

Medieval Lighthouses

Part 12 - Lights of Empire

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ABOVE: The castle of Belem in Lisbon was built 1514-20, largely to celebrate successes abroad. It was used as a medieval lighthouse during the period when Portugal led the Age of Discovery.

The period known as the Age of Discovery probably began with the voyage of Henry the Navigator (1415–1460) of Portugal who sponsored the systematic exploration of the West African coast. It led to the discovery of Madeira (1419), the Azores (1427), and Cape Verde Islands (mid-15th century).

His compatriot Bartolomeu Dias (1487–1488) was the first European to sail around the Cape of Good Hope, proving access to the Indian Ocean via Africa's southern tip.

Spaniards were first to venture across the Atlantic Ocean in 1492 with Columbus seeking a western route to Asia. Britain's John Cabot sailed farther north in 1497 to find Newfoundland and the north American coast.

By the time Vasco da Gama (1497–1499) reached India by sea, rounding Africa and establishing a maritime trade route to Asia, it had become clear that there were great riches to be found in these new worlds. Portugal celebrated by constructing the castle of Belem in Lisbon which was lit by night, and as the portfolio of ownership abroad increased, so did the first fortified Imperial sites appear outside of Europe - with lights set up to mark their locations.

Objectives

To give an outline of the use of navigation lights at the start of the period of European Imperialism.

Lights During The Age Of Discovery

We have considered the part played by lightstructures during the times when civilization advanced through maritime trade and commerce. However, another aspect is their role during the growth of empires in the late middle ages.

There is a great deal to consider here and the full story of this phase of lighthouse development has yet to be reported. Almost all of the discussion has been focused on Europe as if to say that there is nothing to report elsewhere in the world. Indeed, this is largely the case, for there is so little solid data to work with.

In ancient times discussed in Volume 1 there was nothing reported as taking place in China, or indeed Asia in general, whilst Africa, Australasia and the Americas remained in primitive states of development. I could argue that the situation was exacerbated during the Medieval period of this study as European civilization advanced considerably compared to the rest of the world. I have already stated that lighthouse development seems to equate rather well with the development of civilization in the broadest sense.

It will become clear in Volume 3 how the major European nations that nurtured Imperial ambitions in fact exported lighthouse technology around the world. On its own, that story would be misleading, for there is no doubt that the use of lanterns and fires that we have now learned about throughout Europe before 1700 also played a significant role in assisting the mariner explorers.

The Age of Discovery, also known as the Age of Exploration, began in the early 15th century driven by a mix of economic ambition, technological innovation, religious motives, and geopolitical competition. By the 1400s, Europe was recovering from the Black Death, and powerful states like Portugal and Spain were becoming more centralized and ambitious. At the same time the Ottoman Empire had captured Constantinople (1453), disrupting traditional land trade routes to Asia. Demand in Europe was rising for spices, silks, gold, and exotic goods from Asia and Africa.

Thus there were strong economic motives. Europeans sought direct sea routes to Asia to bypass Arab and Venetian middlemen. Control of the spice

trade (pepper, cloves, cinnamon) promised great profits. In parallel were the technological advances in navigational tools such as the compass, astrolabe, and improved Portolan charts. Shipbuilding too was improving with the development of the caravel - fast, maneuverable ships with lateen sails. And then, improved cartography inspired greater confidence in long-distance voyages.

A potent, religious zeal was added to the mix, especially strong in the Iberian kingdoms of Portugal and Spain. They were particularly motivated to spread Christianity after centuries of fighting Islamic powers and, as they had done when they participated in the Crusades, they often viewed exploration as a holy mission, attaching Christian names to the places where they landed.

Finally there were political and strategic ambitions as emerging monarchies competed for global prestige and territorial expansion.

Rulers like Prince Henry the Navigator of Portugal (1394–1460) invested heavily in maritime exploration. In 1415, Portugal captured Ceuta in North Africa, an event that marked the start of overseas expansion. Portugal then sponsored voyages down the West African coast, so explorers like Gil Eanes (1434) and Bartolomeu Dias (1488) progressively ventured farther south.

Famously in 1492 Christopher Columbus, an Italian explorer from Genoa but sailing for Spain, reached the Caribbean, believing he had finally found a westward route to Asia. This set off a rush for exploration, conquest, and colonization by Spain and later other European powers.

By the early 1500s, exploration became truly global. In 1498 the Portuguese Vasco da Gama reached India via the Cape of Good Hope. Then in 1519–1522 Magellan, a Portuguese sailing for Spain completed an expedition to circumnavigate the globe. European powers then began to establish colonies, trading posts, supported by naval forces in Africa, Asia, and the Americas.

So, the Age of Discovery began in the early 15th century, spearheaded by Portugal, fueled by a desire for wealth, faith, knowledge, and power, and enabled by maritime technology. It transformed world history - often with violence we find sickening today - by connecting continents, reshaping economies, and initiating European imperialism. The development of a global network of lighthouses followed inevitably.

The Legacy Of Empire

As of 2025, there are 195 countries in the world, and of these, 145 countries have coastlines whilst 50 countries are landlocked with no coastline at all.¹ However these 21st century nations were configured politically during the medieval period, their lands were clearly open to visits from the sea.

On the whole, European nations grew in power and dominance earlier than the peoples of the other continents such that, over history, the vast majority of the world's modern countries were, at some point, under the control or influence of European empires, particularly during the 15th to 20th centuries, times now known as the age of exploration, colonialism, and imperialism. Out of the 195 current sovereign states, approximately 165 to 170 countries were once colonized or ruled by a European power.

The main empires responsible for overseas colonization were Portugal, Spain, Britain, France, The Netherlands, Belgium, Germany, Italy, Russia² Denmark and Sweden.³ Most island nations were colonized by the British, French, Dutch, or Germans. Even in Europe, countries like Ireland, Estonia, Latvia, and Lithuania were once under larger empires (British, Russian, Swedish, for example).

A very small number of countries were never colonized in the traditional sense, for example Japan, Thailand (Siam), Liberia, Ethiopia (briefly occupied by Italy but not fully colonized). North and South Korea, depending on interpretation were colonized by Japan, not Europe. Thus around 85–90% of today's countries were once part of a European empire and the legacy of this colonization still shapes languages, borders, legal systems, and economies worldwide. The colonial legacy is also very evident when we consider the world network of lightstructures.

My main argument is that being more powerful, by definition, the Imperial nations were able to greatly influence the development of infrastructure, including ports, harbours and, of course, lighthouses. Even countries such as China and Japan were never colonized, but were still very much influenced by Britain in terms of maritime affairs. Both countries would rely heavily upon British lighthouse technology to improve their economic and political situations.

This entire subject will be covered extensively in Volume 3, but it is necessary to consider the

situation here also because the Age of Discovery began in this period of consideration.

Whilst not exactly a colonial lighthouse, a good starting point is at Belem in Lisbon. The Belém Tower (Torre de Belém) played a notable role not only as a fortification but also as a navigational aid during the Age of Exploration. Constructed between 1514 and 1520 during the reign of King Manuel I, the Belém Tower was designed by architect Francisco de Arruda. Its full name is the Tower of Saint Vincent (*Sao Vicente*, after Lisbon's patron saint).

Built on a small island in the Tagus River (*Rio Tejo*) estuary, it was intended to guard the entrance to the port of Lisbon, one of the busiest and most important ports in Europe at the time. While primarily a military fortification, the Belém Tower had secondary functions that supported maritime navigation. This model is typical of many other constructions that we shall find across the world. Its distinctive Manueline style, ornate design, and prominent location made it a highly visible landmark for sailors. Approaching ships from the Atlantic used the tower to identify the entrance to the Tagus River and orient themselves toward Lisbon's harbour.

The tower housed cannon emplacements that could be used not only for defence but also to signal the arrival of ships, warn of enemy vessels, or coordinate port activities. Signals from the tower were used in harbour control - part of a broader communication system that included other nearby fortifications like the Fort of São Julião da Barra.

Symbolically, the tower became an icon of the Age of Discovery, marking the departure point of explorers like Vasco da Gama. Returning ships also looked for the tower as a sign they had arrived safely home.

There is no record of a dedicated lighthouse or fixed beacon being installed on the Belém Tower in its early years. However, torches or fire baskets may have been used occasionally as temporary lights, and this was a common practice at many fortified coastal sites before formal lighthouses were adopted after 1700. Today, the tower stands as one of Portugal's most famous monuments and a UNESCO World Heritage Site, symbolizing the nation's maritime heritage.



ABOVE: An engraving of Portuguese Ceuta (Septa) in North Africa in the early 1600s. As was now proven to be so useful across Europe, irregular lights and fires were important in assisting the Portuguese navigators to find safe haven when far from home.

Colonial Lights

The first colonial “lights” were informal - fires, torches, and lamps on forts or towers. The Portuguese were the earliest to use systematic maritime lighting outside Europe (Ceuta, Elmina, Goa). The Spanish Caribbean followed closely, with makeshift lights by the early 1500s. True masonry lighthouses - with towers, lenses, and regulated keepers - came much later, generally in the 17th-18th centuries.

Portuguese Empire

Ceuta (1415)

Captured from the Moors in 1415, Ceuta was Portugal’s first overseas possession. It was a fortified port and naval base guarding the Strait of Gibraltar. Existing Muslim watchtowers that may well have had fires or lanterns were repurposed by the Portuguese and there is some evidence (see Cortesão, *Portugalae Monumenta Cartographica*, vol. I) that Ceuta’s towers served as night marks for shipping entering the strait. Ceuta was still under Portuguese control until 1640 when it became Spanish. By the early 17th century, Ceuta had regular beacon fires on its citadel and possibly a lamp on the Torre de Vigia near the port entrance. The *Livro das Fortalezas* (c.1509-1521) depicts the citadel’s towers, and later 17th-century Spanish portolans note the *luz de Ceuta*. This was probably a signal for military and convoy traffic in the Strait of Gibraltar.

An open-flame beacon or oil lamp was maintained by garrison guards. Their watch duty (*vigia de noite*) included keeping beacon fires burning when Portuguese or allied ships were expected. Early 17th century orders in *Regimentos das Fortalezas do Norte de África* specify “custody of the light” as part of night watch duties.

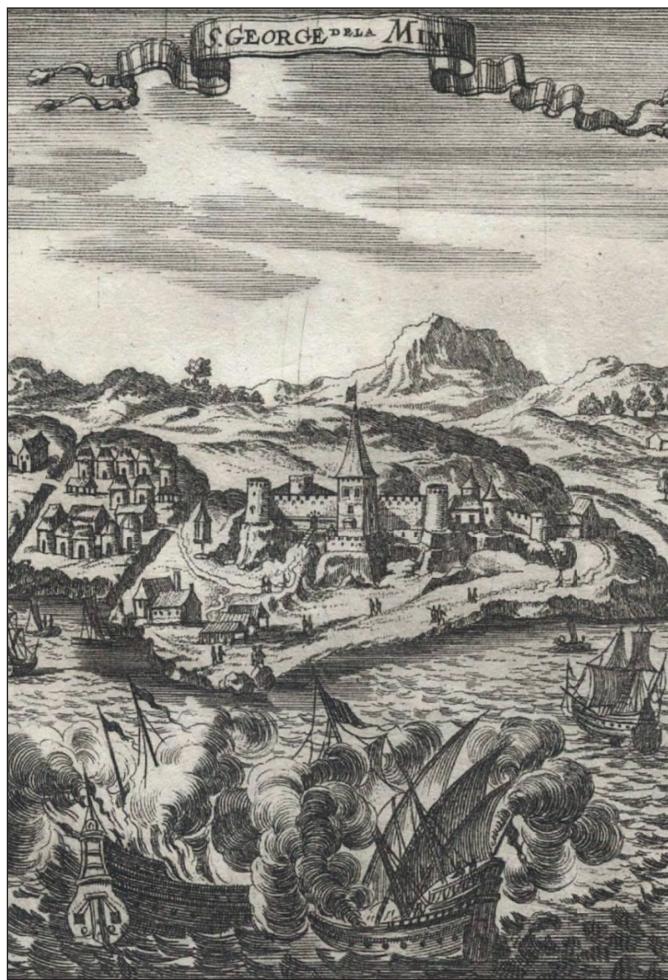
Madeira (1420s) and Azores (1430s)

These were early plantation economies, settled and cultivated with sugarcane. Funchal, the main city of Madeira, became a prosperous Atlantic port and stop-over. By the mid-17th century, the Farol de São Lourenço promontory is mentioned in Portuguese navigation charts as a place where fires were lit for ships. There was no permanent tower here, but the city maintained signal fires and lamps near the customs quay and chapel of São Pedro. Mariners used church lights as landfall guides - an early hybrid of religious and navigational illumination. The Azores archipelago was also a vital waypoint on Atlantic routes. Mariners often used bonfires or torches on promontories to signal safe landfall, particularly near Angra do Heroísmo. The earliest formal light in Madeira at São Lourenço appears only in the 18th century, but ad hoc lighting is well attested.

In Funchal, local fraternities and harbour officials managed the lights. Fires or lamps were lit near the chapel of São Pedro or the customs quay. Church sextons sometimes tended the lights when vessels were due, continuing the medieval pattern of ecclesiastical watch-keeping.

São Tomé and Príncipe (1470s)

This island in the bay of Guinea was the first tropical sugar plantations using enslaved African labour. Its economic value made it important to locate in the unknown seas of West Africa and fires ashore were used to find it.



ABOVE: The Portuguese-built castle of St. George at Elmina on Africa's Gold Coast in 1685. Lights were shown here to assist ships into port.

Elmina (1482)

A fortress and trading post called *São Jorge da Mina* became central to the gold and slave trades of west Africa from 1482 at Elmina on the Gold Coast. The fortress had a tower facing seaward and there are sources⁴ that suggest a lamp or brazier may have been used to assist approaching ships. Its main purpose was defensive, but the fort's visibility itself functioned as a landmark. Elmina was captured by the Dutch East India Company in 1637. Dutch records in the 1640s refer to a "lantern in the castle tower" lit at night when company ships were expected. This is among the earliest documented fixed colonial lights in sub-Saharan Africa. Operated intermittently, it was probably an oil-burning lamp or brazier type of light. Under the Portuguese, garrison slaves or African auxiliaries probably tended the fires under supervision. When the Dutch ruled, company-employed Africans (often coerced) maintained the lantern. The VOC⁵

maintained a small allowance of oil or tallow for the "lamp in the tower." This is one of the first instances where enslaved or indentured labour is recorded in lightstructure maintenance, foreshadowing later patterns in colonial service roles.

Goa (1510)

Goa was captured from the Sultan of Bijapur in 1510 and became the capital of Portuguese India. As a major naval base, Goa's entrance was difficult to navigate. Portuguese pilot books (*Roteiros da Índia*) mention beacon fires on the Aguada headland. These were the forerunners of the Fort Aguada lighthouse completed in 1864, but maintained informally by the military in earlier centuries. A small masonry platform for a nightly fire was probably present by c.1620-1650. The lights were managed by Portuguese soldiers at Fort Aguada; later records⁶ mention "keepers of the beacon" (*guarda da fogueira*). They built a platform and kept a fire burning during the ship season of September-March. Showing lights was a military duty associated with the *Estado da Índia*'s defence network rather than a civil service. Jesuits also occasionally oversaw lights in nearby chapels, maintaining the medieval link between piety and navigation that we saw in the chapter on Ecclesiastical lights.

Brazil (1500)

After its initial exploration, colonization of Brazil by the Portuguese began in earnest under royal governors and sugar planters and was well established by the 1530s. Early colonial ports such as São Vicente and Bahia relied on bonfires lit on hilltops rather than fixed lights. A lantern at the Barra fortress is described in Portuguese maritime logs - the predecessor of the Farol da Barra, the first recorded actual lightstructure on the South American coast in 1698.

From the late 17th century until the 1830s, the aid to navigation was not the present cylindrical tower. It was a much more primitive installation inside the same fort. After the wreck of the Portuguese galleon *Santíssimo Sacramento* on a sandbank off Salvador in 1668, the fort was rebuilt in the 1690s. As part of that work (usually dated 1696–1698), they added a square turret with a glazed bronze lantern fed with whale oil. Brazilian sources treat it as one of the first permanently maintained lighthouse lights in the Americas. William Dampier, sailing in 1699, explicitly notes seeing lamps hung at the fort to guide ships into the *Baía de Todos os*



ABOVE: In Brazil, the Portuguese Forte de Santo Antônio at Salvador Bahia Vista Aérea showed a 17th century colonial light where a modern lighthouse of 1839 now stands, commonly known as Farol da Barra.

Santos. Through the 18th century, that light remained basically an architectural appendage on the fort rather than a free-standing tall tower.

The Barra fort light was kept by soldiers of the garrison. The fort's commander was responsible for fuel supply (wood, oil) and pay for the *fogueiro* (fire-tender). After 1698, with the formal Farol da Barra, the post of *faroleiro* (keeper) was created - a rare official recognition in the colonial world before 1700. In 1832 a decree mandated replacement of the existing late-17th-century lantern at the fort. The new system was manufactured in England and erected in 1839, being first lit on 2 December of that year, resulting in the present 22-metre tall masonry conical tower at the site.

Spanish Empire

Whilst the Portuguese can be regarded as the first to use irregular shore lights to assist their ships in foreign locations, it was the Spanish who contributed the most in the earliest times under consideration here. By 1700, the British and French had begun to dominate the introduction of formal lighthouses across their great empires, but this part of pharology will be considered in volume 3. In this essay we are concerned with the earliest use of crude lanterns, lamps and fires ashore.

Santo Domingo (1496)

La Isabela (1494) on the island of Hispaniola⁷ was Columbus's short-lived first colony, abandoned soon after in favour of Santo Domingo, a location that became the first permanent European city in the Americas and seat of the Spanish administration. By the 17th century, a lamp or fire on the fortress of Ozama served to mark the harbour entrance, reported in 1673 as "*una luz en la boca del río.*"⁸ A crude beacon, this was not a structured lighthouse. The light was maintained by soldiers in the Fortaleza Ozama when night-duty guards maintained torches or lanterns.

Adjacent chapels sometimes housed votive lamps visible from the river mouth - again blending spiritual and navigational lights. Lamp oil came from municipal funds collected from port fees (*alcabalas del puerto*).



ABOVE: The site of a medieval Spanish garrison at Castillo San Felipe del Morro at San Juan, Puerto Rico where lights were shown to guide ships into port.

San Juan (1508-1521)

For ships bound from Spain to the Americas, San Juan in Puerto Rico was often the first Caribbean port of call, a waypoint before Santo Domingo. *Castillo San Felipe del Morro* at San Juan, Puerto Rico⁹ was an early colonial fortress strategically placed at the harbour entrance where a light was shown for navigation. Pilots' manuals of the 16th-17th centuries¹⁰ list "*Cabo de San Juan*" and "*la torre del Morro*" as primary landfalls when approaching from the east. Thus, the fortress served both as a military guardian and an optical landmark - a daymark by its massive profile and a night signal by its beacon fire. Construction began in 1539 by order of King Charles V as part of the defensive network protecting the sea routes from Spain to the Caribbean and onward to Santo Domingo, Havana, and Veracruz. The engineer was Juan Bautista Antonelli, an Italian engineer who designed several Spanish Atlantic fortresses. The fort was located on the northwestern tip of San Juan Island, guarding the entrance to San Juan Bay. From the beginning it served as both a military bastion and a landmark for navigation, dominating the narrow channel known as *La Boca del Morro*. There is strong evidence that the Spaniards kept a beacon light there as early as the late 1500s. Sources¹¹ describe "*una torre que guarda la boca del puerto... donde se hace fuego para los navíos de la armada*" — "a tower that guards the mouth of the port, where fire is made for the ships of the fleet." This refers directly to El Morro, indicating that a watch fire or oil lamp was

displayed at night to guide arriving vessels into San Juan. The fire was maintained by the garrison, a practice that seems continuous through the 17th century. In the 1690s, governors' reports mention maintaining "*luz en la torre del Morro para la seguridad de las naves*".¹²

Later, in the 19th century, Spain erected an official lighthouse structure at El Morro. A dedicated lighthouse was first built on top of the fort in 1846 under Spanish rule. That first 1846 light was then rebuilt and modified after battle damage, and eventually replaced by the iron/brick lighthouse you see on the fort today, which was repaired again in the early U.S. period after 1898.

Readers will have noticed the frequency with which the Spanish named their sites to include the word *morro*. In Spanish, it literally means a headland, promontory, or blunt hill rising above the sea - something like "the snout" or "nose" of land. It is often used in maritime Spanish to describe a coastal point projecting into the water. Thus "*Castillo San Felipe del Morro*" translates as "Saint Philip's Castle on the Headland." Early Spanish navigators repeatedly used *morro* for prominent headlands — natural features that were daymarks long before formal lighthouses existed. Thus we find:

El Morro, Havana — *Castillo de los Tres Reyes del Morro* (begun 1589);

El Morro, San Juan — *Castillo San Felipe del Morro* (1539);

El Morro, Santiago de Cuba, El Morro de Arica (Chile), and others.



ABOVE: The lighthouse on Morro Castle in Havana Cuba in 1901.

Each was a fortress built on a projecting rock or cliff overlooking the harbour entrance and was ideal for both defence and navigation.

A second observation is how frequently given names were Christian. So a topographic term (e.g., *Morro, Punta, Monte, Puerto*) fixed the geographic identity, whilst a saint's name invoked protection for those acting in the service of the Lord, for instance, *San Felipe* (St. Philip the Apostle) or *San Diego, San Juan, Nuestra Señora del Carmen*, etc. So a fortress like *Castillo San Felipe del Morro* married strategic geography with Christian patronage as a sign that both the landscape and the enterprise were under divine sanction. We should note at this point the similarity with the traditions of the ancient Greeks who sailed the seas under the watchful eye of pagan gods long before the age of Christianity.

Havana, Cuba (1515)

The Spanish explorers discovered that the location now called Havana on the island of Cuba was a natural harbour with strategic importance. Its deep, narrow-mouthed inlet was a superb natural harbour but dangerous to enter at night. Ships had to pass through the Boca de la Bahía between two rocky headlands, the Morro to the east and the Punta to the west. From the mid-1500s, it became Spain's chief American naval base where treasure fleets gathered for the Atlantic crossing. Because of the narrow entrance, visual signals were essential both for defence and for navigation.

During the 1540s–1560s Spanish pilots and

governors already mention a watchtower and torch fire on the eastern cliff (the Morro). Chronicler Antonio de Herrera writes in 1601¹³ that ships were guided by "the fires of the tower at the port of Havana." These were military signal fires, maintained by the garrison to identify friendly ships and warn of corsairs, but they also served as the first navigational beacons. Such fires were fueled with oil or resin and placed atop a wooden or masonry turret, rebuilt several times after attacks by French and English privateers (notably in 1555, when the town was burned by Jacques de Sores). So by the mid-1500s, a regular lighted signal existed at the port entrance, informal, but continuously maintained.

After repeated raids, Spain began a comprehensive fortification program. The *Castillo de los Tres Reyes del Morro*, designed by Giovanni Battista Antonelli and begun in 1589, was built on the eastern promontory. From its earliest phase, records refer to a lantern or fire on the watchtower. Governor Pedro Valdés's reports in the 1590s mention the *Faro o luz del Morro* to guide the fleets entering the bay.

By the early 1600s, the fortress maintained a permanent night light, described as being shown from the highest tower, an oil lamp or brazier kept by the sentries. This makes El Morro at Havana one of the earliest continuously lighted harbour entrances in the New World. Throughout the 1600s, the light remained military rather than civil, tended by the fort's watch under the captain of artillery.



ABOVE: At first, medieval lights in the Caribbean were entirely of Spanish origin, set up in the 16th century in support of the expansion of her empire. They were merely crude fires, or oil burning lanterns shown irregularly. Later, British and French were able to set up colonies on some of the smaller islands to become competitors for the riches on offer, but it was too late and the great majority of the lands in the image above became Spanish-speaking even today.

In 1629, Havana's governor ordered regular night burning of torches during convoy season - an early regulated light service. The light apparatus was a primitive, open flame, possibly later enclosed in glass, replenished nightly. It served as both beacon and signal post for identifying inbound vessels.

The *Derroteros de las Indias* (Spanish pilot manuals) of the 1620s–1670s consistently note: “*Al entrar en la Habana, se verá la luz del Morro a levante del canal...*” — “On entering Havana, you will see the light of the Morro to the east of the channel.”

Documents from 1629 and 1654 mention¹⁴ expenses for oil “*para la luz del castillo*” (for the light of the castle). Occasionally enslaved Africans or local labourers carried fuel and maintained the fire, commanded by a corporal of the guard under the Captain General of Cuba.

Only in 1764 was a dedicated lighthouse structure - a round stone tower with a lantern - formally constructed atop the Morro fortress. But that was merely the architectural formalization of a light that had already existed for nearly two centuries.

Veracruz (1519)

By late 17th century, a lantern on the *San Juan de Ulúa* fortress was used irregularly. Mentioned

in Spanish naval correspondence (1692), it was probably a small oil lamp behind glass; there was no tower proper. The light would have been maintained by a small detachment of soldiers where the *alcaide* (warden) appointed one or two sentries to tend the lamp. The light was almost certainly only occasional, shown when ships were due from Spain. It would have been fuelled by whale oil imported from Spain or lard oil from local sources with costs included as part of fortress expenditure.

Panama City (1519)

Panama City (*Panamá la Vieja* and later *Panamá la Nueva*) is crucial to the story of the Spanish invasion of south America because it became the hinge between the Atlantic and Pacific and was the first permanent European settlement on the Pacific coast of the Americas.

The city was founded on 15 August 1519 by Pedro Arias Dávila (known as Pedrarias Dávila), governor of Castilla del Oro, the Spanish province covering Panama and the isthmus. It was located on a small coastal plain facing the Pacific, about 8 km east of modern Panama City, now called *Panamá Viejo* (“Old Panama”). Here it served as the Pacific terminus of the trans-isthmian route linking the Caribbean port of Nombre de Dios (and later

Portobelo) to the Pacific Ocean. This made it the departure point for the conquest of Peru (Pizarro's expeditions began here) and the assembly point for precious metals heading back toward Spain.

Panamá Viejo was built as a coastal *entrepôt*, not a fortified bastion like Havana or San Juan. Its protection came from the fact that the Pacific coast was less frequented by European rivals until the late 1500s. The city included a cathedral, treasury, and royal warehouses (*casas reales*), reflecting its role as a royal administrative hub.

Because it fronted shallow tidal flats, large ships anchored offshore and cargo was lightered to the beach. Navigation into the anchorage was difficult, so local pilots used daymarks and possibly small beacon fires on the sand-spit or church towers for orientation, though no formal lightstructure is recorded in the 1500s.

Goods arriving from Peru were carried by mule along the Camino Real to the Caribbean ports. This system was overseen by the Casa de la Contratación representatives and the Viceroyalty of New Spain. From an imperial perspective, Panama became the fulcrum of the treasure route — gold and silver from Peru being transported across the isthmus to where fleets departed from Portobelo or Nombre de Dios. The isthmus also served as a key intelligence and communication route between the two oceans, hence the early presence of monasteries and official chroniclers.

Throughout the 1500s the main threats were indigenous resistance and pirate raids on the Caribbean side. The Pacific side remained relatively secure until the late 1600s. In 1671, Henry Morgan, the Welsh privateer, attacked and destroyed Panamá Viejo after crossing the isthmus with a force from Portobelo. Following this devastation, the Spaniards relocated the settlement a few kilometers west to a more defensible peninsula — the site of the current Panama City, founded in 1673, called Panamá la Nueva.

The original 1519 city quickly became the seat of a bishopric (established 1520s) and included Franciscan, Dominican, and Mercedarian houses — hence there was a strong ecclesiastical presence from the outset. The friars played key roles in mapping routes and maintaining trans-isthmian way-stations, and occasionally maintained the lights or signal fires used to mark ports or river mouths.

Although the Pacific side was less trafficked than the Caribbean, a few practices relevant to

navigationals did occur. Ships approaching from Peru navigated toward "the town and its tower," using church bell towers as daymarks. Spanish pilots' *derroteros* of the 16th–17th centuries mention "*la torre de Panamá*" as a visible landmark from the anchorage, and although there was no formal lightstructure before the late 18th century, there are occasional references to fires on the beach or tower for ships expected from Peru, an early form of port signaling, much like at Havana and San Juan.

Acapulco (1565)

As the "*puerta de oriente*", the Pacific terminus of the Manila Galleon route, Acapulco completes the great circle of the early Spanish maritime world. The port of Acapulco (*Acapulco de los Reyes*) lay on Mexico's Pacific coast in the province of New Spain. It was first described by Andrés de Urdaneta in 1565 when he discovered the *tornavias* — the return route from the Philippines across the North Pacific to Mexico.

The port itself was formally developed as a royal harbour in the 1560s under Viceroy Luis de Velasco, and by 1573 it had royal customs officers, warehouses, and a chapel dedicated to the Magi (hence *de los Reyes*). The port served as the arrival and departure port for the Manila Galleons, which linked Asia and the Americas annually from 1565 to 1815.

Acapulco Bay is a semi-circular natural harbour, open to the southwest but protected by steep surrounding hills. Its narrow mouth made it one of the best anchorages in the Pacific but also difficult to find at night. Early *derroteros* note that the port was approached visually from seaward by aligning the outer headlands, Punta Grifo and Punta Bruja, and steering toward the beach below the town. But because of this tricky entrance, daymarks and later night signals were critical.

The first references to a light or fire guiding ships into Acapulco appear in late 1500s pilot books: "*Se reconoce la ensenada por las hogueras que se encienden cuando el galeón se espera*" : "The bay is recognized by the bonfires lit when the galleon is expected." These watch fires were maintained on the hill called La Roqueta (the small island at the bay entrance) or on the fort hill above the town. Their purpose was dual: signaling the expected arrival of a Manila ship and marking the anchorage at night.

Thus, Acapulco had a primitive but functional

light by the late 16th century, maintained by the harbour guard or local friars rather than a formal lighthouse authority.

Repeated raids by English and Dutch privateers (notably Thomas Cavendish, 1587, and Joris van Spilbergen, 1615) prompted Spain to build a permanent fortification. The Fort of San Diego was begun in 1617 and completed around 1618, under Viceroy Diego Fernández de Córdoba, Marqués de Guadalcázar. It was a pentagonal bastioned fortress, designed by engineer Adrián Boot, located on the promontory north of the bay. Like Havana's or San Juan's Morro, San Diego's ramparts provided the best vantage for watch fires or signal lights and 17th-century port registers note "*la luz del castillo*" visible from seaward when the galleon approached.

Every year, in expectation of the Manila galleon, the governor of Acapulco issued orders for bonfires, bells, and rockets to be used for night signaling. The *Archivo General de Indias* contains several *ordenanzas del puerto de Acapulco* (17th c.) stipulating the duty of lighting the fires when ships are sighted, both as a signal of arrival and as a navigational aid. These were thus semi-formal "lighthouse" duties carried out by military personnel.

After 1700, the Fort of San Diego was rebuilt (1783) following an earthquake, and a formal lighthouse - a fixed lantern on the fort - is documented from 1791 onward. But the pre-1700 period already saw two centuries of organized light signaling, putting Acapulco on a par with Havana and San Juan as one of the earliest ports in the New World with a continuous tradition of night guidance for shipping.

Lima (1535)

Lima, and its port of Callao form the last great piece of this early Spanish network of fortified ports that used lights to safeguard navigation before 1700. The light at Callao was among the earliest documented in the South Pacific and closely tied to both defence and imperial communications.

Lima was founded by Francisco Pizarro on 18 January 1535, as Ciudad de los Reyes (City of the Kings). Its harbour, located about 13 km west at Callao, became the principal Pacific port of the Viceroyalty of Peru. From the 1540s, Callao was the entry and exit point for ships to Panama, Chile, and the Manila galleon trade via Acapulco. As early as

1550, Spanish sources mention a watchtower and signal fires on the headland east of the harbour, called La Punta. The combination of reefs, shoals, and the narrow entrance to Callao Bay made night entry perilous so the alcalde del puerto ordered fires to be lit on the tower whenever ships were expected from Panama or Chile. One writer noted that "the port of Lima [Callao] has a tower upon the point where a light is shown for the navigation of the fleet."¹⁵ This description puts Callao in the same category as Havana or San Juan by c1600, that is, a garrisoned port where a regular beacon fire served as both a defensive watch-light and a navigational aid.

Lima itself, built on a low terrace inland, had several large churches and convents whose towers were visible from the coastal plain. Travellers and pilots reported seeing lights from the church towers (especially from the Convento de la Merced) used as orientation beacons for caravans or ships anchoring offshore when returning at night. While these were not formal lighthouses, we have now seen plenty of examples of the use of ecclesiastical towers for illumination or signaling with monks and friars often tending them.

After an earthquake and tsunami in 1604, Callao's defences were improved, but pirate attacks forced the Crown to formalize them. A substantial fortified enclosure, the Castillo del Callao, existed by the mid-1600s. The main tower (torreón) doubled as the site for the port light, a brazier or oil lamp kept by the night watch. By 1687, the light was formally listed in the *Ordenanzas del Puerto del Callao* as "*la luz que se mantiene en el baluarte mayor para la entrada de los navíos*" - "the light maintained on the main bastion for the entry of ships."

Thus, by the late seventeenth century, the Callao light had become a standard administrative duty, recorded alongside pilotage and tide-keeping. It was, arguably, the earliest official lighthouse function in South America.

Another catastrophic earthquake and tsunami of 1687 destroyed much of Callao and swept away the fortifications. When reconstruction began, the Spanish engineers (later including Luis Godin, after 1746) retained the concept of a signal light as part of the rebuilt fort's parapet duties, a deliberate continuity from the earlier system.

Callao's light was not only practical, but it became emblematic of the safe haven of the Viceroyalty of

Peru. Ships arriving from Panama, Chile, and the Philippines were said to look for “la luz del puerto de Lima” - literally the beacon that signified arrival in the richest and most secure port of Spanish South America.

British Empire

Before 1700, Britain’s overseas maritime presence was too fragmented for centralized lighthouse provision. Instead, each colony or fort improvised signal fires, and navigation relied on local pilots and landmarks. Permanent lighthouses emerged only in the 18th century, for example at Madras (1796) Port Royal (1841) and Bermuda (1846).

St. John’s (1583)

An early fishing station, often regarded as the first English overseas colony, was at St. John’s, Newfoundland (1583) where fire beacons were recorded by early fishermen. Records from the 1620s mention signal fires on the headland, probably lit according to the fishing season and not for continuous use.

Roanoke (1585-1590)

A competing candidate as the earliest British overseas settlement was at Roanoke in North Carolina. Roanoke was the first sustained English colonial attempt in the Americas, organized under Sir Walter Raleigh’s patent (1584) and led in succession by Sir Richard Grenville (1585), Ralph Lane, and John White (1587). The settlements lay on Roanoke Island (in present-day North Carolina’s Outer Banks), a notoriously hazardous coast of shoals and inlets — conditions that made coastal navigation and signaling essential from the outset. There is, however, no record of lights here and the colony mysteriously did not survive more than a few years.

Jamestown (1607)

The first permanent English settlement in North America was at Jamestown in Virginia (1607). Soon, Chesapeake Bay had temporary navigation fires. Formal lights at locations such as Cape Henry date only from the 18th century. Early Virginians relied on bonfires when expecting supply ships.

Bermuda (1610s)

Bermuda was one of the best-documented early colonies in terms of maritime navigation.

Early references (1610s–1620s) in the Somers Islands Company records mention fires kept at Castle Island and St. David’s as night beacons for incoming vessels.

Governor Nathaniel Butler’s Report on the State of the Somers Islands (1622) describes “a watch with fire upon the Castle” for signalling approaching ships. These were temporary signal fires, not built lighthouses, but they served the same navigational function. No purpose-built lighthouse was erected in Bermuda until St. David’s Lighthouse (built 1879), though Castle Island lights are the earliest known British “colonial lights.”

Barbados, Jamaica and St Kitts (1627)

Barbados (1627 onwards) had numerous coastal forts; some contemporary maps (e.g., Richard Ligon’s True and Exact History of the Island of Barbados, 1657) show signal stations and beacons used for alerting plantations and ships. Jamaica (after 1655) records “watch fires kept at Port Royal” for ship signalling (mentioned in local council records from the 1660s), but no lighthouse existed before the 19th century.

St. Kitts and Nevis used “lookout posts” on Brimstone Hill and Saddle Hill for both military and navigational watch.

Tangier (1661–1684)

Tangier was perhaps the only early British overseas possession to approach a formal lighthouse structure. The Mole was built by English engineers and included a lantern or watch-light at its extremity. It functioned both as a harbour light and as a military signal post.¹⁶ This could arguably be called the first true British-built overseas lighthouse

Bombay, Madras, St Helena (1660-80)

The British expansion into south Asia was led by the East India Company which established several settlements. In the 1670s in the south Atlantic, St. Helena showed a signal fire on Ladder Hill for approaching ships. At Fort St. George in Madras records of the East India Company refer to “watch-lanterns kept burning for ship arrivals” in the mid-late 17th century. Similarly, at Bombay a small “lighted beacon” is mentioned in port instructions by 1678, likely a simple lantern at the pier-head.



ABOVE: Galle is in a strategic location at the southern tip of Sri Lanka where we find a modern lighthouse today. This fortification was begun by the Portuguese around 1588 but was much rebuilt by the Dutch in the mid-late 17th century who took the land from the Portuguese in 1640. Sri Lanka was eventually captured by the British in 1796. Bastions of this fortification were used irregularly to show lights for ships.

French Empire

Whereas England's early overseas ventures were mostly private, scattered, and experimental, France's followed a more centralized and strategic model, tied from the start to royal, religious, and mercantile institutions. Certainly, at first there were private adventurers, thus in the period 1500–1540 explorers such as Verrazzano and Cartier investigated the St. Lawrence and Newfoundland. However the first colonizing attempts from 1541–1600 were religious–mercantile ventures at Charlesbourg-Royal and Florida (Fort Caroline) that were later mostly unsuccessful.

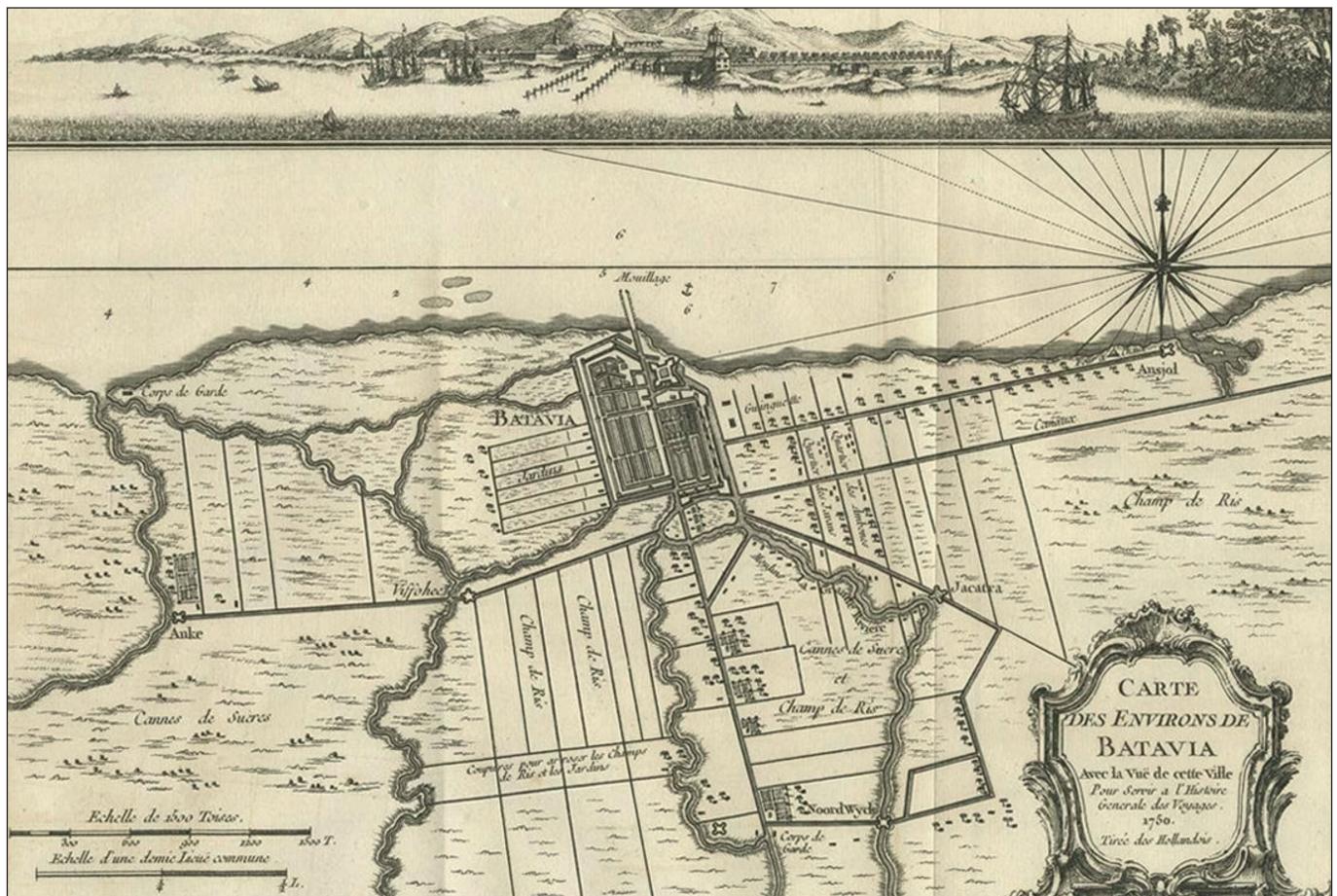
Port Royal, Quebec (1605–8)

Later, royal sponsorship of Henri IV and Richelieu during the period 1600–1660 led to settlement at Acadia,¹⁷ Quebec and Antilles with full Crown authority. Founded by Samuel de Champlain and marking the start of "New France", Quebec (1608) was not known for lights until the 18th century. French colonial outposts had no fixed lights in the 17th century and ships navigated the St. Lawrence

by daylight. Under the stewardship of Colbert, a centralized, bureaucratic empire was established in Canada, Louisiana, Antilles and the Indian Ocean during 1660–1700. Though France had no permanent lighthouses in its colonies before 1700, several types of signals, beacons, and harbour lights appear in records, roughly parallel to the English pattern but better recorded in royal correspondence. For example, Samuel de Champlain mentions "*feux de garde allumés sur la hauteur*" in *Voyages de la Nouvelle France* (1613), describing them as guiding beacons for ships. By the 1660s, harbour watchmen at Quebec maintained a "*lanterne de nuit*" on the battery.¹⁸

French Caribbean (1660s)

Martinique (Fort Saint-Pierre) and Guadeloupe (Basse-Terre) kept fires or lanterns on fort bastions for arriving convoys¹⁹ and the *Ordonnance de 1671* for the Antilles required governors to "*tenir feux ou signaux aux passes du port*", effectively the first French colonial regulation requiring harbour lights or signals.



ABOVE: This old engraving of 1750 shows a map of Dutch Batavia, and also - at the top - a mariner's-eye view of the approaches to the port. In the centre a lighthouse is clearly visible.

Dutch Empire

As a final element to this analysis we now consider the role played by the Netherlands, a nation that had already become masters of the sea and navigation. In an earlier chapter we examined how the Dutch had, to a great extent, developed the principle of lights to assist navigators, ahead of later efforts by France and Britain. It is not surprising that we find the use of lights by the companies that executed Dutch imperial policy was well considered. The Dutch East and West India Companies were quasi-sovereign powers: they minted coins, waged war, and maintained ports. Their charters explicitly included the "care and conservation of havens, beacons, and sea-marks."

In this part of the discussion, the Dutch term *vuurbaak* (fire-beacon) is crucial. It designated not merely a signal fire but an engineered, maintained structure of timber or masonry, with a metal basket or lantern. There are examples quoted here already (see p189) such as the *vuurbaak* at van Katwijk aan Zee of 1605. This architectural vocabulary was exported abroad and we find that VOC plans for

Batavia, Galle, and Colombo all use the same term. Thus the *vuurbaak* became a hallmark of Dutch maritime visual culture. It appears prominently on Joan Blaeu's maps and in seventeenth-century marine paintings by Ludolf Bakhuizen, Reinier Nooms (Zeeman), and Jan van de Cappelle — always symbolizing safe landfall and organized commerce.

The East India Company VOC was founded in 1602 and operated in the territories of the Cape of Good Hope, Batavia, Ceylon, Malacca, Banda, Formosa. It set up signal stations in Table Bay, a light in Batavia harbour and a beacon at Galle Fort in Ceylon. The West India Company was formed in 1621 and its field of operations was Brazil (Pernambuco), Curaçao, Suriname, New Netherland. At Fort Amsterdam (Manhattan) there were watch-fires and there were harbour lights in Curaçao. The VOC's "Book of Instructions for Ships' Commanders" (1614) required ships to look for brandende vuren (burning fires) kept at certain points when approaching home or colonial ports and by 1620, these fires were being maintained under company order at Table Bay and Batavia.

Table Bay (1650)

The VOC had built signal fires and flag masts on the Lion's Rump (Signal Hill) by 1650. The Journal of Jan van Riebeeck (1652–62) repeatedly mentions "the watchfire on the hill for the ships to see at night." These were systematized: red or white fires signalled wind conditions or safe anchorage. This predates the English and French Caribbean equivalents by decades. A small beacon tower (a cylindrical stone structure with brazier) was built there by c. 1700, making it arguably the first formal lightstructure in the southern hemisphere.

Batavia (1619)

Batavia became the capital of the Dutch East Indies. By 1619 the Dutch had quickly erected a wooden lantern tower on the harbour mole. VOC records²⁰ describe a lighted lantern on the west mole of the harbour, maintained nightly for ships in the roadstead. Maps such as Joan Blaeu's "Casteel Batavia" (1667) show a structure labelled "fanael" or "lanterna." By the 1670s, a timber lantern house at the harbour mouth was a standard feature, essentially a prototype colonial lighthouse. It was maintained nightly by the port authority and was possibly the first regularly kept colonial lighthouse outside Europe. Later rebuilt in stone (late 17th century), it served both mercantile and defensive roles. The keepers were civil employees of the VOC and known as *lichtwachters* ("light watchers"). VOC *Daghregisters* (daily journals) from 1628 note salary payments for the light's upkeep.²¹ These keepers were often Eurasians or freed slaves employed as port staff. The lantern burned fish oil and was trimmed nightly under VOC regulation - one of the earliest bureaucratically managed lighthouse operations outside Europe.

Galle and Colombo (1640)

Under Dutch control (taken from the Portuguese, in 1640), both forts maintained beacon fires on bastions for arriving convoys.²² These sites later became the location of true stone lighthouses under British administration in the 19th century.

New Amsterdam (1625)

The Dutch gained a foothold in North America with a settlement called New Amsterdam, later New York. The WIC maintained a "watch house with lanthorn" on the southern point of Manhattan (Fort Amsterdam) by 1648.²³ Keepers were city watch or

dock workers who hoisted lanterns on poles when ships were expected. After the English takeover in 1664 lights continued under the port warden's supervision, maintained by common labourers paid per night. Dutch colonial records (1650s) mention lanterns on poles near the Battery for arriving ships.

Conclusions

There are many aspects in the story of the use of lights during the Colonial period that parallel developments already in place across Europe. There are also idiosyncrasies.

By the 1600s, we see the first network of maintained colonial beacons - simple by European standards but continuous in some key ports.

As the earlier nationals to establish colonies abroad, Portugal and Spain pioneered lights integrated into fortresses.

The English and French lagged behind the other European colonizers until the 18th century, reflecting their later colonial maturity.

Most colonial lights were military or civic beacons (open fires, torches, simple oil lamps) mounted on forts, church towers, or headlands - not purpose-built lighthouses.

A few purpose-built lighthouses begin to appear only at the end of the 17th century.

Regular service by "light keepers" emerges selectively. The Dutch at Batavia (Jakarta) are the clearest case of a regularly maintained harbour lantern by the 1620s-30s under VOC payroll; the Portuguese and Spanish generally used garrison watch routines, sometimes supplemented by church lamps.

In the tropics, enslaved or coerced labour was introduced into maintenance of lights, particularly under the Portuguese and Dutch. This was an early form of what later became state-administered light keepers - *faroleiro* (Spanish) or *lichtwachter* (Germanic).

Portuguese and Dutch colonies were the most systematic in light management; their imperial bureaucracies recorded fuel consumed and wages paid.

Spanish colonies tended to rely on fortress budgets and supplements from religious sources.

Colonial lights symbolized power and royal presence as well as Christian dominion, not merely navigational safety.

Keepers of colonial lights occupied peripheral social spaces - neither sailors nor clerics, they were often men of low rank, mixed ancestry, or servitude.

Unlike their later European successors, colonial lights were rarely manned by trained keepers. Maintenance duties fell to whoever controlled the fort or settlement.

The Dutch systematized harbour lights for trade efficiency (Batavia being crucial).

At Batavia (Jakarta), the lantern tower on the harbour mole (1628) employed paid keepers. This is arguably the first sustained, bureaucratically managed colonial light outside Europe.

Only at the end of our period of study did a true, dedicated lighthouse appear at Bahia/ Salvador (Farol da Barra, 1698), capping centuries that relied on improvised or semi-formal lights.

Notes

1 A country is considered to have a sea border if it has a coastline along any ocean, sea, or large saltwater body, including seas like the Mediterranean, Caribbean, Red Sea, and Baltic Sea. Countries bordering inland seas (e.g. Caspian Sea) are sometimes counted depending on context, but generally not counted as true “sea-bordering” states in global maritime statistics, since the Caspian is technically a landlocked saltwater lake.

2 Russia is also considered to be an imperial country, though it was a largely contiguous land empire.

3 Denmark and Sweden had a limited but significant

involvement in imperialism.

4 Duarte Pacheco Pereira: *Esmeraldo de situ orbis*, c.1508.

5 The VOC was the *Vereenigde Oostindische Compagnie* known in English as the Dutch East India Company, a powerful chartered trading company founded in 1602 by the Dutch Republic to conduct and monopolize Dutch trade, colonization, and navigation in Asia and the Indian Ocean.

6 Goa Archives, *Livros de Fortaleza*.

7 Hispaniola is the Caribbean island consisting of Haiti in the west and the Dominican Republic in the east.

8 A light at the entrance to the River (Ozama). Spanish *Derrotero del Mar de las Indias*.

9 https://en.wikipedia.org/wiki/Castillo_San_Felipe_del_Morro

10 *Derrotero del Mar de las Indias* (17th-century Spanish pilot books). Various MSS/editions; consult Biblioteca Nacional de España.

11 The *Derrotero de las Indias Occidentales* (c. 1580s) and later *Relacion de las Fortalezas de Indias* (Juan de Tejeda, 1587).

12 "Light in the tower of Morro for the safety of ships."

13 Antonio de Herrera: *Descripción de las Indias Occidentales*, 1601.

14 Actas Capitulares de La Habana (1629, 1654).

15 Antonio de Herrera: *Décadas*, early 1600s.

16 Documentary references appear in Calendar of State Papers, Colonial Series, 1661–84, notably letters from the Earl of Peterborough and Samuel Pepys's Tangier correspondence.

17 Acadia was a region of New France encompassing the Gulf of Maine and the Bay of Fundy in northeast Canada and Nova Scotia with Port Royal and Annapolis Royal.

18 *Archives de la Marine*, Série B4, vol. 9, fol. 212r (1666).

19 *Correspondance de la Marine*, Dépôt des Colonies, série C8A, vols. 1–5, 1666–1690).

20 Batavia Castle Diaries, 1640s–1650s.

21 *Daghregisters van het Kasteel Batavia* (1620s–1670s). Nationaal Archief (The Hague). (VOC payroll/orders for harbour light service).

22 A 1672 plan of Galle (Nationaal Archief, Den Haag, VEL 1074) marks “Vuurbaken” (fire beacons).

23 Recorded in New Netherland Council Minutes.