen ter kust van Guinea, over 1866:28). In 1867, 62 fishing permits were assigned on Bonaire (Verslag van de handelingen van de Staten Generaal, 1868-1869:1103). Five years later, only 48 fishing permits were assigned. By this time, the Bonairean fishery at Los Roques had ceased completely (Staatkundig en staathuishoudkundig jaarboekje voor 1875:195). According to an early twentieth-century source, fishermen needed to obtain a permit at La Guayra for 6 Dutch guilders, which needed to be renewed every two months (Bussy 1907:127). In addition, it was no longer permitted to bring salt from Bonaire to conserve the fish; this had to be brought in from Venezuela. This unfortunate situation continued well into the twentieth century, as an article in the *Amigoe di Curaçao* newspaper from November 22, 1913 states that because of high duties charged by Venezuela for fishing at the Las Aves and Los Roques

islands, Bonairean fishermen were unable to fish at these islands. Moreover, by this time it was not even possible for Bonaireans to sell fish caught in Bonaire at the Venezuelan markets.

In 1878 and 1879, 24 and 41 turtles were exported, respectively. Throughout the second half of the nineteenth century, the price of turtle meat decreased. Around 1850, a pound of turtle meat would fetch 40 guilders, while in 1905 the price had dropped to between 12 and 15 guilders. Export of turtle meat decreased in the early twentieth century (Hartog 1957:288):

Year	Amount	Value
1903	10.5 kg	f 157.50
1906	19 kg	f 285
1919	18 kg	f 540
1925	13 kg	f 274
1931	43 kg	f 400
1932	25 kg	f 120



After 1932, no mention is made of the export of turtle meat. Except for private consumption, some turtles were caught for the souvenir industry. By 1903, the government of the ABC islands realized that steps needed to be taken to prevent turtles from becoming extinct. It had proved difficult to come up with a plan due to the unreliability of the Venezuelan government. By this time the turtle population on Bonaire had dwindled due to overharvesting, although some turtles were still caught on the beach on the north side of the island.

Some people believed that dynamite fishing, practiced on Bonaire in the late nineteenth century with dynamite stolen from Venezuelan copper mines by Bonairean workers, had scared the turtles away (Amigoe di Curaçao, 01-04-1905). Another early twentieth-century source mentions that turtles were on the brink of extinction due to overfishing and the gathering of their eggs (Boeke 1907:207).

## **IN THE LATE 19TH CENTURY DYNAMITE FISHING WAS PRACTICED ON BONAIRE WITH DYNAMITE STOLEN FROM VENEZUELAN COPPER MINES**

## **BY 1903, THE GOVERNMENT OF THE ABC ISLANDS REALIZED THAT STEPS NEEDED TO BE TAKEN TO PREVENT TURTLES FROM BECOMING EXTINCT**



**Figure 8** Turtle catchers (Boi Antoin collection).

An account published in 1907 paints a vivid picture of the Bonairean fishing industry in the early twentieth century. At this time, islanders possessed one large fishing net, which was approximately 100 fathoms long and three to four fathoms deep. This net was used by a handful of fishermen on the island's leeward side north and south of the roadstead, at Slagbaai, and in Lac Bay, in places where the sea floor was shallow and sandy. In other parts of the island, fishing was done by hook

and line or with the use of traps. Bait was caught with a smaller throwing net called a 'taraai', which was done at the roadstead where there was an abundance of small baitfish. On the roadstead, traps made of bamboo were also used (Boeke 1907:206).

The main fishing grounds of Bonaire were situated at Lac Bay, which contained large numbers of fish. These were caught with throwing nets and traps, but at the time the traveler visited Bonaire, most traps were broken, and the fishermen did not have the financial means to replace them. Much fishing was also done outside of Lac Bay on the rough east coast, where fishermen would sail along the coast with hook and line. Fishing also took place at Lagun, but not on a regular basis (Boeke 1907:206).

### **TO FISH AT SLAGBAAI (SIX- TO EIGHT-DAY TRIPS) FISHERMEN NEEDED TO HAVE PERMITS WHICH WERE ISSUED BY THE GOVERNER**

coast, as much fish found here was said to be poisoned ("sjwatie"), in particular the "piska di piedra" that were found very close to shore (Boeke 1907:207).

### **IN 1907 FISHERIES FLOURISHED ON BONAIRE. ESPECIALLY AT THE MAIN FISHING GROUNDS WHICH WERE AT LAC BAY**

Another main fishing area was at Slagbaai. Fishermen needed to have permits to fish there, which were issued by the Governor. Boats went on six- to eight-day trips to this area, sometimes as far north as Boca Bartol or even to the northwestern tip of Klein Bonaire, where the fishermen fished without any fixed plans. Fish they caught was salted on board and transported to Kralendijk or straight to Curaçao.

Fishing was limited at the other bays on the west



**Figure 9** Fishing at Playa (Boi Antoin collection).

During the first half of the twentieth century, Bonairean fish exports increased steadily. This was partly due to the introduction of modern refrigeration (Hartog 1957:286), although 'ice-boxes' were the primary cooling system until the second half of the 20th century, electrical refrigerators were not readily available until later. Fishing provided a livelihood for many people in 1930 (Curaçaosch verslag 1931:3). A year later, 1,600 guilders worth of fresh fish and

### **FISHING ON THE WEST COAST WAS LIMITED BECAUSE MUCH FISH FOUND ON THE WEST COAST WAS SAID TO BE POISONED ("SJWATIE")**

### **IN THE MID-20TH CENTURY, EXPORT OF FISH INCREASED DUE TO THE INTRODUCTION OF REFRIGERATION**

160 guilders worth of salted fish were exported to Curaçao (Curaçaosch verslag 1932:10). In 1932, the island government loaned money to four individuals to build or buy sailing ships for fishing. This allowed for larger fish exports to Curaçao. That year, 5,620 guilders worth of fresh fish and 32 guilders worth of salted fish were exported (Curaçaosch verslag 1933:12). In 1933, export of fish to Curaçao was worth 4,410 guilders in fresh fish and 174 guilders in salted fish (Curaçaosch verslag 1934). Throughout these years, the local fishery met the Bonairean population's demand for fish. Most, if not all, fish destined for export was sent to Curaçao. In 1945, these were mainly masbangos (bigeye scad, *Selar crumenophthalmus*) (Curaçaosch verslag 1946). Exports to Curaçao decreased and even

## EXPORTS TO CURAÇAO DECREASED AND EVEN CEASED IN 1941 DUE TO THE LARGE DEMAND AT THE LOCAL INTERNMENT CAMP AND US MILITARY BASE

## IN 1930 FISHING PROVIDED A LIVELIHOOD FOR MANY PEOPLE ON BONAIRE

ceased in 1941 due to the large demand at the local internment camp and US military base (Curaçaosch verslag 1942 & 1943). When looking at the mid-20th century fishing on Bonaire, we must also consider the environmental factor of two major hurricane strikes at Bonaire in 1931 and 1933, which along with disruption of the fish population habitats, also would have destroyed many boats, nets, piers and other physical requirements for fishing.

Year	Amount	Contemporary USD equivalent	2016 USD equivalent*	Weight (kg)
1931	f 1,760	\$ 1,050	\$ 16,611	
1932	f 5,652	\$ 3,270	\$ 57,487	
1933	f 4,584	\$ 2,540	\$ 47,030	
1938	f 2,430	\$ 1,480	\$ 25,149	
1943				56,000
1945	f 10,555	\$ 5,597	\$ 74,600	
1946	f 5,410	\$ 2,869	\$ 35,200	
1948	f 19,478	\$ 10,327	\$ 103,000	
1952	f 38,488	\$ 20,407	\$ 184,000	
1953	f 59,037	\$ 31,302	\$ 281,000	
1954	f 56,484	\$ 29,949	\$ 267,000	
1955	f 68,983	\$ 36,576	\$ 328,000	
1956	f 84,906	\$ 45,019	\$ 398,000	

\*Based on the real price commodity value, calculated using the website [www.measuringworth.com](http://www.measuringworth.com) for the 1940s and 1950s, and [www.iisg.nl](http://www.iisg.nl) for the 1930s.

# ON ST. EUSTATIUS THE AMERINDIAN PEOPLE SEEMED TO HAVE A SPECIAL RELATIONSHIP WITH HAWKSBILL TURTLES AND STINGRAYS

## 2. SINT EUSTATIUS

### AMERINDIANS

A significant Amerindian site excavated in the Caribbean Netherlands is the Golden Rock 1 site on St. Eustatius. Golden Rock 1 is a Saladoid site dating from around 600 to 900 AD, and was excavated in the 1980s by archaeologists from Leiden University. 'Saladoid' is a ceramic style identified with a specific cultural group of Amerindians that moved into the Lesser Antilles from the South American mainland, starting around 500 BC. The ethnic group who made these ceramics are referred to as the 'Igneri' in the Eastern Caribbean, and they introduced ceramic manufacture, agriculture, and a more sedentary lifestyle to the islands.

The archaeologists excavated several house plans. The houses, consisting of perishable materials, are all gone. The only visible remnants are features in the soil, differently colored stains, which indicate where the wooden posts used to be. By excavating and documenting these features, archaeologists can reconstruct what the houses may have looked like. The most interesting house found is the 'Sea Turtle House'. One of the structures has a very distinct pattern and, when the positions of the post are connected and seen from above, a drawing of the skeleton and carapace of a hawksbill turtle (*Eretmochelys imbricata*) appears. The floorplan of the house resembles the anatomy of this species in many ways. Although this interpretation might seem to be a stretch, a ceramic bowl shaped like a turtle was also found. Furthermore, a burial of a complete hawksbill turtle was found at the site. If people had caught this animal for meat, a proper burial would not be expected, and would certainly not be in the right anatomical position. This find is therefore interpreted as a cache, an intentional deposit of an object as a human practice to materialize a certain social relation between people and the buried context. Based on these finds it seems that the indigenous people living on St. Eustatius in the Late Saladoid period had a very special relationship with hawksbill turtles. Another house plan found at Golden Rock 1 was shaped like a stingray, suggesting this animal too occupied a special place in peoples' lives, as well as, the spiritual nature and role of animal representations in Amerindian life, a factor that did affect exploitation (Haviser 1994).

Besides several house plans, a midden was also excavated. This yielded an enormous amount of faunal remains. The identification of these remains provides information on the species that were used by the indigenous people of St. Eustatius in the latter half of the first millennium and allows for an interpretation of the subsistence patterns of the population (Versteeg & Schinkel 1992:74).



Faunal remains from Golden Rock consist of vertebrate and invertebrate, primarily crab, fish, and mollusc assemblages. A total of 45,103 bone fragments were found, which represent at least 525 individual animals. The majority of these remains is believed to be refuse of food consumption. A few finds are probably not food refuse, such as a skeleton of a hawksbill turtle which was found buried upside down in the lowest section of the midden, and which is believed to be a cache.

Marine mammal remains found in the excavation included an unidentified cetacean and the mandible of a Caribbean monk seal (*Monachus tropicalis*). Fish was most abundantly represented in the faunal sample. Like their Bonairean counterparts, the indigenous people of St. Eustatius also caught their fish using hook and line. In addition, they may have fished using nets as well. Most species in the sample

are those found in and around coral reefs and rocky banks. Fish that are normally seen in shallow coral reefs include parrotfishes (Scaridae), wrasses (Labridae), surgeonfishes (Acanthuridae), and squirrelfishes (Holocentridae). Species that favor deeper rocky banks include groupers (Serranidae), snappers (Lutjanidae), grunts (Haemulidae), and some jacks (Carangidae). The most prolific fish in

## **AROUND 600 TO 900 AD AMERINDIANS FISHED MAINLY ON FISH LIVING AT CORAL REEFS AND ROCKY BANKS**

the sample in terms of weight of the bone remains are the groupers. Parrotfishes, surgeonfishes, and wrasses represent a minority in the faunal assemblage. Interesting to note is that the plate-like scales of the triggerfish (Balistidae), which preserve well, were recovered in great numbers ( $n=962$ ). These were not included in the quantification of either the count or weight, as this would bias the sample (Versteeg & Schinkel 1992:80).

## **AMERINDIAN PEOPLE OF STATIA ALREADY USED HOOKS AND LINE TO CATCH FISH**

The best-known group of fishes in pelagic waters is the tuna family (Scombridae). These are not numerically abundant in the sample, but because the individuals represented are the largest fishes caught by the inhabitants of the Golden Rock site they are an important species in terms of biomass. Other pelagic species are the halfbeaks (Hemiramphidae), needlefishes (Belonidae), and scad (pelagic member of the Carangidae). The halfbeaks and needlefishes are only marginally important, and the scad is the most numerous represented fish. It was not possible to identify the species of scad accurately, but it is either a rough scad (*Trachurus lathami*) or a round mackerel scad (*Decapterus punctatus* or *Decapterus macarellus*). These were caught in great numbers by the inhabitants of Golden Rock as at least 187 individuals are represented in the site, accounting for almost half (44.6%) of the individual fish in the sample (Versteeg & Schinkel 1992:80).



**Grouper**

Source: Wikimedia



**Tuna**



**Scad**



Together with grouper and tuna, scad make up three quarters of the biomass estimate in the sample and were therefore the major contributors to the prehistoric diet. Scad were most likely caught with nets, while the grouper and tuna were probably caught with hook and line. Turtles further complimented the local diet. Turtle remains indicate a minimum number of three individuals caught.

## ALTHOUGH CAUGHT IN SMALL NUMBERS, THEIR LARGE SIZE MADE TUNA A MAJOR CONTRIBUTOR TO THE PREHISTORIC DIET, TOGETHER WITH GROUPER AND SCAD

Below is a list of all marine species (excluding shellfish) found in the excavation:

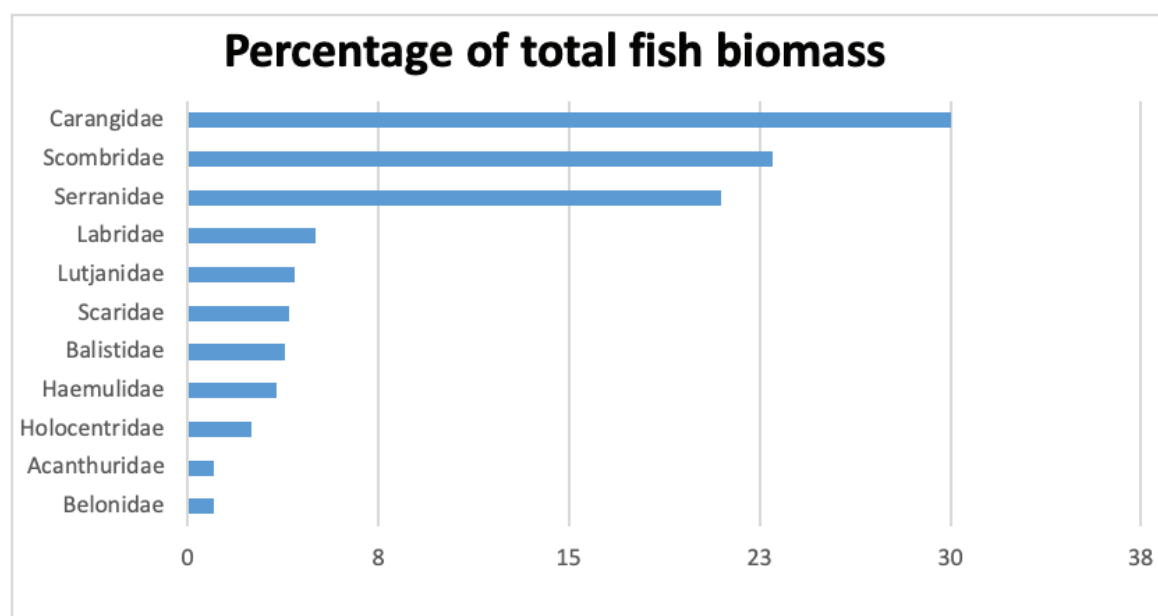
Family name	Species name	Common name
Selachimorpha		sharks
Muraenidae		morays
Hemiramphidae	Hemiramphus sp.	halfbeak
Belonidae		needlefishes
Holocentridae	Holocentrus sp.	squirrelfish
	H. cf. ascensionis	
	Myripristes sp.	soldierfish
Serranidae	Epinephelus sp.	grouper
	E. fulvus	coney
	E. cf. guttatus	red hind
	E. cf. adscensionis	rock hind
	E. cf. cruentatus	graysby
Carangidae	Trachurus sp.	scad
	Caranx sp.	jack
	C. cf. crysos	blue runner
	C. cf. ruber	bar jack
	C. cf. hippos	crevalle jack
	Trachinotus sp.	
	cf. Selar crumenophthalmus	bigeye scad
Lutjanidae	Lutjanus sp.	snapper
	L. cf. buccanella	blackfin snapper
	L. cf. mahogany	mahogany snapper
Haemulidae	Haemulon sp.	grunt
	H. sp. album	margate

	Anisotremus sp.	
	A. cf. surinamensis	black margate
Sparidae	cf. Calamus sp.	porgy
Sciaenidae		croakers and drums
Mullidae	Mulloidichthys sp.	goatfish
Kyphosidae		sea chubs
Sphyraenidae	Sphyraena barracuda	great barracuda
Labridae	Bodianus sp.	
	B. cf. rufus	Spanish hogfish
	Halichoeres sp.	
	H. cf. bivittatus	slippery dick
	H. cf. poeyi	black-ear wrasse
	H. cf. radiatus	pudding wife
Sparidae	Sparisoma sp.	parrotfish
	Scarus sp.	parrotfish
Acanthuridae	Acanthurus sp.	surgeonfish
	A. cf. coeruleus	blue tang
Scombridae	Euthynnus sp.	tuna
Balistidae	Balistes sp.	triggerfish
	Melichthys sp.	durgon
Diodontidae		porcupinefishes and burrfishes
Phocidae	Monachus tropicalis	Caribbean monk seal
Cetaceae		whales, dolphins
Chelonidae		sea turtles
	Eretmochelys imbricata	hawksbill turtle
Xanthidae	Carpilius corallinus	coral crab
Maiidae	Mitrax sp.	

The excavation also yielded a large quantity of shell material: 2,453 kg. More than 50 species of shell were identified. The majority of molluscs are inhabitants of the rocky shores surrounding the island. Most species are gastropods, while only a small quantity of bivalves was present in the midden (three species: *Arca zebra*, *Chama sarda*, and *Spondylus americanus*). Many intact *Cittarium pica* shells were found, indicating that this was a preferred food. Relatively few conch shells were found in the excavation. When this animal reaches full size, the average edible meat weight is reported to be between 100 and 170 grams. It is an excellent source of protein, being 74% protein by dry weight (Versteeg & Schinkel 1992:88). The conch shells were excellent raw material for artefact manufacture, such as axes and adzes made from the shell's lip. It is believed that relatively few conchs were transported to the site and ended up in the midden. Most animals were likely extracted on the beach and the shells deposited there. It is therefore believed that this shell species is underrepresented in the midden (Versteeg & Schinkel 1992:88).

## NOWADAYS, PROTEIN SOURCES ARE ABUNDANT, BUT IN HISTORICAL TIMES, QUEEN CONCH WAS AN EXCELLENT PROTEIN SOURCE

The role played by molluscs in the diet of the inhabitants of the Golden Rock site cannot be stated with certainty, since a complete insight into the components of the diet cannot as yet be discerned, i.e. the percentages of plant/meat/fish/shellfish in the diet. This is a problem specifically for the molluscs, as the archaeological reflection of the largest species, the queen conch, is most likely incomplete. However, bone collagen studies have suggested that marine resources supplied a large part of the protein in people's diet. Approximately 25% of the people's food intake at Golden Rock had a coral reef area origin. This percentage is similar in the population of coastal Suriname, but larger in extreme marine food consumers such as the prehistoric populations of Curaçao and Aruba (Versteeg & Schinkel 1992:91).



**Figure 10** Percentage of total fish biomass as part of the prehistoric diet per fish family, based on Golden Rock excavation

## COLONIAL ERA

When Christopher Columbus first sighted St. Eustatius on his second voyage, in 1493, the island was no longer inhabited. While it was probably used as a supply station for explorers, pirates, and privateers during the sixteenth century, not much is known about this period. St. Eustatius was permanently settled by the Dutch in 1636. In the ensuing two centuries, the island changed hands 22 times between the Dutch, British, and French before Dutch rule was permanently reinstated in 1816. St. Eustatius became a prosperous colony as a result of trading activities; the island was made into a free port in 1756. Its population rose from a few hundred colonists and slaves in the seventeenth century to a staggering 9,000 in the late eighteenth century. Including transient sailors and merchants, there may have been as many as 20,000 people on the island at any given time in the 1770s and 1780s. The marine environment played an important part in sustaining the population at this time.

It is only in the eighteenth century, during Dutch rule, that the first colonial-period references to fishing appear in the documentary record. Ship officer Cornelius de Jong spent several weeks in the roadstead of St. Eustatius in 1780 and 1781. He mentions that during the time they were at anchor, the crew killed time by fishing. He was amazed by the beautiful fish found in the waters around the island, and described various fish such as pufferfish, eels, and boxfish, which were

plentiful (De Jong 1807:171). In a letter sent to a friend in the Netherlands in 1792, traveler Zimmerman l'Ainé remarks that there is excellent fish and turtle on St. Eustatius, which people cook to perfection. He mentions differently colored fish, such as a red fish they locally call 'Hein' (red hind – *Epinephelus guttatus*). He also mentions that the lobsters are four times larger than those in Europe (NA 3.01.26 – 161).

### **TURTLES WERE HEAVILY EXPLOITED ON ST. EUSTATIUS AND EXPORTED THROUGHOUT THE REGION. THE NAME TURTLE BAY HINTS AT THE SIGNIFICANCE OF THIS RESOURCE DURING THE COLONIAL PERIOD**

even exported throughout the colonial period (Gilmore 2004:170). One bay on the east coast of the island was – and still is – called Turtle Bay, hinting at the significance of this resource. This bay exhibits a wide beach, which is used by turtles to lay eggs. Coming up to the beach at night, they would have been easy prey and once caught, provided ample food. While turtle meat was consumed by slaves on St. Eustatius and throughout the Caribbean, visitors to the island consumed turtle as well; ship doctor Joannes Veltkamp reports having eaten it in 1761 (Baars 2014).

Slaves supplemented their diets – and the diets of others – by fishing. They used canoes for this purpose, which were beached at Lower Town. Stealing fish from other people's pots was a common practice among slaves (Schiltkamp & Smidt 1979:340). Turtle was heavily exploited by slaves on St. Eustatius and

### **STEALING FISH FROM OTHER PEOPLE'S POTS WAS A COMMON PRACTICE AMONG SLAVES**

### **ACCORDING TO VISITORS IN 1761 THE TURTLES ON ST. EUSTATIUS WERE NUMEROUS AND VERY LARGE**

"The turtles here are numerous and very large. One day, we were invited to eat turtle and we found ourselves at a table with twenty people who thoroughly enjoyed the meal. The top shell was the main dish, and was filled with a tasty soup that contained turtle meat that was rolled into little balls".



**Figure 11** Turtle catchers. The back of the picture reads: "This picture was taken in 1932 [...] the turtle came up on the sand to lay her eggs, was caught on Zeelandia Beach before laying. Was brought into Town by donkey cart. Butchered a few days later – found two hundred eggs inside her. She weighed 590 or close to 600 pounds (Collection of Siegfried Lampe offered by the St. Eustatius Center for Archaeological Research collection).

On the plantations, queen conch was not only used for food; the shells were used as musical instruments and means of communication. On many islands, it was customary that the overseer blew on a conch shell in the morning as a signal to wake people up or to start work. As well, conch shells have been identified as an important grave-marker for enslaved African burials, associated with plantation sites. The plantation systems on the various islands would have had an impact on marine resources usage, more than just conch shell use, including control over the resource areas exploited and the means to acquire them, like boats access, and cultural preferences for selected species. For this reason, the plantation systems, both large and small-scale, have played a key role in affecting the colonial marine resources baseline.

## PLANTATIONS RESTRICTED MARINE RESOURCE USE, BY RESTRICTING ACCESS TO THE COAST FOR FISHERS

## WEST INDIAN TOP SHELL WERE AN IMPORTANT PART OF THE DIET OF SLAVES ON ST. EUSTATIUS

Many fragments of West Indian top shell (*Cittarium pica*) were encountered in the excavation of a slave quarters at Schotsenhoek plantation, indicating that this was an important part of the diet (Stelten 2015).

An ordinance from 1783 specifies the prices of certain types of fish that were caught and sold locally, including scad (*Selar crumenophthalmus*) and jacks (*Caranx latus* & *Caranx ruber*) (Schiltkamp & Smidt 1979:320). Herbivorous reef fish such as parrot fish (*Sparisoma viride*) were also part of the local diet; parrotfish bones were found in excavations on Pleasures Estate by Gilmore (Gilmore 2004:168).



A significant problem for Statia's fishery throughout the years has been ciguatera poisoning. Ciguatera is a foodborne illness caused by eating fish that is contaminated by ciguatera toxin. Ciguatera toxin is a heat-stable lipid-soluble compound, produced by dinoflagellates and concentrated in fish organs, which can cause nausea, pain, and cardiac and neurological symptoms in humans when ingested. The toxin may be found concentrated in large reef fish, most commonly barracuda, grouper, red snapper, eel, amberjack, sea bass, and Spanish mackerel. These fish live in coral reef waters and accumulate the toxin when they eat smaller reef fish which in turn feed on the dinoflagellates.



Barracuda



Grouper



Red snapper



Eel



Amberjack



Sea bass



Spanish  
mackerel

Source: Wikimedia

Various colonial-period sources mention poisoned fish in Statian waters. Marten Douwes Teenstra, an early nineteenth-century visitor, remarks that Statia's coasts were teeming with fish, yet many were poisoned. Therefore, not much fish was caught locally, but most was imported (Teenstra 1837:359). De Jong's account vividly describes ciguatera poisoning on his ship. It was said that

## **FISH IN STATIAN WATERS WAS OFTEN POISONED DUE TO THE CIGUATERA TOXIN, WHICH IS PRODUCED BY DINOFLAGELLATES**

the way to determine if a fish was poisoned or not, was to bite in its liver. If that gave a prickly sensation on the tongue, the fish would be poisoned. However, this was not a very reliable test. One day, the crew caught two large fish, which, after being tested, were deemed safe to eat. The crew enjoyed the fish, but a few hours later, everyone became sick and exhibited fever, sharp pains in the belly, and vomiting. This lasted between six and twelve days (De Jong 1807:174).

It was a well-known fact that fish in Statian waters were poisoned, as throughout the nineteenth century, various sources remark on this. The 1823 Transactions of the Royal Society of Edinburgh mention that "the fish [at St. Eustatia] are so remarkably poisonous, that fishermen rarely exercise their trade in that part of the sea." Another source provides a more nuanced account: "All the fish taken between St. Eustatius and St. Kitts are said to be poisonous, although fish of the very same kind taken on the other coasts of the island are harmless. The barracouta, the king fish, the horse eyed cavallee, and even the dolphin are at times poisonous (The Pharmaceutical Journal and Transactions, Volume XII, 1852-1853)." It is thus likely that local fishermen, having an intimate knowledge of their fishing grounds, only fished in certain areas and targeted only certain species.

## **MODERN HISTORY**

Oral historical accounts from people born in the early twentieth century provide detailed information on fishing practices at the time. By the early twentieth century, the island's population had decreased to a mere 900. The decline had already set in at the turn of the nineteenth century, when trade restrictions caused St. Eustatius to lose its status as a free port. Charles Arnold, born in 1900, mentions that when

**CHARLES ARNOLD, BORN  
IN 1900, MENTIONS THAT  
WHEN HE WAS YOUNG, FISH  
WAS ABUNDANT AROUND ST.  
EUSTATIUS AND THERE WERE  
VAST NUMBERS OF LOBSTERS**

he was young, fish was abundant around the island. People frequently fished for jack and red hind. At this time, there were vast numbers of lobsters in St. John's waters: "In those days you could put the water on to boil and go down to the beach – you wade off not to your knee and Barracuda Grouper Red snapper Eel Amberjack Sea bass Spanish mackerel pick up lobsters and come back and cook them. [...] You just catch 'em to eat. We didn't have any market where anybody came in and buy them. You just go out and catch 'em for eating on the island. And all on the shore, all up where the pier is and all around there on the rock you could go in yourself and catch them. All up on the bay side, on up under the bay, they didn't even go on the back at that time, because you could get all you want here right in the front (Crane 1999:22)."

## IN THE EARLY 20TH CENTURY TURTLES DO NOT COME UP TO THE BEACH TO LAY EGGS AS MUCH AS THEY USED TO

for a cent. Soldier crabs were also used for bait. A big advantage according to Arnaud is that the fish caught on the rocks, as opposed to those caught by boat, is not poisoned. Arnaud mentions that in particular the barracuda and 'couvalli' (*Caranx hippos*) are poisoned. When Arnaud was young, St. John's fishermen would still go to Bird Islands to catch turtles and fish (Crane 1999:124). He also mentions that turtles do not come up to the beach to lay eggs as much as they used to.

## HE ALSO MENTIONS THAT TURTLES DO NOT COME UP TO THE BEACH TO LAY EGGS AS MUCH AS THEY USED TO



**Figure 12** Fishermen on Zeelandia Beach (St. Eustatius Center for Archaeological Research collection).

Abraham Arnaud, born in 1906, provides further insights into fishing practices in the early twentieth century. While some fishermen chose to go out by boat, some fished from the rocks at Zeelandia and other bays using rods and later plastic lines, but also nets. One of the species targeted frequently was sprat, which were used for bait and to eat (Crane 1999:122). One fisherman would sell 40 or 50 sprats

## **IN 1907, THERE WERE ONLY 24 PEOPLE ENGAGED IN FISHERIES ON STATIA**

job carried out in the mornings; during the day fishermen would work in the fields (Boeke 1907). Apparently these efforts did not meet local demand: according to a newspaper article in the *Amigoe di Curaçao*, 22-11-1913, conserved fish was imported to St. Eustatius for a value of 969 guilders in 1912 and 711 guilders in 1911. Several decades later, in 1942, the local fishing industry had dwindled due to better prospects in agriculture. Therefore, in this year no fish was exported (Curaçaosch verslag 1943:55).

Fishing in the early twentieth century was not practiced on a large scale. A report from 1907 mentions that two years earlier, there were only four fishermen who owned a rowing boat, and about twenty fishermen who would join in the boats to help fish with nets. Fishing was mostly a part-time

**IN THE EARLY 20TH CENTURY FISHING WAS MOSTLY A PART-TIME JOB CARRIED OUT IN THE MORNINGS; DURING THE DAY FISHERMEN WOULD WORK IN THE FIELDS**

# 3. SABA

## AMERINDIANS

Extensive archaeological research has shed light on subsistence strategies and the social implications of consuming seafood on Saba from its earliest inhabitants to the end of the colonial period. The Archaic Age site of Plum Piece, dating from around 1,875 to 1,520 BC, was inhabited by Amerindian people who lived a hunter-gatherer lifestyle. The site was excavated by Leiden University and provides evidence of the subsistence strategies of the island's earliest inhabitants. Interestingly, the oldest evidence of people in the Lesser Antilles is found in the northern islands, indicating that people settled the islands in a backward stepping-stone fashion. The reason for this may be that from Saba onwards, the next island in the chain (Anegada) is not visible on the horizon, but it can also be that the rich fishing grounds of the Saba Bank provided an incentive to settle in this area first.

Fish and cartilaginous fish (sharks and rays) were the fourth largest category of animal remains encountered in the excavation (Jorissen 2017:55). Forty-one taxa were identified with a minimum number of individuals (MNI) count of 156. These included sea basses and groupers (29%), needlefish (14%), surgeonfish (14%), jacks, pompanos and scads (11%), parrotfish (7%), grunts (7%), wrasses (6%), squirrelfish (6%), and snappers (5%). This data clearly shows that during the Archaic Age, the majority of fish were caught on coral reefs and pelagic fish were barely exploited. Moreover, molluscs constituted a very small part of the diet as well (Jorissen 2017:57).

**BETWEEN 1,875 AND 1,520 BC, THE MAJORITY OF FISH WAS HARVESTED FROM CORAL REEFS**

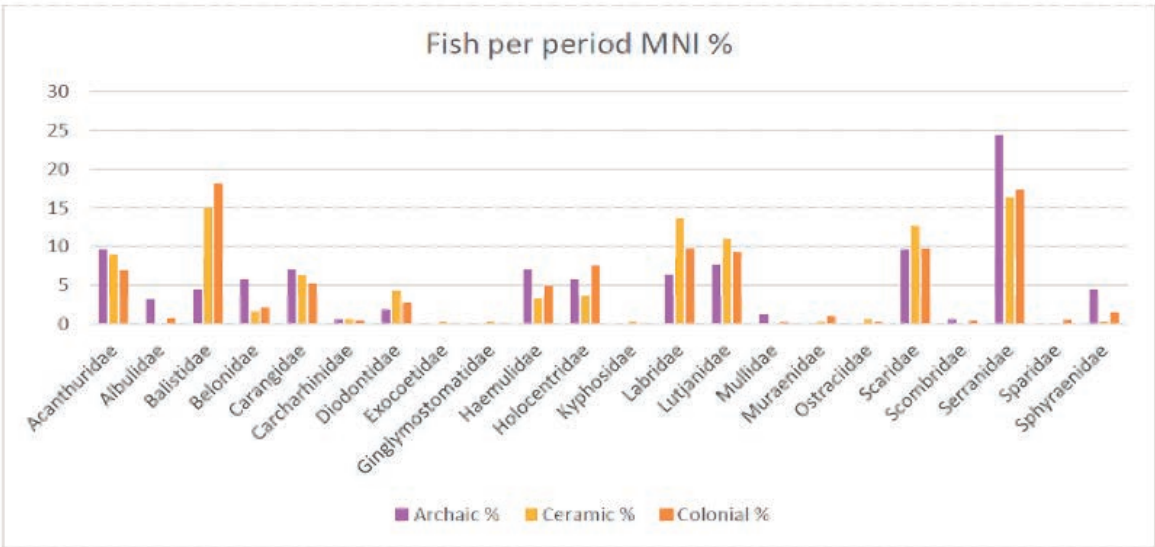


Figure 13 Percentage of individuals per family as encountered in the archaic, ceramic or colonial period.

## BONY FISH, SHARKS, RAYS AND MOLLUSCS WERE IMPORTANT FOOD SOURCES BETWEEN 400 AND 1400 AD

The Ceramic Age sites of Spring Bay and Kelbey's Ridge, dating from around 400 to 1400 AD, were inhabited by Amerindian people who complemented their hunting and gathering diet by agriculture in a way similar to that of the Saladoid period people on St. Eustatius. These sites were excavated by Leiden University, and present a similar fishing strategy compared to the to the Archaic Ag. In the Ceramic

Age, fish and cartilaginous fish became one of the most important classes of animals to be exploited. Species exploited during this time are generally similar to those targeted in the Archaic Age (Jorissen 2017:58). However, in de Ceramic Age the pelagic and shallow-water habitats decline in favor of an even higher reliance on the coral reef habitat (Jorissen 2017:98). In addition to fish, true seal remains (Phocidae) were also encountered. Molluscs, mainly nerites (Neritidae), tegulas (Tegulidae), and chitons (Polyplacophora), constituted a larger part of the diet in the Ceramic Age than before. During both the Archaic and Ceramic Ages, turtles were hunted for food as well. However, turtle remains appear in low numbers, likely due to the fact that there are no permanent beaches on Saba where turtles were easiest to catch.

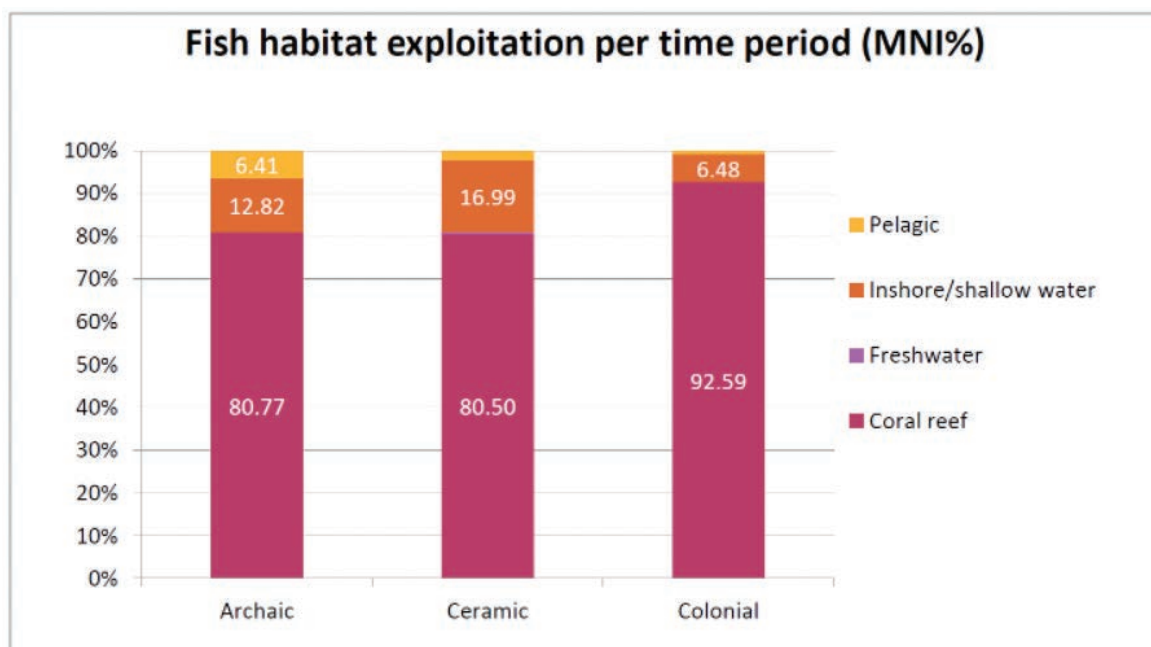


Figure 14 Fish habitat exploitation per time period.

## COLONIAL ERA

Saba was settled by the Dutch from St. Eustatius in the 1640s. A decade later, the island housed 111 people, a number which increased steadily. At the turn of the seventeenth century, 453 people lived on the island, a number which rose to 1,301 by 1815. As the nineteenth century progressed, population numbers grew from 1,617 in 1847 to 2,458 in 1888 before dropping sharply to around 1,500 people throughout the first three decades of the twentieth century. Plantations were set up and the island changed hands much like on St. Eustatius, which was the main of the SSS islands (Saba,

## ENSLAVED AFRICANS RELIED ON DIFFERENT SHELLFISH SPECIES FOR FOOD



St. Eustatius and St. Maarten) at the time. As opposed to St. Eustatius, which only had one large settlement, Saba had many different small settlements throughout the colonial period, including The Bottom, Windwardside, Hell's Gate, Mary's Point, Palmetto Point, Middle Island, and Behind-The-Ridge.

Fishing practices changed during the Colonial period and the differing exploitation of marine resources by various social groups becomes apparent through archaeological research. Espersen's extensive research has shown that the diet of enslaved Africans living at Flat Point relied heavily on shellfish such as *Fissurella nodosa*, *Chiton* sp., *Cittarium pica*, *Littorina* sp., and *Purpura patula*. Interestingly, the remaining part of the faunal assemblage for this site was comparatively small, especially with regards to fish. Only 64 Craniata sp. remains were found, mostly consisting of scales with some small vertebrae and pectoral fins (Espersen 2017:161).

Not all people on colonial Saba, however, relied so heavily on shellfish. The 2013 excavation of a privy pit in The Bottom provides important clues in this regard. The privy contained just one keyhole limpet (*Fissurella nodosa*), a fragment of *Purpura patula*, locally known as the "Frenchman's whilk", and a bivalve shell. The only other shells present were three fragments of *Cittarium pica*, which may be derived from secondary use by Caribbean soldier crabs (*Coenobita clypeatus*) that were attracted to the food refuse in the pit.

Conversely, over three kilograms of non-shell faunal material was recovered from the privy pit. The remains included large mammals such as cattle (*Bos*) and goats (*Capra*); wild avian species; smaller sharks or rays; large, fast-swimming fish species such as tuna (*Thunnus* sp.) and jacks (*Caranx* sp.); and smaller reef fish species such as triggerfish (*Balistoides*), squirrelfish (*Holocentridae*), and parrotfish (*Scaridae*).

While the faunal diet is composed of a wide range of terrestrial, avian, and marine species, shellfish remains are almost completely absent in comparison. All other trash pits on Saba excavated by Espersen, and others excavated or seen across Saba, have so far all contained sizeable proportions of shellfish relative to other faunal remains. This includes high elevation sites such as Behind-the-Ridge in the upper reaches of Hell's Gate. This shows both that they were a common component of the Saban diet, and that they were accessible to all Sabans regardless of distance from shorelines. Their scarcity in the privy pit in The Bottom, therefore, demonstrates that they were deliberately excluded from the diet of this site's households for over one hundred years. Intertidal shellfish, therefore, are a common component of lower-class diets, and probably not considered fare for Saba's upper class. The near absence of intertidal shellfish as part of the site's households throughout the eighteenth and nineteenth centuries strongly implicates shellfish to a component of a lower-class diet, and not commonly consumed by Saba's upper class (Espersen 2017:229). The presence of pelagic fish remains in the privy suggests that the household had access to a large, offshore boat, or that they had the social and financial means to regularly procure pelagic species.

## **IN THE COLONIAL PERIOD, MAINLY REEF FISH WERE CAUGHT AND CONSUMED, ESPECIALLY TRIGGERFISH**

Excavations of sites at Middle Island, Palmetto Point, and Behind-The-Ridge provide further insights into diets in the Colonial Period. The diets of residents of all three villages appear to rely upon large mammals, shellfish, and fish as primary food sources. Shellfish assemblages consisted mostly of intertidal shellfish such as *Neoloricata* sp. and to a smaller extent

*Fissurella nodosa*, *Cittarium pica*, and several others. Interesting to note is the absence of queen conch in the Colonial Period assemblages. The sites contained many different fish remains,

nearly all species that are typical of a shallow water/coral reef habitat. However, even though the assemblage is varied, *Ballistes* spp., or triggerfish, was present in much larger quantities than all others. No deeper water reef fish, such as yellowtail snapper (*Ocyurus chrysurus*) or red snapper, locally known as “redmen” (*Lutjanus campechanus*), were present in the assemblage, and also lacking are any of the large, open water species such as yellowfin tuna (*Thunnus albacares*), dolphinfish (*Coryphaena hippurus*), or wahoo (*Acanthocybium solandri*). Mackerel, together with Atlantic cod (*Gadus morhua*), are species that were commonly salted and sent to the Caribbean as “salt fish”. In light of the absence of other open water species, the mackerel remains found are almost certainly salt fish. In addition, at least three moray eels (*Muraenidae*) were found at Middle Island, and either shark, stingray, or skate at Palmetto Point.

## **MOST INHABITANTS OF SABA DID NOT HAVE THE ECONOMIC OR SOCIAL MEANS TO BUY BOATS LARGE ENOUGH TO FISH OFFSHORE**

Together these assemblages of shallow reef fish and salt fish suggest that the inhabitants of Behind-the-Ridge, Middle Island, and Palmetto Point did not have the economic or social means to acquire larger, seaworthy boats capable of offshore fishing, and especially in the case of Middle Island, residents did not discriminate between fish in terms of suitability as food. Therefore, the diet consisting of these reef fish at Middle Island, Palmetto Point, and Behind-the-Ridge is indicative of lower class (Espersen 2017:304). Throughout much of the colonial period,

it seems that fishing was an important means of subsistence on Saba. Teenstra, for example, mentions that “The men, most of whom are fishermen, catch large quantities of turtles and other species of fish, which they sell on neighboring islands, while also on this island [Saba] excellent and much sought after, fast sailing row boats and canoes are produced (Teenstra 1837:368).” Moreover, Governor Jan de Windt of St. Eustatius described Saba in 1773 as an island inhabited by poor people, who subsist on fish and turtles as a means to support their families (NA 1.05.01.02 – 629).

Further evidence of Sabans’ extensive fishing operation in the late eighteenth century is found in shipping records. For example, six different ships made a total of 71 voyages from Saba to St. Eustatius in 1787, of which only two made a single trip. In this year, total imports from Saba comprised 63 bales of cotton, 52 bags of coffee, 3 hogsheads of rum, 46 hogsheads of sugar, and 47 turtles

## **IN THE LATE 18TH CENTURY FISHING WAS AN IMPORTANT ACTIVITY BOTH IN ECONOMIC TERMS AS IN TERMS OF FOOD PROVISIONING**

## **IN 1787 TURTLES MAY HAVE DECREASED ON STATIA DUE TO FISHING, AS FISHERMEN FROM SABA BROUGHT TURTLES TO STATIA**

(NA1.05.01.02 – 1330). As Saba was not a transshipment center, these products would have been produced and caught locally. The import of turtles is particularly interesting to note. These were brought from Saba on two vessels, the *Eagle* and the *Seaflower*, in July. On November 19, the *Seaflower* arrived on Statia from Hispaniola with a cargo of 40 turtles. On December 7, the *Eagle* dropped anchor in Statia’s roadstead with thirteen turtles from Los Roques. This points to two things: first, that there

was a demand for turtle meat on St. Eustatius, indicating that there might not have been enough turtles left in Statian waters to satisfy local demand; and second, that Saban captains, after

delivering two cargoes of Saban turtles, had learned of this fact as they were actively scouring the Caribbean for more turtles to sell on St. Eustatius.

At some point in the mid-nineteenth century, Sabans left the fishing industry en masse, as late nineteenth- and early twentieth-century sources paint a very different picture. In 1854, the island counted just two fishermen (Tweede Rapport 1856). Again, this is a reporting of commercial fishing by Sabans, which indeed declined, however the regular and consistent personal-use fishing continues until today, which is a factor for baseline calculations of population needs.

## IN 1854 SABA COUNTED JUST 2 COMMERCIAL FISHERMEN

### MODERN HISTORY

In the first decade of the twentieth century, Sabans were regarded as excellent fishermen and many worked on fishing vessels on other islands or the South American coast. At this time, however, the fishing industry on Saba itself was very small (De Bussy 1907:128). This situation continued well into the twentieth century. A 1913 newspaper article from the *Amigoe di Curaçao* mentions that Saba has no full-time fishermen. Instead, fishing was done



**Figure 15** Fishermen launching a boat on Saba (Nationaal Archief Den Haag, Fotocollectie Rijksvoorlichtingsdienst, 2.24.10.02, 121-1118).



**Figure 16** Fishermen relaxing on a boat on Saba (Nationaal Archief Den Haag, Fotocollectie Spaarnestad Onderwerpen, 516033).

## IN 1913 THERE WERE NO FULL-TIME FISHERS ON SABA AND FRESH FISH WAS NOT MEETING LOCAL DEMAND

occasionally by planters and sailors. In 1938, imported fish could not meet local demand. At this time, many people had left the island and even though the government provided the community with a fishing vessel in 1938 and again in 1942, this did not provide an impetus to the dwindling fishing industry (Curaçaosch verslag 1939:33; 1943:55). In 1945, fishing was still practiced on a very small scale and people regularly complained about the lack of fresh fish. This was particularly true for the people of Windwardside, as any fresh fish that reached the island was often sold in The Bottom (Curaçaosch verslag 1946:60).

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