Giant wooden cargo ships that braved the oceans thousands of years back are still being made in the South Indian state of Tamil Nadu. Even when metal motorised ships became the norm, some shoreline communities in South India continue to make these wooden cargo ships. This is the story of these ships and the people who craft them.

The South Indian state of Tamil Nadu has a long maritime tradition. Its onnections spanned East and West. Fishing communities during colonial times made small barges. These barges provided loading and unloading support to large cargo vessels which could not enter shallow ports. The end of the colonial era changed the economic landscape with the emergence of large ports and containerisation. Yet some ship building communities negotiated the emerging environment with their technological innovation, collaborative work and good business sense. By increasing the size of the wooden sailing barges and by motorising them later, these innovative ship builders and entrepreneurs found new markets where their skills could be adapted and put to profitable use.

In a successful blend of reason, creativity and persistent hard work the communities engineered their past to create a successful future. The book traces the transition of this tradition in detail over time. The authors have created an extensive photo documentation using hundreds of images which capture the atmosphere of the shipyard and to offer a visual narrative. Through visual anthropology it offers an anthology of wooden cargo ship building and craftsmanship.

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Wild Craft

Wooden cargo ships of South India

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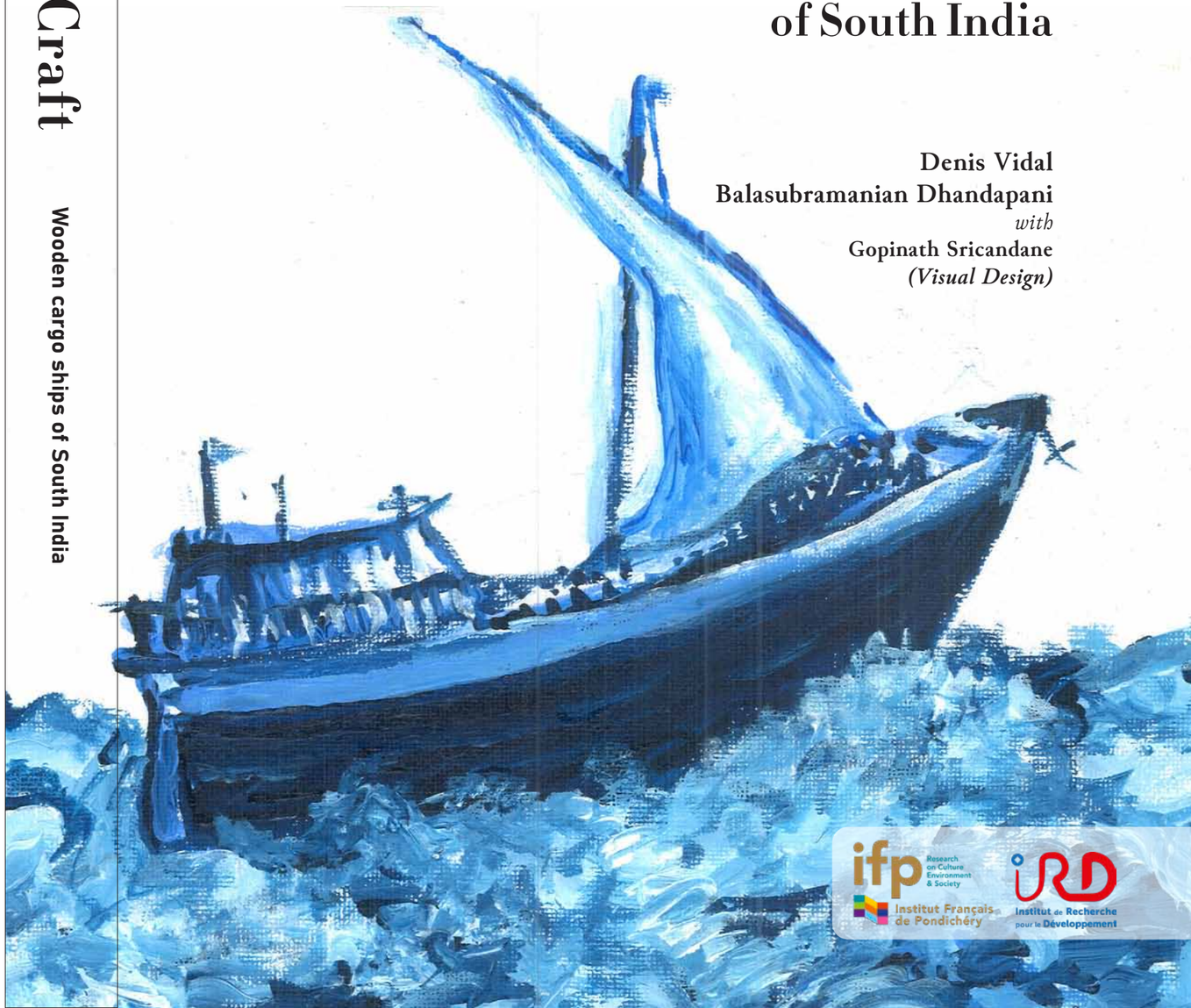
Denis Vidal
Balasubramanian Dhandapani
with
Gopinath Sricandane
(Visual Design)



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ISBN: 978-81-8470-249-1

Cover: Painting by Denis Vidal
All photographs by the authors unless otherwise mentioned

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ACKNOWLEDGEMENTS

This book would not have been possible without the support and the kindness of too many people for us to list them all. Various people helped us decisively at different stages of this research work and of this book. Kamala Marius and Senthil Babu were instrumental in our initial discovery of this shipyard. Kathiravan occupies a special place in our thanks. From the beginning of this research to its end he never stopped helping us in all sorts of ways and shared his immense experience and deep knowledge of everything related to the construction of wooden cargo ships in Tamil Nadu.

Equally important are the numerous carpenters, caulkers, mistris, tindals, lascars, mechanics, ironsmiths and other related craftsmen on both east and west coasts of South India who shaped this research. We shall never forget the tremendous help given to us by Ayyaadurai, Raja and his family, Antony Ignaci, Stanley, Aslam, Celestine Villavarayar, his father Joe Villavarayar, his brothers and his associates. We also pay our respectful homage to Ayyadurai, Stanley, Aslam and Pattani Tindal who passed away during the course of the study.

Gopinath Sricandane played a key role in the making of this book which goes beyond its visual design and, like Kathiravan in a different way, he should be rightly considered as one of its authors. Arunkumar AS accompanied us to the first field trip on the west coast and Amalorpavam Murugan drove us on our field visits. Antony helped to transcribe some of the interviews and Mary Premila helped us to revise the English text. Eric Denis, Pierre Grard, Blandine Ripert, Cecile Hoorelbeke, Anurupa Naik, Murugan B and the librarians of IFP supported this endeavor.

Yuko Watanabe volunteered with her artistic skills in creating many illustrations. Ranjith Kumar and Ganesh Gopal took upon themselves the challenge of making the CAD drawings of the kotia.

Senthil Babu, Kannan M, Prakash V, Gerard Chenus, Vincent Guigueno, Alain Mourier, Emma Tarlo, Julius Vidal, Roland Wittje, V. Geetha, Thomas J Mathew and Dr. Sreenivasan agreed to read and comment on various versions of the book.

Last but not the least, neither the research work nor the publication of this book would have been possible without the constant and generous support, the logistic assistance and the financial help of our research institutions: the French National Research Institute for Sustainable Development (IRD, Marseille, France), the French Institute of Pondicherry (IFP, Pondicherry, India) and the Research Centre on Migration and Society (URMIS- Université Paris Cité, Paris, France).

Let us thank finally the members of our families who have been a constant support throughout this research, sometimes accompanied us on site, and above all showed the greatest fortitude by becoming experts in spite of themselves on everything related to our research.

Some common terms in use by the shipbuilders and the crew

ஏறா	ēṟā	keel
பிச்சல்	piccal	aft
அணியம்	aṇiyam	stem
கால்	kāl	frame
சரிமட்ட கால்	carimaṭṭa kāl	equal frame
குறைந்த கால்	kuṟainta kāl	unequal frame
குச்சி கால்	kucci kāl	reeper frame
சாத்து கால்	cāttu kāl	shaping frames
வங்கு	vaṅku	bottom part of a frame
வாரி	vāri	deck frame
பலகை	palakai	plank
பட்டறை	paṭṭaṟai	scrieveboard
பொதி	poti	cargo hold
தட்டு	taṭṭu	deck
பத்தாறு	pattāṟu	sides of the boat
தாவா	tāvā	port side
செவ்வனா	cevvaṉā	starboard side
பொய் போடுத	poy pōṭuta	gunwhale
கானா	kāṉā	handle to manoeuver the rudder in sailing vessels
சுக்கான்	cukkāṉ	rudder
பாய்	pāy	sail
பாய்மரம்	pāymaram	mast
இலை	ilai	propeller
நங்கூரம்	naṅkūram	anchor
வத்தல்	vattal	wooden vessels used for lighting cargo
பாய் வத்தல்	pāy vattal	sailing vessels of Cuddalore
கோட்டியா	kōṭṭiyā	mechanised sailing vessels of Cuddalore
தோணி	tōṇi	vessels of Tuticorin
உரு	urū	vessels of Beypore
மேஸ்திரி	mēstiri	master carpenter
கலப்பத்து மேஸ்திரி	kalappattu mēstiri	caulking mistri
கொல்லர்	kollar	blacksmith
தண்டல்	taṇṭal	captain
லஸ்கர்	laskar	sailor
பண்டாரி	paṇṭāri	cook

INTRODUCTION

This is a story of people and their ships on the coasts of South India. They are Hindus, Muslims and Christians, most of whom belong to the communities of fishermen who live along the coasts of India. In colonial times, they specialised in the commerce of barges that loaded and unloaded cargo ships, which could not berth close enough in the shallow water ports of the region, in particular in Cuddalore and Tuticorin. A few people even made fortunes with this business. Unfortunately, for various economic and political reasons, the activity slowly collapsed after Indian independence. Those involved did not passively accept their fate but reinvented a new kind of tradition for themselves. While Tamil Nadu has had a long maritime tradition, including centuries old connections with the East and West, immediately after independence little memory of it remained and maritime activity involved mostly fishing. What these communities did was not only to reinvent an original form of coastal and overseas trade, which has flourished for nearly a century now, but also to reinvent a type of wooden cargo ship with sails, the Kotias up to 350 tons or even more, with which they conducted this trade.

It is precisely on the process of reinvention of this singular category of ships that we have chosen to focus this book, offering a detailed study of how they are built, of the diversity of crafts and know-how involved in their construction and the technical, social and economic logic which underlies it. There are two reasons for such a choice. The first may appear circumstantial but is relevant nonetheless. When we began to follow the story of these ships in 2011 at Cuddalore, where their building was concentrated, eight of them were in the making and this activity, which had then been developing there for nearly sixty years, was flourishing. But when we started writing this book eight years later in 2019, no new ships had been built in Cuddalore in the previous four years and no one locally was sure of this tradition surviving at all. Now in 2023, the situation looks slightly brighter with a new kotia under construction since October 2022. We nevertheless felt a kind of duty to document this tradition and the various forms of crafts and expertise involved as faithfully as we could, having been fortunate enough to study it while it was still dynamic and thriving.

There is another reason for us to focus more specifically on the craftsmanship that accompanies the building of these ships. As will be shown in this book, we believe that what prevails today is largely the product of a conception of maritime history, which can be contested in many aspects, along with mistakenly rigid notions about the very nature of craftsmanship and its transmission. What this exemplary shipbuilding tradition shows, for example, is that it may be a serious historical mistake to rely on an evolutionist conception of maritime history in which wooden and sailing ships would unavoidably disappear with the invention of the iron hull or be condemned to be used only as pleasure boats. As a consequence of this preconception, the few remaining wooden cargo ships, generally located in the less noticeable maritime regions of the world, may well attract a kind

of historical or 'heritage' interest but they are nevertheless considered as a simple phenomenon of survival, inevitably destined to disappear in the very short term. Much as this could well be the case with the ships that we have studied, we would like to draw a very different lesson from their existence.

Even if they were to disappear in the coming years after having developed and flourished for nearly a century, they have something to tell us about craftsmanship. This is the simple fact that craftsmanship is not always about immemorial traditions transmitted through innumerable generations and threatened today by economic and technological progress. It may equally involve reinvention or invention, improvised and perfected in a generation or two, susceptible to develop and flourish for a specific amount of time and to generate ever-changing forms of knowledge and expertise as well as new forms of object. Craftsmanship may also disappear, because of changes in context, including technological changes, but this does not prevent it from taking on new and unpredictable forms again in the future. The only way to understand such processes is to observe them in the places where they occur. In our case, this will lead us first to the riverbank of a small fishing hamlet, Thaikkal Thonithurai, immediately south of Cuddalore in Tamil Nadu, the very town where the British began their fateful expansion through the whole of South India.

The presentation of the village of Thaikkal, its atmosphere and the occupations of its inhabitants will constitute the first chapter of this study. We shall also introduce the main characters to whom we have become attached during this investigation.

The second chapter is of a different nature. It seemed essential to us, before we began a detailed analysis of the construction and use of the boats that we have studied, to introduce the activity in the context of our times. While the very existence of wooden sailing ships and the use of wind power in the merchant navy have long been considered as a relic of the past, such a point of view is rapidly changing. Not only does it lead us to look very differently at the existence of a tradition like the one that we will introduce in this book, it also invites us to reconsider a number of concepts and notions commonly used to describe local industries of this sort.

The third and fourth chapters constitute the main core of our exposition. They are based on an in-depth analysis and a detailed visual archive of cargo shipbuilding in Thaikkal today.

The fifth chapter, however, is of a different nature. It is a visual intermezzo that we wished to introduce in the core of this book to do full justice to the craftsmen who make these vessels by highlighting the very high quality of their work.

The sixth chapter presents the way they are used during their lifespan and the economic rationale behind that. We intend to show the exemplary role played by the existence of such a craft industry in India today, not only because of its heritage and environmental undertones, but also because of its social and economic meaning for the subaltern communities of fishermen who initiated it and have maintained its existence up to today. We also introduce at this stage a new analytical use of the concept of 'niche', which is more commonly used in the context of ecological theories. Such a notion seems particularly appropriate to us if we wish to capture the lessons that may be analytically drawn from such research on a more general level in India today.

Finally, in the last pages of this book, we briefly look at the most recent developments that we have been witnessing during the eleven years of this study, and also attempt to speculate—but not to prophesy—about what may lie ahead in the years to come.

1. On the riverbank
2. Reinventing the kotia
3. Building a kotia
4. At sea
5. Visual intermezzo
6. The life of a kotia
7. What next?

1

On the river bank

FIRST ENCOUNTERS

On the western bank of the Paravanar river as it meets the Bay of Bengal, lies the village of Thaikkal Thonithurai, about 10 Km, south of Cuddalore New Town. The wide riverbank with its coconut groves belongs to the temple of Karuppumuthu Mariamman. This is where most of the wooden cargo ships of Cuddalore (the kotias) are built (along with another group of villages in the north, where the fishing harbour lies on the banks of river Gadilam as it flows into the Bay of Bengal). The right to build a ship is attributed against a modest fee to the local temple. The construction of a ship may last for two years or more and during this time it is not uncommon for some of the workers and supervisors of a ship to live on site in small huts used for storage. When we came for the first time in 2011, eight ships were at different stages of construction in the village and in 2013 when we came back, there were three of them. It was through befriending the people who constructed these ships and by following each stage of their work at regular intervals over eleven years that we acquired most of our knowledge of the fascinating process of craftsmanship which is involved in building these ships.

Stanley

A gift of God

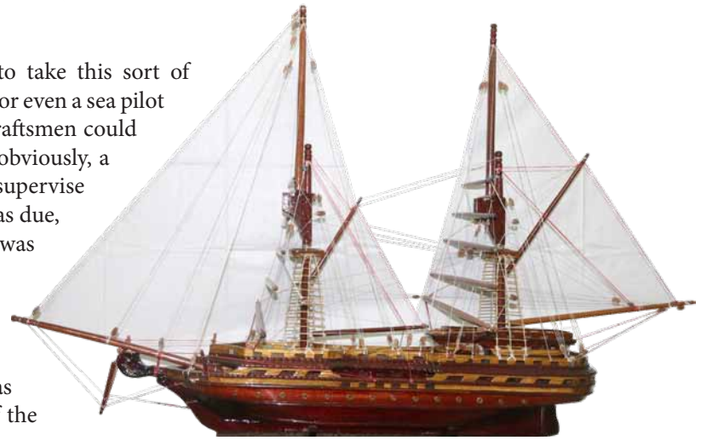
Stanley is one of the first people we met when we arrived to study the making of these ships on the riverbank of Thaikkal. A frail man in his forties, very lively but a bit fragile, he welcomed us warmly when we explained the aim of our visit. Oddly enough, however, what he immediately wanted us to look at was not so much the huge wooden structure of the ship which was lying just in front of us, the construction of which he had then been supervising for some years but rather the few model ships he had crafted during that time and that he kept as precious objects in his hut.

Socializing with the help of ship models

Until recently Stanley considered himself a lucky man. As he explained to us emphatically, building small boat models was not only a simple hobby that he loved to practise but more fundamentally a gift of God. By doing this, not only was he obeying God's command, but he had managed to acquire quite a social reputation, at least among his family, friends or work associates to whom he regularly gifted some of his models.

A model too far...

As long as Stanley had been using his models in social contexts, everyone was pleased and admiring and no one was disturbed by his daring to be creative, making not only historical models of ships but also new models for improving existing ones. But things began to sour rapidly when he demanded that the craftsmen under his orders implement his improvised 'ameliorations' on the ship that he was supervising. Was he seriously pretending to know their craft better than they did themselves and to teach them how to make a better ship?



What made it particularly shocking for him to take this sort of initiative was the fact that he was not a carpenter or even a sea pilot or a captain whose professional authority the craftsmen could respect. He was indeed a simple sailor even if, obviously, a clever one. If he was effectively in a position to supervise the building of a new kotia in Cuddalore, this was due, in reality, to two sets of circumstances. The first was that he had made the acquaintance of the future owner of the ship through being active in the same religious congregation. This allowed for a degree of intimacy between them in spite of their social differences. But the second reason was purely logistic: both he and the future owner of the boat were living in Tuticorin, a few hundred kilometres from Cuddalore where kotias were built. Because the contract to build a new kotia was given to a master carpenter (mistri) from Cuddalore, and because of the necessity of following up on the progress of the building of the ship from close quarters, it was almost compulsory that someone stay in Cuddalore for two or three years to represent the interests of the future owner. Stanley gladly accepted the responsibility. And nothing would have gone seriously wrong if he had not attempted to capitalise on this situation by asking the local carpenters to change their ways and make alterations to the ship according to the design of his models. That was certainly not something they could happily comply with.

" They don't even float "

The specific circumstances of this case may certainly explain, even if only partially, why local craftsmen did not agree to follow the design changes proposed by Stanley to improve the design of the ship. But there were more fundamental reasons as well. Whether in India or in the Gulf, the makers of dhows and wooden ships have, in fact, always refused to use any sort of plan—not to mention models—for building ships which might have a size of up to one hundred metres and a weight of 2000 tons for the biggest. One master carpenter joked with us that—even when they were obliged to make a plan of the ship they had built for administrative reasons—they would do it after and not before the ship was finished. We will see more precisely at a later stage how these types of ship are built, but there is no doubt in this case that a kind of mutiny brewed when Stanley insisted on changing the way it was ordinarily done.

The workers began to cast slurs on Stanley, joking, for example, about the fact that his model could not even float properly, so how could one expect the actual ship to float. But things became slightly ugly when the affair acquired a communalist tone. Usually in this part of India, seafarers have a tradition of cooperating well, whether they are Hindu, Christian or Muslim. In more ordinary times, no one would have bothered about the fact that Stanley was a Christian while the hired workers were Hindus. Given the ongoing tensions, the rumour began to circulate that Stanley, a Christian devotee, was trying to convert the local people. It is a grave accusation in this part of the world even if, in this particular case, it was unfounded. Things turned even more ugly when some of the local workers threatened to throw Stanley in the river. As he began to lose his authority, something had to be done quickly if the situation was to be saved.

Stanley. He was the representative of a shipping family in Tuticorin (Vilson shipping Pvt. Ltd.) which commissioned a wooden cargo ship in Cuddalore.

Boat models in Tamil Nadu

For thousands of years, small model ships have been used as toys, objects of prestige or decorative artefacts in coastal societies. More recently, the making of them has become a sort of hobby and they are also sold to tourists; from the seventeenth century onward, they came to be used as engineering devices by naval engineers and in arsenals. Nevertheless, in many societies the most significant use of models of boats fundamentally remained a ritual and a social one. Such has been especially the case in Christian cultures where ship models have regularly been used as reliquaries and as ex-votos. It is then not surprising to discover that boat models still find a prominent place amongst the Christian population of Tamil Nadu along the coast.

Left: Our lady of snow, Tuticorin

Below: The frontispiece of Sinthathri Madha Church,Tuticorin

Facing page, clockwise: A ship model made by Stanley. An over-head water tank in Cuddalore Old Town. A ceremonial model kept in the same church at Tuticorin

A providential man

Antony Ignaci was another employee of the Vilsons family in Tuticorin and, too, an old friend of Stanley's. But in contrast to him, he was no simple sailor; he was rather a very experienced and respected captain of kotias and also a pragmatic man. He was eventually to be the captain of the ship that was being built in Cuddalore. It was then wisely decided that he would coordinate with Stanley in supervising the building of this ship. Moreover Stanley, slightly sickened by the whole episode, decided to take some respite from Cuddalore. As a consequence of this, not only were all tensions quickly appeased but, with the help of Antony, the work on the ship began to progress quickly. It was also a great opportunity for us because, from this time, Antony became one of our best friends on the riverbank and a most valuable informant.

A slightly lost salesman

Stanley was not the only man we met when we began our enquiry on the riverbank of Thaikkal. Another man was particularly intriguing to us because of his demeanour. He was obviously not a local but seemed to be rather idle and not exactly sure why he was there and what he was supposed to be doing. After we introduced ourselves to him, we learned that he was a sales representative. His job, not yet very successful at this stage by his own assessment, was to advertise and sell Chinese motor engines to the builders of fishing boats and cargo ships in Tamil Nadu. What we found especially interesting when talking with him was the manner in which he introduced us to the subtle ways that motor engines for cargo ships were, for a long time, obtained in India. For many years, indeed, Indian made engines were considered to be both expensive and relatively inefficient. So, the trick was to buy an old second hand engine to enable the new boats to reach the Gulf, and to buy a cheaper and better engine there. Nowadays, however, the problem is slightly different. While better engines have been available for a while in India, it has been the Indian companies themselves which were uninterested in this market—too small and specific in their eyes to bother much about. As a consequence, Chinese companies that specialise in selling motor engines all over the world, sensed an opening. At this particular stage, representatives like our salesman were more involved in exploring the market than seriously exploiting it. Also, in a way, he was a distant colleague of ours, trying as we were, to better understand the overall logic of this small local industry.

The net mending social club

The bank of the river is not used only for building big wooden cargo ships; it is also used for building or repairing fishing boats and all varieties of these are parked along the bank. On the track that leads to the village from the bank, there is a spot where fishermen sit to mend their nets and gossip in the relative coolness brought by the breeze. This informal meeting place that we call 'the Net Mending Social Club' came to play an important role in our enquiry. It gave us many opportunities for meeting ship owners, sailors and lascars. But the very existence of this "club" also has a sociological significance. It confirms that shipbuilding and fishing activities are intertwined; in fact, only a handful of the local carpenters and craftsmen can be defined exclusively as carpenters. For most of them, work on boatbuilding is seasonal and for the majority fishing remains the main source of income.

Kulfis and kotias

We also met Bablu, a young man from eastern Uttar Pradesh of North India, whose family struggled to make ends meet out of their small landholding. Bablu was making some additional income by selling ice cream in Cuddalore. But as he explained to us, this was by definition a seasonal business. Few people would buy ice cream during the winter months in the north so he had come up with the idea of going south where the heat lasted most of the year and where he could sell his goods during the winter season. Once there, he found the opportunity—like other members of his family—to work on the building site of kotias in Cuddalore. He and many men from his family were engaged in various jobs there.

Working on kotias, gave him the opportunity to work towards becoming a carpenter in the future. His example shows that even if the building of kotias in Cuddalore may at first appear to be a local speciality, the reality is more complex. Professional opportunities exist for migrant workers whenever the need arises for additional workforce. Nowadays there are more migrant workers from the North working in South India than previously, especially in the construction sector. Thaikkal is no exception.

Ayyadurai

While we have been lucky enough to meet many interesting people during our study, our greatest piece of luck was to meet Ayyadurai and Kathiravan.

Then in his eighties but vigorous and certainly not looking his age, Ayyadurai was spending most of his days on the bank supervising the building of a kotia funded by his son-in-law. It would have been difficult to find anyone better for this role. As we quickly learnt, Ayyaddurai played a leading role in the initiation of a wooden cargo shipbuilding industry at Cuddalore, in the years following Indian Independence. Before building kotias, he had started as a sailor and then a captain on smaller sailing vessels (paai vattals). We will describe later in detail how this industry was born, but suffice it to say here that if the history of maritime trade in Cuddalore can be told today, it is only thanks to the generosity and the living memory of people like Ayyadurai.

Kathiravan

Kathiravan is certainly someone we should mention at the beginning of this book. A small but sturdy man, Kathiravan, who is in his forties, is a master carpenter whose reputation extends well beyond Cuddalore, that is basically to all the places where kotias are made, used or repaired. His father was a sea captain (tindal) and he trained under two different master carpenters (mistri). We met one of his masters at Beypore on the West Coast where he was supervising the works of other Cuddalore carpenters who reside and work there for a few months each year, repairing and refurbishing old kotias. Kathiravan has built as many as sixty fishing boats and six kotias. When he is not working on kotias, he looks after the fishing boat that he owns and which provides him a complementary income, particularly in times like the last few years when no kotias were built. We learnt a lot about the art of navigating with Antony the captain, and the history of their 'invention' with Ayyadurai but it is with Kathiravan that we are really able to understand what it takes, what it means and what is needed to build a kotia.

A SHIPYARD ON A TEMPLE LAND

The village of Thaikkal and its dargah

The village of Thaikkal was built on land that belonged to a dargah (a shrine built over the grave of a Sufi saint), which houses the tombs of Sufi saint Bolesha Waliuullah and his disciples. He was the younger brother of the saint Shahul Hamid, who is revered in the famous Nagore dargah, 120 kms south of Cuddalore. Hence the Urs festival here is celebrated a day after the Nagore Urs, on the 11th day of the crescent moon in the lunar month of Jumada al-Thani. Bolesha Waliyullah and his brother in Nagore are known for their healing powers, particularly of people with mental health issues. One could see many of them camping at the dargah premises. In exchange for a small fee, they are admitted to reside at the dargah, where daily rituals are performed and people pray for their recovery.

A noticeable aspect of the Sufi cult, especially in the South is the atmosphere of religious harmony that surrounds it. It is a common practice for Hindus to visit the dargah regularly seeking the benediction of the Sufi saint. The local fishermen, irrespective of their religion, used to tie blessed green flags from the dargah on their boats as protection from misfortune. They don't do this nowadays for fear of being mistaken for Pakistani vessels. One of the three tombs in the dargah is of a brahmin woman devotee called Pappathi Ammal. A caretaker of the dargah and a Hindu villager who was present, both insisted on the amicable relationship and mutual respect for each other.

Bolesha Waliyulla's dargah at Thaikkal.

"Everyone regardless of their religion comes to the dargah, we are not other people. Invitations are regularly exchanged for temple festivals and for marriages too and so far nothing untoward has happened, no conversion for marriage, and no eloping. Even if we have been so close to each other, no tensions and conflicts so far. Kathiravan says in a lighter vein, 'he is my mama (uncle), we talk to everyone, even vie for mama's daughter' (laughs). Ansari responds saying 'you ask for her hand and we will give you our daughters'. No religion related problems so far, even if there had been I would not get violent, it will grow only if we engage. Why issues between mama and machaan (nephew), God will take care! "

The village of Thaikkal and its temple

Apart from a few Muslim families living around the dargah, the village of Thaikkal is populated predominantly by paravar fishermen. The full name of the village is Thaikkal Thonithurai, signifying its role as a ferry point for people living on the eastern bank of the Paravanar River. Initially, four fishermen families came to live along the bank and were followed by other families who settled on plots of land bought from the dargah. The dargah then had about twenty-two acres of land, almost all of which have been sold to the fishing villagers over the years. The agricultural land alongside the riverbank was gradually bought by the temple committee and has, bit by bit, become temple land.

Most of the streets of Thaikkal run parallel to the west bank of the Parvanar river up to the new bridge that crosses the river to Sothikuppam, another fishing settlement situated between the eastern riverbank and the Bay of Bengal. While the dargah is in the northern part of the village, nowadays the social centre is the big village ground where the Karuppumuthu Amman temple overlooks the western bank of the river. It was a small temple when we first saw it in 2011 but was completely rebuilt on a larger scale in 2016.

According to our informants, Thaikkal comprises about 300 families (290 public distribution system's ration cards). Almost all families have at least one member engaged in fishing activity, while half of the men are engaged in carpentry as a profession. People in Thaikkal own about 3 trawlers, 30 small FRP (Fibre Reinforced Plastic) boats, 10 catamarans and two big 'kanna' boats bought from Kerala for purse seine fishing. Around one hundred of these men sail regularly on kotias for eight to nine months in a year and hundreds work as marine carpenters, in the village and outside, for several months. They find work on the West coast and beyond in Gulf countries such as Qatar, Dubai etc. There are also skilled workers employed in Singapore and as sailors in mercantile shipping, with a few engineers and doctors. A very small number of factory workers, mainly women, work at the large industrial complex (SIPCOT) at the doorsteps of the village. This small number of factory workers was explained to us as due to the factory owners' preference for employing people from other parts of Tamil Nadu, or even immigrants from other Indian states who are easier to 'manage' compared to locals. All children attend local schools and about half of them pursue their higher education in polytechnics, industrial training institutes (ITI), arts and science colleges and a few in Annamalai University at Chidambaram. Finally, we should mention four owners of kotias, whose social status is linked to their possession of these.

Karuppumuthu Amman temple. View of the old temple and consecration of the renovated temple in 2016.

The main square of Thaikkal on a festival day.

"In the old days, there was a village across the river towards the coast called Karuppankuppam, where there was an Amman temple. It was not well maintained by the small fishermen villagers. There was not even a dedicated poojari for the temple and sometimes even the dhobi was lighting the lamp of the temple, which was considered unclean. Such was the attitude of the villagers towards the temple. The villagers were dependent on Thaikkal thonis to cross the river. One evening, a thoni driver heard a female call from the other shore and he went to pick her up. About to land in Thaikkal the thoni driver demanded the price of the trip and the woman said she had no money. The thoni driver started shouting and abusing her, at which the woman turned into a snake and crawled out of the boat. The thoni driver fled on seeing this. The snake came and wound itself around a young neem tree in Thaikkal. That very night, the amman appeared in the dreams of a few of the village elders and said that she planned to reside henceforth in Thaikkal. Next morning, the elders set up a stone near the neem tree and started worshipping it. Muslims from the village offered land for the temple. They would throw a stone from the tree and the land up to the farthest point of the thrown stone would belong to the temple."

The bridge was built in 2004 . Up to then, the people who lived in small hamlets on the flat.... of land , in between the other side of the river and the ocean, could only join the main land by boat. They were amongt the people who sufferd the most of the tsunami of 2004.

Kotias in the making

When we first came across the riverbank of Thaikkal in 2011, eight wooden cargo ships were at various stages of construction. Two more were being built a bit further north, on the bank of Gadilam River opposite the old port and the current fishing harbour. According to various testimonies, an average of two kotias were built each year between 2003 and 2013. And we know for sure that 195 of them were built upto 2015. It normally takes a year to a year and a half to build a kotia, but more often than not the stated numbers don't fit very well with what we saw in Thaikkal as it took three to four years to build one there. However, getting to know how long this activity lasted and how many kotias actually set sail from when they were first built proved to be a more difficult exercise than expected. But what could be traced for sure is that wooden cargo ships were first made in Cuddalore in 1957 (still called at this stage paai vattals). They became very profitable during the 1980s, when most of them were progressively mechanised (assuming the name of kotias), a process that took up to twenty years to complete.

The last of the wooden cargo ships equipped only with sails were in use until 2004. The demand for kotias increased up to 2013 when it began to decline and no new kotias have been built in Cuddalore since 2015. In 2022, however, when we came back to Thaikkal, a new kotia was being built. As long as these boats remain profitable, owners keep the possibility of building new kotias alive. Meanwhile kotias are regularly refurbished up to today (in 2022) whether in Cuddalore itself or by Cuddalore craftsmen working on the West coast. During the period between 2003 and 2013 anywhere between 800 to 1000 people were engaged in some capacity in the building and operation of kotias. The vast majority of them came from the fishing villages around Cuddalore port and approximately half this number were earning their livelihood by sailing on these kotias. All of this goes to illustrate the crucial role of kotias in the economic life of fishing communities around Cuddalore port.

Thaikkal riverbank, 2011.

Fishing boats of Thaikkal

The mixed use of a riverbank

Fishing practices and the crafts associated with fishing boats would easily fill an entire volume. We intend to deal with them here only as far as they are intertwined with the evolution of kotias, especially in Thaikkal. This is because the majority of those involved with kotias are not only fishermen themselves, but still own fishing boats or work on those of others. Moreover, most of the carpenters and master carpenters working on kotias trained themselves by building fishing boats. The riverbank is thus not used exclusively for building wooden cargo ships, but also for repairing and parking fishing boats. Fishing boats are also to be found parked alongside the concrete jetty and, more recently, along the bridge nearby, which was constructed after the Indian Ocean tsunami of 2004. It may be mentioned, too, that even if fishing is not a major activity on the Paravanar River itself, oysters and mussels, which can attract good prices, are collected regularly.

Reinventing fishing boats

Fishing boats and fishing practices have evolved as much, if not more than the kotias. One cannot forget that in spite of the traditional appearance of most of the activities which are taking place in Thaikkal, we are living in rapidly changing times—challenging ones too—like everywhere else. An interdisciplinary program at IFP on transformation of coastal ecosystems, particularly in the Cuddalore district of the Coromandel coast looks at these changes in their geo-physical, ecological and socio-political aspects with fisher well-being as focus. An unexpected consequence of the 2004 tsunami's devastation in Tamil Nadu was financial. The lives of the fishermen in the region were greatly transformed, not only by the tragic deaths the tsunami caused but also by the flow of large financial aid, international in particular, that was poured into the region. As a consequence, in the years following the tsunami, the traditional catamarans—simply made by assembling together a few logs of wood—were being motorised or replaced by small fibreglass boats, called FRP (fibre reinforced plastic) boats. Crucial changes also took place in larger fishing boats. Most of these are built nowadays by using fibreglass with an internal wooden frame, commonly known as STB - Stern Trawling Boats. In neighbouring fishing ports, such as Nagapattinam and Karaikal, boats entirely made of iron are also becoming the fashion; but not so much in Cuddalore as most people are of the opinion that the life and maintenance of iron boats does not match its investment.

Left: A fibreglass boat being sent to Andhra Pradesh after repairs from Thaikkal.

Below: Fishing boats being built in Thaikkal in 2019.

Big Kerala made kanna boats are also used nowadays. They are deployed in the newly found purse seine operations, with a large net encircling an entire school of fish. These nets, imported from Japan initially, were in use for some years in Kerala and Goa. The kanna boats and the purse seines bought second hand on the West Coast began to be used extensively in Cuddalore. Their use is highly controversial because of the destructive nature of the fishing it entails. Though they are officially banned, their proliferation has gone unchecked and has emerged as a serious cause of conflict within the fishing community. Equally significant is the common use of GPS and sonars on the fishing boats. Because they allow the fishermen to identify schools of fish precisely, these have become a real asset for profitable fishing. Considerations of engine power and resulting speeds have become important as never before. Along with the decisive role of the use of fibreglass in fishing boat construction, this marks a definite transformation in the fishing activity in the region. Fibreglass boats are quickly replacing wooden boats. Against this background, the building tradition of wooden kotias is a fascinating exception.

A new development in the long history of shipbuilding

It is widely accepted that there was a progressive transition between two techniques in constructing the hull of a boat. The first consisted of assembling the planks forming the lateral sides of the boat followed by strengthening the structure with an interior framework. The second, supposed to have developed later on and in contrast to the first one, consisted of first setting up the frames, upon which the planks were attached to form the shape of the hull (Rieth and Pomey 2006; McGrail 2015); these were respectively identified as plank first and frame first techniques. But in the case of fibreglass boats, an unexpected combination of these two techniques has emerged. Following the frame first technique, a thin wooden frame structure is set up but it is provisional. Its aim is only to facilitate the layering of fibreglass coatings forming the hull. In the next step, the frail fibreglass structure is strengthened with a strong wooden interior framework, more in accordance with the plank first technique. These interior frames are again covered with fibreglass. As a result, the widespread use of fibreglass for building of fishing boats has led to a new hybrid method combining two fundamentally different techniques in boat building. This new technique is also characterised by the combined use of two different sorts of material: wood and fibreglass. Such a combination of traditional and modern techniques characterises more generally the reinvention of wooden cargo ships in Tamil Nadu.

At the confluence of the two rivers

Cuddalore was the main outpost of the British in South India for almost a century (1653-1758). It served as a gateway for the export of goods, mostly cotton fabric from Tanjore and surrounding areas to Indonesia where they were exchanged for spices. The British established Fort St. David, of which there are hardly any remnants today, but whose importance was paramount in South India and greater for a time than Fort St. George at Madras. Cuddalore changed hands between the French and the English many times, but was finally handed over to the East India Company. Robert Clive was its Deputy Governor for a while in the 1750s and it was from here that he developed the influence of the British in India, to the great benefit of the East India Company, as well as to his own.

Shops in Clive Street, one of the main streets of Cuddalore Old Town. Obviously, the colonial past has not been completely erased.

The political importance of Cuddalore declined drastically after the mid-eighteenth century. During the later colonial period it survived as a relatively minor economic centre with the port retaining some importance for trading goods between South India and the rest of the world. It was only in the 1980s with the establishment of an industrial zone (SIPCOT) that Cuddalore 'benefited' from some economic recovery with the establishment of more than twenty factories, mostly manufacturing chemicals. But there has been a heavy environmental cost to this and the surroundings of Thaikkal are today one of the most polluted areas in the district of Cuddalore. This is particularly detrimental to the local inhabitants, mostly fishermen and small farmers, especially as they don't even derive any major income from the presence of the industrial zone. It is also the most significant difference between the importance of Cuddalore as a place of artisanal production of wooden cargo ships and its new industrial avatar. While these two are obviously not on the same scale, the artisanal practice directly benefited the locals. This is especially true for the fishermens' communities surrounding Cuddalore. But it is also the case to a lesser degree for various other adjacent settlements, such as Sellankuppam, Kannarapettai and Salakkarai, where one finds a number of ironsmiths, coir makers and other craftsmen or small businesses who participate in one way or another in the building of kotias.

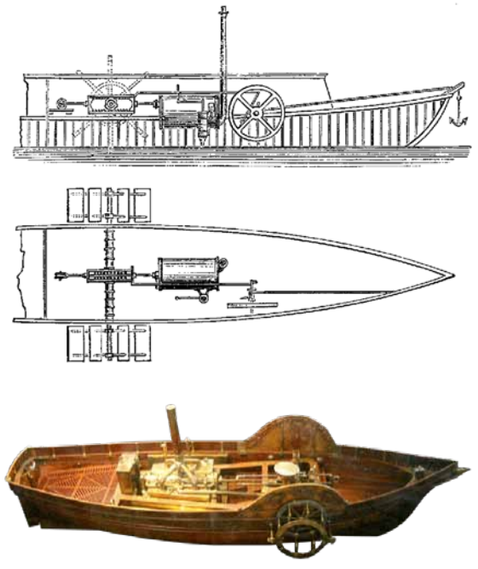
2

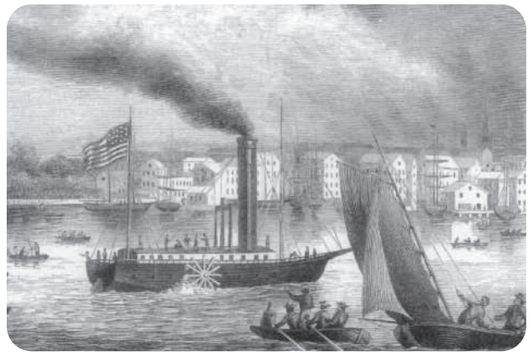
Reinventing the kotia

Wooden ships have never totally lost their popularity but they are mostly confined nowadays to recreational or heritage use. As far as the merchant navy is concerned, that is a different history. At a time when the largest existing container ships can reach more than 20,000 tons (TEU), the use of sails or wooden hulls for merchant ships appears like a vision from a bygone era.

The first steamboat trials date back to 1776 but it was only in the first decades of the 19th century that they became seaworthy enough to cross the Atlantic or to reach India from Europe. And though the first iron-hulled boats were made in the 1840's, the common use of steel would also wait until the second half of the 19th century (1869). From that time on, the exclusive reign of sailing ships to transport goods around the world declined at first progressively, then dramatically after the first world war; such was the case at least in Europe and in the United States. But the same evolution did not take place at the same pace everywhere. In the Indian Ocean, the decline of sailing vessels for transporting goods was to come much later.

It is not surprising in this context that many people are amazed to learn that we could return to the use of sails for transporting goods in the near future; or, to be more precise, what is being considered nowadays is most often to combine the use of sails with that of motor engines, as was done in the past.





Above: Illustration of Robert Fulton's first commercial steamboat (1807).

Left: Plan and model of Claude-François-Dorothée, marquis de Jouffroy d'Abbans's steamboat.

The return of the sail

It has become commonplace to associate globalisation with the accelerated flow of capital and with the development of the Internet, but this does not mean that only intangible flows are involved. Never before in human history have so many material goods been produced and transported over such long distances around the world. What has rendered this possible has been the increased affordability of maritime transportation. It is currently estimated that 90% of global freight traffic passes through the sea at some stage on its journey to the consumers. But, in contrast to other industries or modes of transport, it is only recently that the environmental damage caused by maritime transport has really been acknowledged. Studies show the alarming seriousness of maritime pollution caused by cargo ships. As a consequence, environmental activists are no longer the only ones concerned. Shipowners cannot afford to remain indifferent to it either. As new environmental regulations are being framed in different parts of the world, they have no other choice but to envision various solutions to reduce the negative impacts of their polluting activity in the marine environment. The return of sail and of other devices using wind energy represent one solution, even if such initiatives are mostly isolated experiments. But the situation is rapidly changing

Below: Container ship made in 2018 with a carrying capacity of 20,000 TEU.

Facing page top: The Aeropleustic Art of Navigation in the Air by the use of Kites, or Buoyant Sail – a magnificently creative treaty written by James Pocock in 1827. He didn't hesitate to put his ideas to test.

Facing page bottom: Prototypes made by Yves Parlier for exploring the possible use of kites on cargo ships.

For example, Yves Parlier, one of France's most famous sailors and a renowned innovator of sailing techniques, is one of a few entrepreneurs attempting to install gigantic kites on commercial cargo ships in order to tow them. The objective is to save as much as 20% of fuel, while helping to reduce the disastrous pollution rate of these giants of the seas. The main advantage of this technique is that it is cost effective and, unlike other low-polluting technologies, it does not require fundamental changes to the structure of existing cargo ships. But for such a proposal to be economically viable, the gigantic kites would have to be deployed and brought back on board automatically without the need for additional staff. This is the main technical difficulty even if it does not slow down the interest generated by the project. Thus, Thalès, one of France's biggest technological firms, recently agreed to participate in the experiments carried out by Yves Parlier and his team. Airbus, the manufacturer of aeroplanes was also inspired by this work to initiate its own research in this field[1].

Kites are not however the only solution to harnessing wind energy to save fuel and reduce pollution; other technologies are being tested. Many people advocate the use of rigid sails, which might be a more effective technique[2], and capturing wind energy through gigantic rotors

on ships is also under consideration[3]. Exploration of the possibility of using the boat's hull itself as a kind of sail is also being explored[4]. But no matter how promising these projects may be, they are mostly still at the prototype stage, and have been for a long time.

As is made very clear in his wonderful treatise written in 1827—The Aeropleustic Art of Navigation in the Air by the use of Kites, or Buoyant Sail—George Pocock spent his entire life promoting the use of kites on land and at sea. He made the first officially recorded trip on a boat powered exclusively by this means between the Isle of Wright and Plymouth. In 1905, a gigantic five-masted ship, the Preussen, was launched in Bremen, whose partially automated sails already made it possible to greatly reduce the size of the crew required to operate it. Shortly after this, in 1925, the first crossing of the Atlantic was accomplished by a ship using the rotor invented by Anton Flettner.

More than a century after their invention, however, we are still waiting to see which of these inventions will prove to be economically viable and have at least a partial impact on the future of the merchant navy. But other initiatives exist in this field, which although less "futuristic" have the advantage of being more operational. Old sailing ships are refitted or modified in order to be reused for freight transport. One of the most successful of these is the Tres Hombres: it is a refurbished wooden ship which was used for clearing mines during the Second World War, then recycled for deep-sea fishing and finally converted for freight. The Tres Hombres has been successfully trading rum and other organic products between the Americas and Europe for about ten years now.[5] A new regular line of cargo sailboats (Neoline) of a new type is also about to be established between the French coasts and the United States with the financial support of one of the largest shipowners in the world (CMA -CGM)[6].

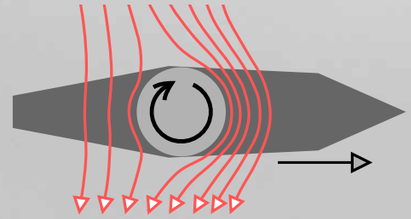
Below: The von Preussen. Built in 1902, it was the first ever five masted ship-rigged sailing ship and was carrying forty seven sails . It had an iron hull and the manipulation of sails was partially mechanized. It remained the fastest cargo ship in the world.

Of course, while comparing these various experiences, one should not confuse the logic of returning to ancient ways of commercial sailing with more futuristic prototypes. What these initiatives have in common is the laudable ambition to build a technological bridge between the past and the future of merchant shipping. But in both cases, it is the resources of the present that risk sometimes being neglected. Other lesser known forms of maritime trade, which may not have been evolved consciously to address the same concerns but which are equally relevant should not be overlooked. Especially since taking them into account makes it possible to challenge maritime history and, more generally, our understanding of how technologies evolve.

Above: The Tres Hombres: one of the few examples of a wooden sailing cargo ship who managed to be more or less economically viable today. It has been trading rhum, cacao, coffee, honey and other organic products between America and Europe for the last twelve years.

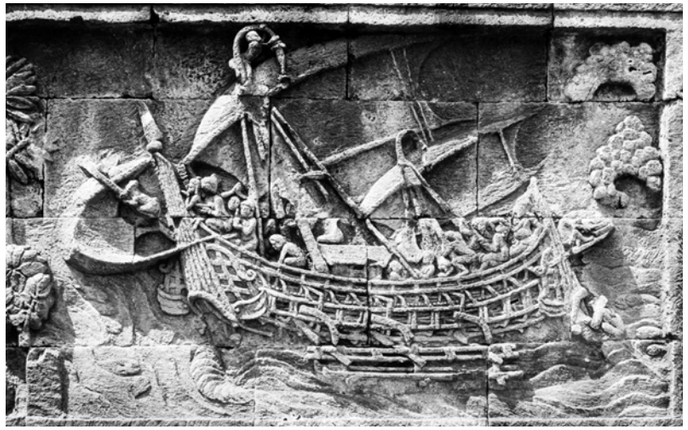
Below: The ecoliner: an example of the new sort of hybrid ships using both sails and motors which are planned nowadays but are still at the stage of concept, unfinished projects or pure prototypes.

Flettner rotor boats: the first one built in 1924 and a new model built by Norsepower and Maersk in 2018.



Magnus effect at Flettner rotor boat.

An invisible history



The cultural and economic importance of the historical exchanges which have taken place since ancient times in the Bay of Bengal and across the eastern Indian Ocean cannot be disregarded; the profound specificities of Balinese society, for example, still bear ample witness to this today. But with the exception of a few remarkable studies, the knowledge available today on the maritime history of commercial exchanges in this part of the world remains scarce, especially so for the colonial period. This is in stark contrast with the interest generated by the cultural and the commercial exchanges which have taken place on the other side of the subcontinent, in the Western Indian Ocean between India, East Africa, the Persian Gulf and Europe.

Only a few researchers have undertaken the study of the construction process of artisanal boats in Tamil Nadu, and the rare sociologists or anthropologists interested in this field mostly devoted their attention to the building of fishing boats and almost none of them to the construction of wooden cargo ships. The principal aim of historians was to learn about the past, even when they were studying the present. Such a perspective is legitimate, especially when it is guided by the principles of ethnohistory but the risk of thereby introducing epistemological bias is not negligible.

For example, David Hornell, one of the finest specialists of maritime history during the last decades of British India, valued the study of local traditions on the East coast of India considering it to be an ideal

Above: Bas-relief of the Borobudur ship in Java, Indonesia.

Facing page top: An archeological site - the bottom hull of the Newport ship of XVI century was recovered in 2002.

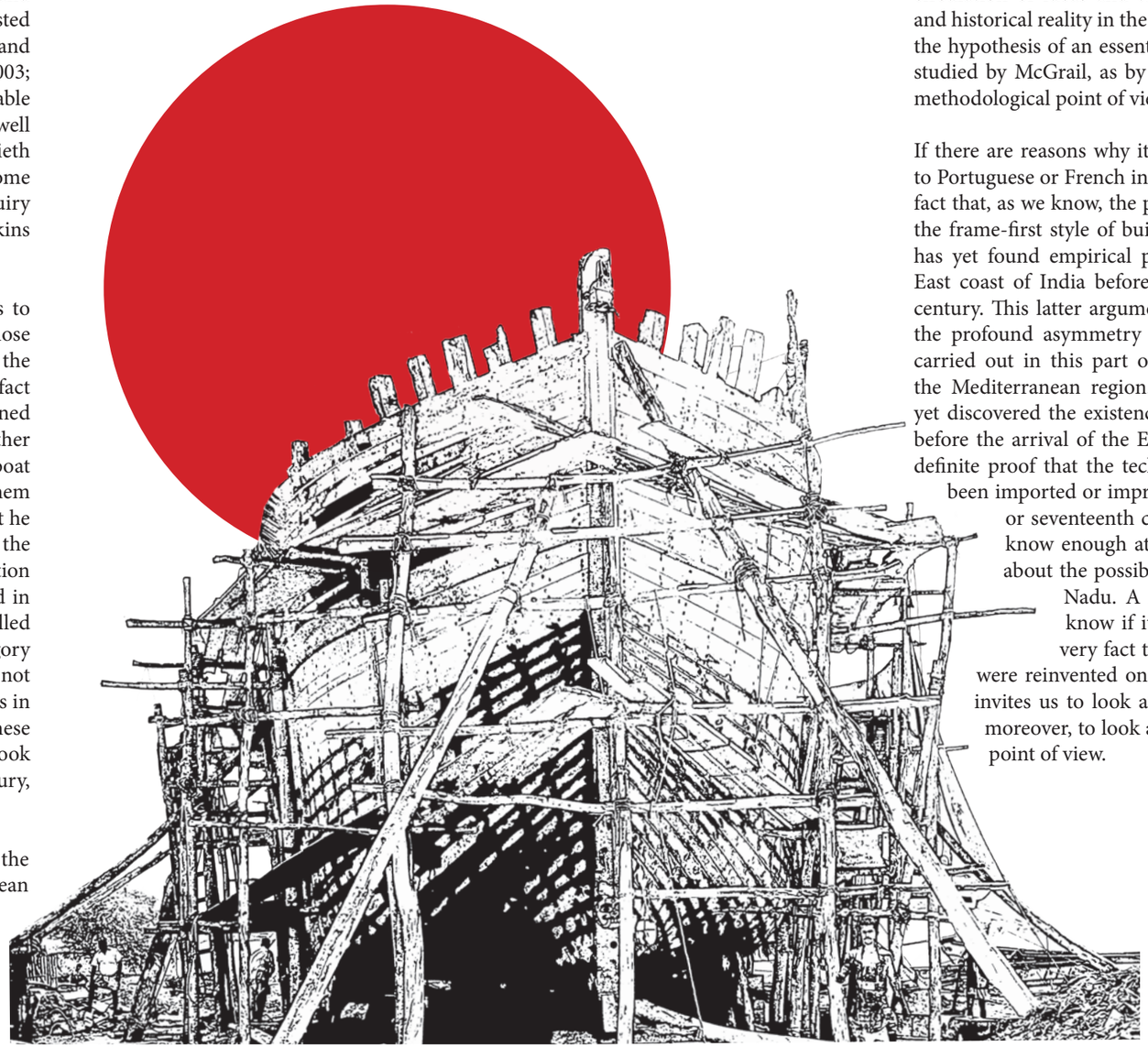
Facing page below: the bottom part of a kotia in construction at Thaikkal.


ARCHA-NOE
habitacio animalium
habitacio hominum
habitacio animalium
Apotheca herbarum
Herbaria
Apotheca speciorum

conservatory for learning ancient methods of building ships, not only in the Indian Ocean but also from the beginning of human society (Hornell 1920; 1946). In a more measured vein—we find some excellent research on the boats of the region, conducted by Sean McGrail and his colleagues in the late 1990s; but they, too, were primarily interested in the historical past of shipbuilding in the region (Blue, Kentley, and McGrail 1998; Kentley, McGrail, and Blue 2000; McGrail et al. 2003; Rajamanickam 2004). We should, however, mention a remarkable exception. Clifford Hawkins, a remarkable photographer and a well known author of books who specialised in documenting the twentieth century's last commercial wind ships, is the sole author to give some attention to the sort of boats which interest us too, even if his enquiry was limited to only one category: the thonis of Tuticorin (C. W. Hawkins 1965; 1977).

A main result of the research of McGrail and his colleagues was to show that Tamil Nadu had a very specific tradition of vessels whose morphology and construction methods were different from all the other traditions on this coast of India. What characterised it was the fact that the hull frames were made at the very beginning and thus defined the final shape of the vessel. This method was the opposite of other traditions of boat building on the eastern coast of India where the boat builder begins by fashioning the planks of the hull and then fastens them together to define the shape of the hull. It is only at a later stage that he may fasten the frames inside the planking in order to strengthen the structure. McGrail and his colleagues provided a detailed description of both the morphology and each of the successive stages involved in the construction of a particular category of fishing boat, locally called a "vattai", which was supposed to be the most representative category of this family of 'frame first' vessels. Their aim while doing so was not only to identify the specific existence of a particular family of vessels in this part of India but actually to trace its origins in order to situate these vessels in a larger historical panorama. They argued that one should look for their origins in the influence of the Portuguese in the 16th century, or possibly that of the French in the 17th century (McGrail 2001).

These colonial powers were thought to have popularised in India the construction methods that developed around the Mediterranean basin from the first centuries of the common era onwards and to have spread from there in successive waves to different parts of the world. McGrail and his colleagues saw proof of this theory in the fact that the indication of this alleged influence may still be found today not only in Tamil Nadu but also in Brazil and



Newfoundland: that is, basically on various coasts where the Portuguese presence made itself felt. All of these shipbuilding traditions would thus share this same origin. Such an assumption is plausible. After all, the circulation of ideas and techniques is a well-established sociological and historical reality in the field of shipbuilding. But on the other hand, the hypothesis of an essentially European origin of the kind of vessels studied by McGrail, as by ourselves, deserves utmost caution from a methodological point of view.

If there are reasons why it may be tempting to attribute their origins to Portuguese or French influence, they are derived primarily from the fact that, as we know, the plank-first style of building vessels preceded the frame-first style of building all over the world. Secondly, nobody has yet found empirical proof of the nature of vessels built on the East coast of India before the arrival of Europeans in the sixteenth century. This latter argument however is less convincing if we notice the profound asymmetry between maritime archaeological research carried out in this part of the world and that being carried out in the Mediterranean region. It may well be that we have simply not yet discovered the existence of vessels built frame-first in this region before the arrival of the Europeans. Conversely, we also do not have definite proof that the technique of frame-first shipbuilding had not been imported or improvised on this coast later than the sixteenth or seventeenth century. Thus, in simple truth, one does not know enough at this point in time to speculate very much about the possible origins of these kinds of vessels in Tamil Nadu. A more fundamental question however is to know if it really matters. As will be shown later, the very fact that wooden cargo ships equipped with sails were reinvented on this coast of India during the last century invites us to look at their whole history with a fresh eye and, moreover, to look at the history of technology from a different point of view.

A history of use

As David Edgerton convincingly showed, it is now time to abandon the conventional approach which still prevails in most histories of technologies through focusing mostly on their origins (Edgerton 2008). The historical account of any technological field should, however, be associated with the study of its use and with the practical innovations that go with it. The contemporary use of catamarans on the coasts of Tamil Nadu offers a simple example of this.

Simply composed of a few long wooden trunks tied together by ropes, catamarans are regularly dismantled after use. The very simplicity of their design has led many scholars to consider them as living fossils in the history of shipbuilding, representing one of the most archaic stages in the development of navigation. This may or may not be the case but, if their actual use is taken into account equally seriously, they may appear in a different light. It is more fitting to see their simplicity as a convincing example of the sort of design which, may indeed be ancient but which, more importantly, remains as relevant today as it may have been in the past. The proof of this is the way in which these vessels coexist today alongside the mechanised fishing boats also to be found in the region. They are towed by these larger fishing boats to deploy their huge nets more easily in the sea once they reach the fishing grounds.

Many accounts of maritime history then convey the feeling that decisive progress in the history of shipbuilding originated in the West if our focus is on the infant stages of technological innovations. If we consider early attempts to substitute sails with motor engines or wooden hulls with steel hulls, we may easily accept the narrative of these inventions in which they are simply attributed to the creative genius of one or a handful of pioneers, generally coming from the West. But if we look at the same history with the aim of discovering how all these inventions developed and acquired importance, a very different geography and sociology of innovations emerges: a very different crowd of innovators and a whole new set of key players, whose role cannot be neglected, comes to the fore and plays a decisive role. Their numbers spread to all regions of the world and to all sorts of social groups. The process of the reinvention of wooden cargo ships in Tamil Nadu will clearly demonstrate this. Before we enter into the details of it, however, it seemed essential to us to reconsider a number of concepts and notions commonly used to describe local industries of this sort. This methodological preamble seemed to be indispensable for understanding what is at stake in the construction of wooden cargo ships in Tamil Nadu today. It will then allow us not only briefly to address the history of shipbuilding in this coastal region of India, but also to reconsider more fundamentally the very question of the existence of these wooden cargo ships.

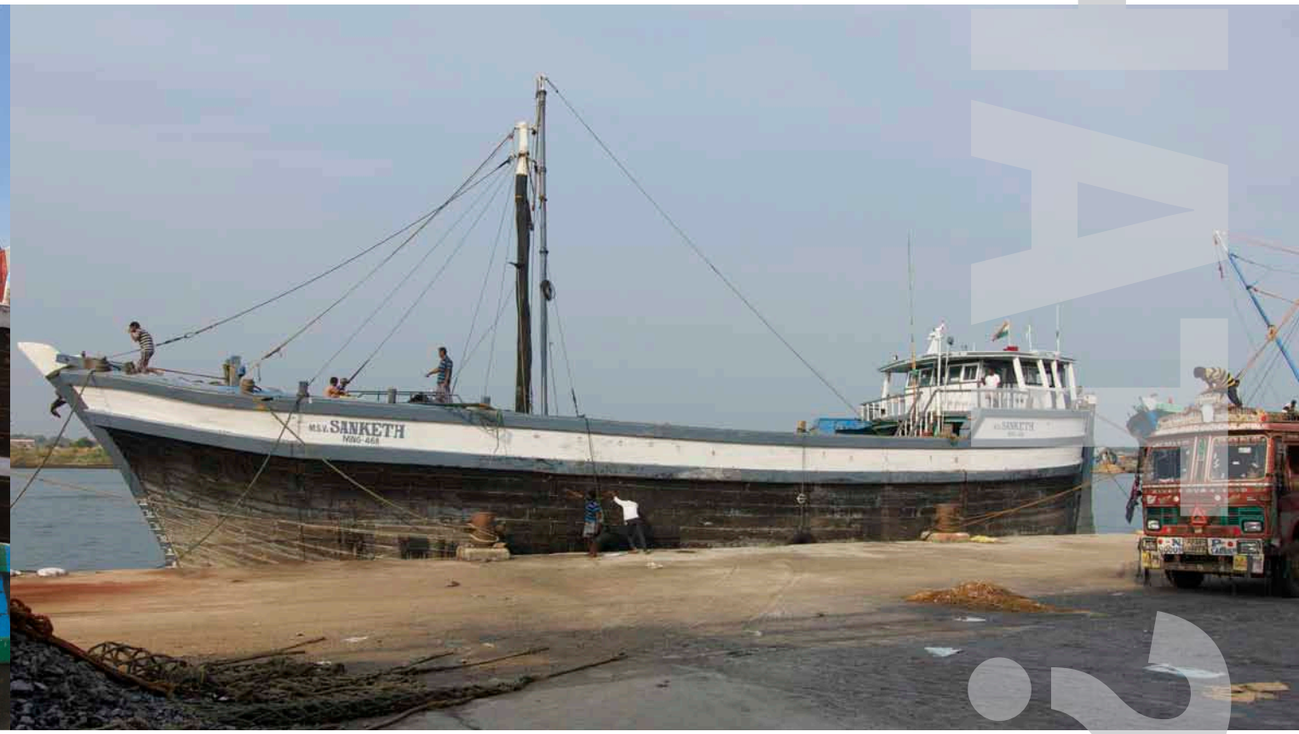
Wooden catamarans in Thaikkal plying the Paravanar river for small catch.

What is an indigenous vessel?

All the people we met who had any kind of role in building and designing boats and ships in various shipyards of South India acknowledged the diversity of sources from which they were drawing inspiration for their work, whether it was by talking with others, looking at boats from other parts of India or abroad or by looking at all sorts of documentation on the Internet or elsewhere. But unlike maritime historians who are fascinated by this kind of detail, they did not attach much importance to it.

What really matters to them is how to get every part of the ship right, how to combine each stage of their construction in such a way that a functional vessel may finally be obtained, capable of accomplishing what it is intended to do. The fundamental preoccupation is knowing how to put together, and in good time, all the necessary know-how and material in a particular location. Whatever may have been the origin of a certain technique or method is only a small aspect of the equation, not necessarily relevant as long as what is needed is finally achieved. The whole process is far from obvious as will be shown in full later on.

In such a context, the only geographical origin of a ship that matters is where it is built, or where it will be refitted several years later. Such identity is also formally recognized, in the case of the ships that we have been studying, by the three initials that precede their registration number, written in large characters on their bow. It is also what everyone immediately notices when they see one for the first time. The answer to the question of what an 'indigenous vessel' is thus has a simple answer for those concerned: it is a ship which has been built or refitted and registered in a new place, whatever its sources of inspiration, nature and appearance may be.



What is craftsmanship?

The Industrial Revolution brought a marked shift in the representations of craftsmanship in the West. Up to this point and with a few exceptions craftsmen and craftsmanship ranked rather low in the social hierarchy of most societies. Following the ancient Greek point of view, if any serious quality is to be attributed to a work of craftsmanship, the merit is bestowed on its patron rather than on its maker. When an increasing number of craftsmen and their work was being replaced by the use of machines, the new products were often criticised as being 'artificial' and 'soulless'. As a result, the status of craftsmanship began to change significantly.

In England, for example, strong criticism of industrialisation developed from the second half of the nineteenth century, and ideas of social reforms and diverse initiatives to revalorise and revive craftsmanship were combined; under the leadership of strong personalities such as William Morris of The Arts and Craft Movement. Such criticism found its counterpart in Asia, especially in Japan where it was often combined with a rejection of colonialism. It assumed specific undertones according to the countries where it developed, such as in India where Gandhism valorised craftsmanship in a very specific way. Its influence can still be felt today, whether it is in rather ossified State craft organisations or in more lively initiatives originating from civil society that are trying to revive the initial spirit. As a consequence of such development, a rather idealised notion of craftsmanship still pervades, one which may sometimes have only tenuous links with the reality. The nature of craft involved in shipbuilding in South India today is an example.

One of the common ideas associated with craftsmanship is that all crafts somewhat resemble lacework, demanding not only deep concentration and extreme attention to detail but also the most expert turn of hand and discrete forms of creativity. In many ways, this is the impression you get from observing caulkers and carpenters working in shipbuilding. The observer cannot fail to be impressed by the extreme sense of detail and precision required; for example, you only need to watch caulkers surrounding each of the thousands of nails that are used to make a wooden cargo ship with a thin layer of coconut fibre or of cotton in order to ensure that the hull is completely waterproof. Similarly, one has only to try it once for oneself to be convinced of the extraordinary expertise of local carpenters, able to cut extremely large wooden trunks with the help of only simple axes and saws to give them precise shapes. Last but not least, you cannot fail to admire the formidable art—mastered only by the best of marine carpenters—of designing and putting together immense logs which give their shape to the hull of the wooden cargo ships. But if such aspects go with the conventional idea that one may have about expert craftsmanship, there are others that don't correspond as well.

An example is the manner in which the finished wooden cargo ships are launched into the water. This will be described in more detail later on but let us simply state that, even if the operation involves the same workers, it has very little to do with controlled expertise or the master manoeuvring of hands. As photographs will demonstrate better than words, it is brutal and quite approximate in the way it is organised, which often appears to be spontaneously improvised on the spot.

Another idea constantly associated with craftsmanship is that it is incomparably more creative and body-friendly than any kind of work associated with factories and modern machinery. But while this may be the case for certain aspects of craftsmanship, it is far from true with all of those associated with wooden shipbuilding. Most of the work involved puts great stress on the body and is indisputably tiring; some of it is even dangerous.

That is the case with the task of cutting wood as there is always a risk of slashing oneself badly as any false movement made with the axe can be serious, even lethal. Similarly, the risk of falling off the huge scaffolding while working on the hull is constant; we saw an accident of this sort happening. Even the apparently benign activity of bending planks of wood with the use of oil and fire can be deadly dangerous; a sea captain we knew was killed doing precisely that. Caulking, while it may not look dangerous, is far from free from hazards such as burns from hot tar. Finally, the perilousness of the blacksmiths' work is not to be underestimated; the slightest lapse of concentration during the process of forging a nail and the blacksmith or his apprentice may hurt themselves badly and become lifelong invalids. As was explained to us, this does tend to happen and is said to be one of the reasons why people avoid taking up this profession nowadays.

A blacksmith may be required to produce up to a ton of nails for just one vessel in a short time, regardless of the danger. Making nail after nail, day after day is not exactly a creative job. As a matter of fact, the only way to distinguish it from the most menial work accomplished on a factory chain is that the workers are independent.

While there are cogent reasons for valorising craftsmanship, such craft occupations should not then be blindly idealised. Yes, they may be creative and rewarding at a personal level and may have great cultural and socio-economic value, but it cannot be denied that they may be extremely tiring, badly paid, boringly repetitive and pretty dangerous too. Different aspects have to be taken into consideration—bad as well as good—before attempting any sound judgement of its desirability or undesirability as a profession.

Building a wooden ship can be a risky business.

What is a craftsman?

A common assumption is that a person does not simply become a craftsman by virtue of being paid to accomplish a particular task, as it is not easy to improvise the work of a craftsman. It is assumed that anyone worthy of being called a craftsman or an artisan will have undergone a rather long and strenuous process of apprenticeship on his way to becoming an authentic expert in his domain. It is also presumed that most artisans have a relatively independent status as workers and possess their own tools. Yet another widely shared presupposition is that most artisans and craftsmen inherit their skills either by birth, or by being included in a specific professional milieu from a young age. Finally, it is often assumed that artisans and craftsmen—perhaps because of their largely independent status—are firmly organised in guilds, corporations, or other organisational structures specific to their profession. Moreover, in the Indian context, it has often been emphasised that most artisans specialised in the same craft belong to the same caste and that some crafts are the traditional monopoly of particular castes. As we shall see, however, none of these definitions of a craftsman or artisan are adequate to designate the majority of the craftsmen who constitute the primary shipbuilding workforce in Tamil Nadu and, more generally, in South India.

Fisher-carpenters at work at the Thaikkal shipbuilding yard and the fishing harbour at Cuddalore Old Port.

Let us take, for example, the case of carpenters, who along with the caulkers constitute the most important category of workers involved in shipbuilding at Cuddalore, one of the main places where these wooden cargo ships are built. When this industry developed in Cuddalore, it was reported that there were no more than twenty craftsmen involved in boat building up to the second half of the twentieth century, with most of them being the first in their family or generation to engage in this craft. At the beginning of the twenty-first century, however, there were at least five hundred registered in the local trade union of maritime carpenters and more were employed on a temporary basis.

Yet the maritime carpenters of Cuddalore have managed to acquire not only a regional and national reputation but also an international one. According to the time of the year and available opportunities, they are

to be found working in the shipyards of Cuddalore or Tuticorin in Tamil Nadu, on the West Coast of India, in various countries of the Persian Gulf and even in Hong Kong or Singapore. The paradox is that while their reputation as carpenters and craftsmen is well established, their definition of self does not necessarily correspond to their well-earned reputation. Most of them define themselves as fishermen (Paravars).

With the exception of a few carpenters and caulkers who have acquired the status of masters, and perhaps also of a few blacksmiths who still belong to the traditional caste associated with their activity, it is then difficult to identify ship building craftsmen of Cuddalore with the conventional assumptions commonly associated with the idea of an artisan or craftsman. Even if this is not the place to explore this aspect further, it is worth noting that the very definition we may have of an artisan or craftsman in India or elsewhere may be reconsidered from this point of view.

Facade of the French Institute of Pondicherry, originally a house of a slave cum indentured labour trader of 18th century, later functioned as the Treasury of the French colonial Government.

What is cultural heritage ?

Nowadays there is a worldwide tendency to value any form of tangible or intangible heritage that may reinforce cultural identity. This trend offers an unexpected chance for the revival of wooden-hulled sailing vessels in many parts of the world. Most of these vessels would have become extinct otherwise, due to competition from other modes of transport which are either cheaper or more convenient. There are, however, other motivations that play an important role in this revival, whether pure nostalgia, ecological ideals or new forms of tourism. In Turkey, Greece, or in Asian countries such as Indonesia, for example, wooden sailing vessels are used more and more for sea excursions and cruises and they may be found in different cities modified as cafes, restaurants, floating hotels or houses. One also finds good examples of this trend in the Persian Gulf. The small countries of the region can boast of all the traps of modernity, more often than not made possible by the oil economy. The dhows which belong to the same family of wooden sailing vessels that we present here from Tamil Nadu are a noticeable exception. The similarity, too, can easily be explained because many of the ships operating in this part of the Indian Ocean have always had Indian origins. Even if they belong to owners in the Gulf, they have often been bought in India or made locally by craftsmen from India who continue to do this, contributing to a certain revival. Though the reasons for constructing and owning them might have changed dramatically, the wooden hull and the way of building it largely remains the same with their interiors adapted to their new function. So, if one takes into account the recurring attempts to use wind energy for maritime transport mentioned before, the future of wooden cargo ships and sailing vessels may appear less bleak. But the Indian situation remains different.

India is, perhaps along with Indonesia, one of the very few parts of the world where there are still a sizable number of wooden cargo ships at work. Their existence still has a real impact on the coastal populations involved in their building and their use, both in social and economic terms. It is then saddening to notice that, outside of those directly involved with these ships, India is perhaps the only country where no one appears even remotely interested in their fate or their eventual revival, whether for reasons of heritage, tourism or ecology. This tells us something fundamental about the very notion of cultural heritage and how it is defined.

Cultural heritage as a private affair

From the Taj Mahal to the Elephanta Caves, from national parks to historical urban centres, innumerable monuments such as fortresses, temples, Mughal or colonial buildings and even the French Institute of Pondicherry, for example, where we are writing this book, there is a wide diversity of sites and artefacts which are maintained as cultural heritage. Given that the small mountain railways of India are rightly considered as cultural heritage, it is disappointing to notice that the wooden cargo ships of Tamil Nadu and the West coast of India have not so far been included on this list, though they certainly deserve to be included, if only for the know-how and craftsmanship employed to build them. At the same time, they would fit as well into the category of 'tangible' heritage since their wooden structure is certainly one of the best examples of carpentry in the world. Moreover, the fact of their existence and survival being dependent today on their economic viability should not disqualify them as cultural heritage, but quite the opposite.

The railway line to Shimla.

When we interviewed shipowners about their reasons for building new wooden cargo ships, they all gave economic and financial reasons but these were rarely the only explanations they mentioned. The two ships whose construction we followed at Cuddalore bear witness to other reasons for building a ship. The first was built for a shipowner's family in Tuticorin, which is a very ancient port town and a gateway to Sri Lanka. While the owner did not disregard the financial side, another motivation played an equally important role. The ship was being built for his second son in memory of his grandfather's legacy in the thoni trade. Similarly in the case of the second kotia, financial considerations were important to the owner but it was also to please his father-in-law, who played a leading role in their local development that a new ship was being built. Neither of these cases was exceptional: whenever we talked with any current or past owners of these ships, money was never their only consideration. All of them had other powerful reasons for building, whether it was to remain faithful to their family traditions or to further their quest for status at a local level.

It is quite usual for an individual or a whole family to remain deeply attached to a particular activity but also to a house, a piece of land or a specific artefact for reasons which have little to do with 'caste obligation' or finance per se. It can as well be for reasons that may legitimately be identified in some cases with a form of 'cultural heritage', whether or

not recognised as such by institutions like UNESCO. Wooden cargo ships certainly belong to such a category. It would be then a real pity if they now disappeared without their cultural importance having even been noticed. Regardless of this, there are other powerful reasons to urge their preservation and it may soon become a matter of bitter regret if these ships vanish in the near future.

Above: Pinisi wooden sailing ships of Indonesia
Below: A Cuddalore kotia on the seas

What is an ecological shipyard ?

The deep affinity which is supposed to prevail between ecological ideals and craftsmen's mentalities is frequently exaggerated, yet there is perhaps no local infrastructure that would fit more convincingly into ecological preoccupations than a shipyard in this region.

Harbours and shipbuilding construction sites usually make great archeological finds but it might be difficult for future archeologists even to guess that the banks of the river near Thaikkal had been such a hub of shipbuilding activity for nearly seventy years. It may well be that some remains of a small concrete quay on the bank of the river may eventually survive, but that quay has principally been used for docking fishing boats. The adjacent long bridge which crosses the Paravanar river nearby has no direct relation with shipbuilding activity either. As a matter of fact, one most remarkable aspect of traditional shipbuilding in Cuddalore is that it requires so little infrastructure; and also, that whatever little may exist has always been of such a temporary nature.

When we visited Thaikkal in 2019, no kotia had yet been built and there were hardly any remnants of the hectic activity that we had witnessed only four years before. There was practically nothing left of the thatched

huts used to protect materials and people on the site. Nothing could be seen of the large stocks of wooden planks that had been lying all around in the previous years, waiting to be used, and neither was there any sign of the huge, heavy wooden logs used to support the ships and launch them into the water. There was no trace of the wood and bamboo scaffolding, which played such an important role in the work on the hulls. It was only by looking very carefully at the bark of coconut trees that we noticed some scars on the spots where ropes had been tightly tied for securing the scaffolding.

As far as human activities were concerned, they were not completely absent but no longer had anything to do with building wooden cargo ships but were mostly associated with fishing activity, which had been going on long before the practice of building wooden cargo ships developed here. Some activities were however completely new, with villagers employed to make artificial concrete reefs to be deposited in the sea to help with the repopulation of the fauna, though it is questionable if it is really ecologically sound to throw tons of concrete into the sea in this way. But coming back to our archeologist of the future, her only hope of discovering the existence, for so many years, of a shipyard on the river bank would be to find, amidst seashells, a few rusty iron nails or other tools or, much later on, a few fossilised pieces of wood, the exact use of which might be very difficult to identify. Coming back in 2022, however, we see that a few kotias have reappeared on the riverbank for refitting and a new one being commissioned.

Facing page: Casting of artificial reefs for enhancing marine fish breeding. Kotias are used to deposit them in the Bay of Bengal.

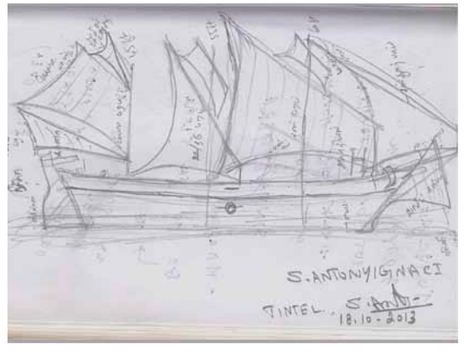
Above: Grooves on a coconut tree trunk caused by the ropes used to secure boats under construction.

Left: Parts of a discarded wooden rudder of a kotia at Thaikkal.

What is a sail used for?

It was hard to believe that the people we talked to were not exaggerating when they described the dozens of sails apparently used on kotias, some twenty years ago. The magnificent photographs that we found later, however, spoke for themselves. It is only from the eighties when engines were introduced that their use has been progressively diminishing. Sails continued to be used for a while in complement with the engine when there was favourable wind. Nowadays, sails are used only in the event of engine failure but even till 2004 a few kotias were navigating exclusively with sails. Most of the sailors that we met who had navigated with sails felt nostalgic and told us that they would really like to use sails when the weather is conducive. Not only would this allow them to burn less fuel but, because they are paid in shares of the profit made by the ship, they would also have a financial interest in using them. According to them, younger sailors feel 'lazy' about using sail and they no longer have the necessary expertise. So, one question remains: why would recent builders of wooden cargo ships even bother to equip them with masts and sails, when by their own account, they seldom use them anyway? Is this simply proof of a will towards conservatism on their part?

Owners of kotias, in fact, regularly ask themselves whether it would be better to remove the sails or to replace wooden hulls with steel hulls. But if they have refrained from making changes up to now, it is for administrative and legal reasons. If they ceased to use the wooden hulls and sails which constitute their most defining features, as they explained to us, they would risk losing all the administrative advantages and legal privileges associated today with the status of 'indigenous vessel', the dire consequence of which would be the rapid loss of their financial viability. So, we can now answer our initial question: if wooden cargo ships still have sails in this part of India today, it is not because they may be put to use but because of existing regulations. In other words, a sail should not be considered in this case as what it really is, a propulsion device, but rather as some sort of legal artefact. Does this mean that such a change of function is irreversible and that sails would necessarily disappear if the regulations were to change? Not very far from where wooden cargo ships are built, there are fishing boats made of fibreglass which have been reequipped recently with masts and sails because their owners find them cheaper and more practical to use.



A hand drawn sketch by Tuticorin Tindal Antony Ignaci, describing the number and names of sails in use during the heydays of Tuticorin thonis.

Facing page: Photograph by Clifford Hawkins of a tamil cargo ship in 1977. We are indebted to his beautiful photographs, for understanding the appearance of kotias in their full glory of sailing days. Some of them circulated only with sails, even upto 2004.

But enough of the preamble. It is time to end these introductory remarks and not with another 'what?' question, as we could generate those indefinitely, but with a 'why' question this time. That is to ask the fundamental question of 'why' did wooden cargo ships manage to exist up to this day in this part of the world when they had disappeared more or less everywhere else? Interestingly enough, one may convincingly answer this question.

Why do wooden cargo ships exist?

Unlike some of the traditions associated with the construction of fishing boats in the region and on the western Coast of India, the manufacture of wooden cargo ships in Tamil Nadu represents a craft industry of recent origin. It developed in the second half of the 20th century and experienced its greatest period of prosperity only about fifteen years ago, during the first decade of the twentieth century. Before its development only a handful of carpenters were involved in shipbuilding locally but, when it was in full swing, there were at least five hundred of them in Cuddalore. Several hundred other local workers and craftsmen assisted in the manufacture whenever needed. Shipbuilding in Cuddalore thus has nothing to do with a simple phenomenon of 'historical survival', which is another reason why the combination of social, economic and technological factors that enabled the development of this small industry deserves to be studied on its own.

From barges to wooden cargo ships

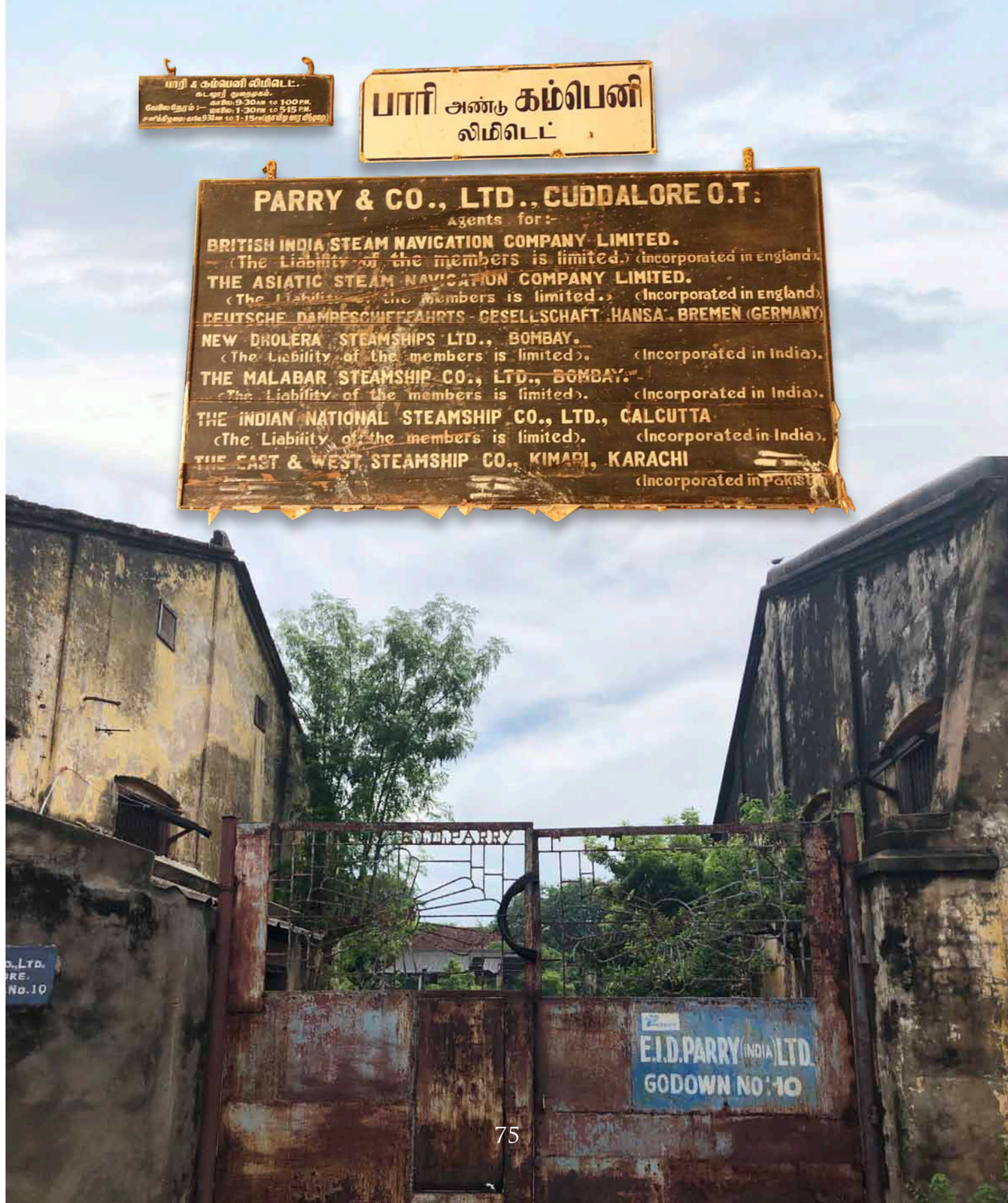
With the exception of Chennai, and later Tuticorin, the development of maritime activity in Tamil Nadu has always suffered from the absence of port sites with sufficient depth to accommodate big cargo ships. When maritime traffic developed during the colonial era, an increasing number of cargo ships used to anchor a few hundred metres away from the ports and warehouses where the goods were stocked. Import-export activities played a central role in the development of Cuddalore, which had been, with Fort St. David, one of the first outposts of the British presence in South India. Still visible today, besides a few other remains of the British presence, is the largely disused complex of godowns and warehouses connected with E.I.D Parry Limited near the harbour. Though this is one of the largest companies of those that thrived in South India during colonial times to remain an important company up to now in the hands of its Indian owners, its presence in Cuddalore has been largely symbolic since the 1980s.

Cuddalore port today is essentially a fishing harbour, having lost its importance as a port for shipping goods in and out of the country. This was due first to the economic focus after Indian Independence on developing a self-reliant and more inward looking industrial sector. One consequence has been to reduce the importance of many of the small Indian ports which had traditionally been outward looking; their activity began to shrink with the onset of increased rail and road transport. Other factors were linked to new developments in maritime

Barges used by Parry & Co to transfer goods from cargo ships to and from their warehouses.

trade, such as the use of big cargo vessels and of container ships that ports like Cuddalore were not able to accommodate, given also the stiff competition from deep water ports such as Chennai and Tuticorin. This led to a drastic reduction in income for the local barge owners and the fishing communities dependent on port activities. They had become instrumental in carrying cargo from ship to port in small wooden vessels functioning as barges, known in Cuddalore as 'Vattals' or 'Vattais', or 'Paai (Sail) Vattals'. A fatal blow was to hit them in the late 1980s when the port administration of Cuddalore decided to buy two large steel barges in order—it was hoped—to boost activity by reducing shipment costs. This was not a success but it marked the end of the traditional forms of port shipping with sailing barges. Luckily for the families of fishermen who had lived mostly from this occupation, some of the barge owners had already diversified into coastal trade and managed to compensate amply for this reversal of fortunes by innovating locally.

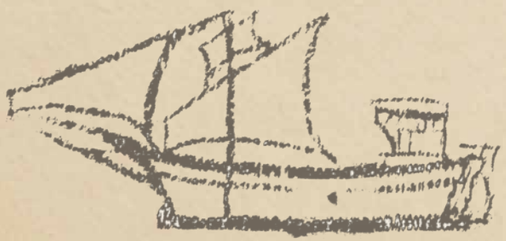
Lighters in the foreground against a kotia under construction at Cuddalore Old Town harbour, 1992.



When we first met Ayyadurai, he was, despite his advanced age, supervising the construction of a 350-ton wooden cargo ship for his son-in-law. Belonging to the local fishing community and a former owner of many vattals, he had been the first of the local barge owners to redirect his attention to building a vessel large and strong enough to carry out trade on the coasts of India and in the neighbouring islands of the Indian Ocean (Sri Lanka, Maldives, Lakshadweep and Andamans). While the local vattals rarely exceeded ten metres in length with a capacity of 10-20 tons, his first wooden cargo ship built in 1957 using the same architecture, only larger in size, could carry up to 70 tons. The business proved profitable and many other barge owners and contractors followed his example. This is how a small industry developed locally, on a basis that would always remain artisanal but whose reputation would increase and spread, as it has up to today. The quality of the wooden cargo ships made in Cuddalore and the know-how of the local maritime carpenters and craftsmen who build them is acknowledged nowadays, not only in Tamil Nadu but also on the West coast of India and as far as the Persian Gulf where they regularly work.

The size of these wooden cargo ships has also gradually increased, even if their shape, and the methods employed to build them, has changed a little since the early days. Some of them can carry a load of up to a thousand barrels, which corresponds more or less to 1000 tons. However, local owners and shipbuilders have learnt by experience that the ideal and most profitable size is generally around 350 tons. As we have seen before, they have gradually been equipped with diesel engines from the 1980s, although some used sail exclusively until 2004 at least. However, the role of sails has declined drastically over the past two decades. This local industry had developed successfully until very recently and it was only when we were already well underway with this study that it began progressively to decline.

A 1000 ton kotia, extended from a 400 ton by Balu Mistry of Thaikkal on the West Coast for trading in the Persian Gulf, 2015.



3

Building a kotia

A methodological note

The process of building a kotia presented here is based on ethnographic observations made at regular intervals between 2011 and 2019. Especially between 2013 and 2015, we closely followed the successive phases of construction of three kotias in Thaikkal. We also observed many others being worked upon in scattered locations over these years. This allowed us to directly observe all significant stages of building such a vessel. We were able to interview and interact with hundreds of people who were involved with the building process in one role or another. The analysis and the images chosen for illustrating the process, is based on this whole body of work. For better coherence, we have decided to base all the concrete measurements and technical details on one of the kotias whose construction we had the opportunity to observe in detail up to its first trip; this is the one that we shall refer to from now as our 'model kotia'.

The registration of this kotia, which was conceived for a capacity of 350 tons, is CLR 194. It was built between 2013 and 2014. The owner of the kotia is A.R.Velavan of Devanampattinam village but its construction was supervised all along by his father-in-law, Ayyadurai of Thaikkal. The master carpenter was Kathiravan who helped us at every point in our study of the making of kotias. The skeleton for this kotia was initially set up in 2008 by another kotia owner called Chandrasekar, but work could not proceed because of space constraints on the riverbank. By 2011, he had lost interest and A.R. Velavan decided to buy the skeleton in 2012 and use it to build his second kotia. When the work started in 2013, the mistri Kathiravan decided to dismantle the skeleton and start afresh with a new design reusing only the soundest parts of the wood from the original skeleton. The building of the kotia started in June 2013 and because of good planning and an uninterrupted flow of finances, it was completed and set sail in October 2014 to the West Coast as CLR 194 MSV R.V. Tharun Velan.

One of the kotia we studied (CLR 194) leaves on its maiden voyage from Cuddalore, October 2014.

Negotiating a deal

Mistri X was chosen as master carpenter to build a new kotia because he was the son-in-law of the future owner who had commissioned the ship. He had gained considerable experience as a senior carpenter and had successfully built many fishing boats. But he had never built a kotia by himself before. Though this was his first attempt at a kotia as a mistri, he boldly lived up to his task and delivered the kotia. It looked fine and at first there were no explicit issues but as soon as it went into operation, everyone discovered that something had gone wrong. The owner had asked for a ship of 300 tons capacity but to his dismay, it turned out that the kotia could carry only around 200 tons. Because of this, as the tindal of the kotia explained to us, a year later, the revenue from the kotia's initial trips was insufficient. As the crew was to have a share of the revenue, they were frustrated, became increasingly restive and threatened to disperse. The owner fell out with his son-in-law accusing him of incompetence and more. The misfortunes did not stop here: the boat was caught in a storm on the West Coast, grounded in the sand and broke up in the sea close to Beypore in November 2021. Luckily, nobody was hurt.

This anecdote shows the crucial role of negotiation between the future owner of the kotia and the mistri (master carpenter) he chooses to lead the construction of the kotia, an important decision because the mistri will have a great deal of responsibility in the making of the ship. Usually, the future owner has only to define the capacity of the ship and perhaps a few aesthetic details that he fancies. If the total budget and the mistri's remuneration is agreed upon, then theoretically all the rest becomes the responsibility of the mistri. That covers all the technical aspects of construction, procuring most of the raw materials, arranging all the necessary equipment, mobilising the necessary work force composed of various categories at various stages and supervising them. He also has to ensure that all this stays within the owner's budget. Finally, it is entirely his responsibility to deliver a ship that corresponds to the size and capacity negotiated with the owner but also a 'good' one, which is pliant for the crew to navigate and easily maintained. As may immediately be realised, it is a huge duty and regardless of how much confidence he may have in the mistri, we never saw any owner who stayed fully away during the construction of a ship. Some of them, like Ayyadurai, were present on the riverbank every day to supervise the progress and were involved in all decisions whether about buying materials or about the building process itself. When the owners could not personally follow up or have a family member do so, often because they did not live close by, they entrusted someone to represent them on site. The extent of the responsibility of the master carpenter is such that one may easily understand why the most reputed ones—like our friend Kathiravan mistry—are in steady demand. There is also scope for tensions to arise between the owners and his mistri. This was the case with two of the kotias that we followed while, in the case of another one, the question did not arise because the owner was also its mistri.

Draft at 6ft in Mangalore port. To trade with Lakshwadeep islands, kotias are designed with shallow drafts so that they can reach many of the islands, unlike their big, steel counterparts.

Wood

No kotia would ever be built without an owner ready to invest in it, but without wood, they could hardly be constructed either. So, obtaining appropriate wood of required quality is the most challenging aspect of building a wooden ship. This is not a new problem; forests have been destroyed the world over in order to build ships but others have been preserved or planted for the same purpose. India is no exception to this. The reputation of Indian teak for building ships originating on the Western Ghats has no equal; it was exploited extensively during colonial times by the British Royal Navy. As a result of its popularity, teak plantations, which originated in Sri Lanka, were developed not only in India but famously as well in Burma, Indonesia and Malaysia; then also farther away in Equatorial Africa and South America. These latter are some of the places where one can still obtain teak today, slightly more easily than in Asia but not of the same quality. Because of its scarcity and the fact that it is more and more protected, the cost of teak has become prohibitive and no one in India thinks about using it anymore for building a ship. At least, that is what everyone believes and was why Kathiravan, the mistri, was so utterly amazed when in 2015 we found some ships being made in Kerala more or less exclusively of teak. But it must also be noted that they were meant for the royal family in Qatar. As far as other mortals are concerned, as in Cuddalore, they have to make do with a mix of different varieties available for a reasonable price, a sufficient quantity from multiple sources.

Wooden log of broad diameter is being cut into planks at a timber depot in Pondicherry for a kotia. The Malaysian Sal was imported through Tuticorin.

Finding wood

There are basically three sources from which kotia builders get their wood, the best quality still coming from the Western Ghats. This can be expensive and bureaucratically tedious to obtain, which is why some wholesale merchants hesitate to buy there. However, it will remain a preferred source for ship builders able to afford it.

The most common choice will be to order wood from nearby wholesale depots. Situated in Pondicherry or in Chidambaram, these depots generally import a variety of woods such as teak, kongu and saal from Burma, Indonesia and Malaysia but also from distant Africa and South America. These woods arrive at the deep sea water port at Tuticorin and are transported by huge trucks to wholesale depots with sawmills, where they are cut into planks and sent to the kotia building site.

The last option, which is opportunistic and clearly cheaper, is to obtain wood locally from trees cut from surrounding areas. The mistri may receive information about, say, a rare Iluppai tree on temple land, which he will then try hard to obtain. Otherwise mistris also buy trees of good size from farmers in neighbouring areas, typically Iluppai, eucalyptus, mango, etc. Finally, new opportunities have arisen recently because of the extensive widening of roads in Tamil Nadu and the need to cut down the rows of trees, often centuries old, that used to line them.

Above: Sometimes trees cut for road expansion are also sources of wood.

Right: Workers cutting a fallen tree to be used in a kotia from a field near Thaikkal.

Facing page: Logs of wood imported from the African continent at a depot in Tuticorin, an old shipbuilding centre on the East Coast.

The use of wood for ship building

The character of wood obviously plays a crucial role in building the various parts of the ship. Its shape, size, strength and resistance to natural elements are fundamental. The most important aspect is the oil content in the wood. Iluppai (commonly called Mahua tree, species *Madhuca Indica*) has a fair amount of oil and so is the tree most preferred for keel and frames. Sal (species *Shorea Robusta*), locally called oil kongu, is the next preferred wood. Certain tree varieties may possess the required characteristics naturally, some have to be treated and some others can be used only for specific uses. While Iluppai is preferred for the keel, eucalyptus for instance can be used only for the deck. Hence shipbuilders may end up using not less than five varieties for shaping the hull such as sal, malaysian kongu, violet wood, vaagai, american teak and karumarudhu. For the sturdy frames, it is better to find big logs of wood with natural 't' shaped bends as close as possible to the required curvature of the frames. Maritime carpentry, because of this, is one of the few wood based crafts for which an old bent tree can be more valuable than a straight one. Another important thing is to find quality wooden trunks for planking, of adequate length, thickness and strength, allowing it to be bent by heat without losing the qualities necessary to ensure the solidness of the ship.

A frame drawn perfectly fitting the natural curve of the log. Such curved wood is preferred, particularly for frames as it helps avoid unnecessary joints.

Labour and its organisation

Workforce, gang and pay

The next major factor in building a kotia is the mobilisation of the required workforce with the appropriate skills and expertise, while being sure of their availability throughout the whole building process. The different categories are ironsmiths, carpenters, caulkers, painters, fibreglass workers, electricians, engine mechanics and mechanical fitters.

The estimated labour requirement for building a kotia, assuming uninterrupted flow of work, has been outlined to us as follows. It takes a team of 15-20 carpenters and about 5 helpers over a period of 6 continuous months to build a kotia. After the hull is built, a caulking team of 10 people takes approximately 45 days to complete the caulking process. The ironsmith team, typically of three members, takes approximately a month to deliver the required quantity of about 1.5 tons of nails and bolts. A team of five painters and assistants takes a week to paint, usually the top parts of the kotia. A four-member fibreglass team takes a week to fix the fibreglass coat over the cabin. A two to three member team of electricians takes three to four days to complete the internal wiring of the kotia. Engine mechanics and fitters spend a day or two on site to fit the engines and the necessary mechanical equipment on the deck. So, about 50 workers in all are involved directly, with most of them on site. in building a kotia completely.

The master carpenter recruits the necessary number of carpenters, preferably from his own place or other neighbouring fishing hamlets.

but they are also recruited from neighbouring villages such as Pachayankuppam, an agrarian hamlet. Even migrant workers from eastern Uttar Pradesh are occasionally recruited as assistants, as we have seen before. The mistri actively holds on to a few carpenters and assistants under his patronage whom he prefers for their skills and working relationships. Carpentry assistants may appear to do only sundry jobs on site but their importance should not be underestimated: they play a crucial role in facilitating the flow of work by cutting wood, moving heavy wood to the required part and helping to fix frames and planks in place. Under the command of the mistri, they form an interface between him and the other carpenters. In general, once the building project is set in motion, the mistri assembles a team of carpenters and assistants that should remain the same till the end of the building process; it may happen that a few will drop out and move to other projects because the work does not proceed continuously. So, maintaining a steady team often is a preoccupation for a mistri.

Apart from the carpenters, the caulking team is organised by its own mistri and typically comprises about 10 members. Given the importance of caulking it is felt that it would be difficult to supervise each one's work if there were more people. There are well organised teams known for caulking in the cluster of five villages. So, the owner identifies and negotiates with one of these teams to assign the caulking responsibility. Similarly, the owner himself handles all the negotiations with each of the teams and pays them directly without the master carpenter being much involved.

According to information provided to us, there were about eight hundred families who earned their livelihoods around Cuddalore, either fully or partially, by engaging in the building of kotias between the years 2000 and 2010. Five hundred carpenters were formally registered

in the newly formed union and two hundred more were involved on an informal basis. There were one hundred more who were specialised in caulking and possibly another hundred who earned their living by working in different capacities in the kotia industry, such as ironsmiths, mechanics, painters and coir workers.

The prosperity of the kotia industry then was such that the mistris had to book carpenters by providing them with an advance on their wages, up to six months before work could commence. It was also difficult to keep them towards the final stages of building because they might prefer to be employed on a new project that would provide regular work in the forthcoming months. This difficulty existed for mistris even while we were there in 2014. Because of that, one of them was ready to pay his workers more during the last stages but was hesitant to do this without consulting others, as it would increase the general wage level of carpenters. If the scarcity of workers might induce owners to pay their workers better, it would appear that the trade unions have a rather patchy record in this regard.

In Cuddalore, according to the union leaders, the negotiating strength of the Carpenters Union had never brought much success because of a lack of unity among the members and failure to act collectively. But in other shipbuilding centres such as Tuticorin and Beypore, one of the reasons attributed to the decline of the industry was the increase in labour costs, caused by the power of the trade unions. This is another reason why the carpenters and caulkers of Cuddalore seem to be appreciated in these two places: not only because of their recognised know-how but also because of their reputation for working hard and quickly for relatively lower wages.

All the teams receive a daily wage that is paid at the end of the week, on Saturday. None of the labourers who work on site, with the exception of electricians, are engaged on the basis of a formalised contract. Though the mistri sets up a team and has the responsibility of directing them, they are paid by the owner directly and not through the mistri. The mistri is paid a slightly higher amount, of about 100 rupees (about 1.20 euros in 2019) more than a regular carpenter and the same goes for the caulking mistri. A carpenter was paid 500 rupees a day in 2014 working on the model kotia and the mistri 600 rupees a day. For caulking the mistri was paid 700 rupees and a worker 600 rupees a day. The higher pay for caulkers compared with carpenters is attributed to the long hours of meticulous effort involved in caulking.

Master and apprentice

Familial relationships exist within teams of carpenters and more generally amongst craftsmen associated with the construction of kotias, but kinship alone does not suffice for one to become an experienced craftsman, let alone a master carpenter. To give an example, our friend Kathiravan mistri, who is one of the renowned mistries of Cuddalore, neither came from a carpenter's family, nor was related by kinship to his master Sugumar, who trained many of the best carpenters in Cuddalore. And Kathiravan's son never became a carpenter. Sugumar himself effectively learnt his trade from his father, the renowned Sivalingam mistry, while Sugumar's son Sudhagar, trains under Kathiravan as a carpenter.

It takes long years of hard work to become a master craftsman in shipbuilding, as in all crafts. A boy often starts very young, even from seven or eight years of age, as a helper and would be recognised as a mistri in middle age. Almost all of the contemporary mistris for kotias are school dropouts and started working in carpentry to substantiate their family income. The beginners start by fetching tools and wood, cleaning and performing all and any tasks, and learning as they grow eventually to become full-fledged carpenters who are given independent tasks but as part of a team. Age and seniority alone does not make one a mistri, and neither is there an explicit teaching process involved; learning is mostly by observation and by listening to other experienced craftsmen. As one of them noted, "not a single fellow taught me a single thing, we have to keenly observe everything and teach ourselves." Those who manage to glean wisdom from sheer hard practice must possess an inquisitive attitude and display a real commitment to the craft. It may appear that a young recruit is just chiselling away and involved in heavy lifting and fitting for days together, but the curious one steadily takes in the whole process of putting together different components in a phased manner that results in a functional yet aesthetically pleasing ship. Good coordination skills and the ability to provide leadership at crucial moments are also necessary as all tasks constantly involve a big team of carpenters and assistants.

Particularly difficult is the process of conceiving a design, drawing the frames on the scrieve board and making the calculations that go with it. As no mistri instructs or holds anyone's hand throughout this process, it is entirely up to the apprentice to observe how the mistri draws and continuously adjusts the calculations to arrive at a good design. The apprentice, when mature enough, attempts to gather his own team, typically starting with repairing fishing boats in many places on the coast. He gains a reputation after many years of autonomously handling fishing boat building projects when other mistris may entrust him with an independent project. This is the moment when people start to recognise someone as a mistri. It is common to see a junior or an emerging mistri ask for work from another mistri. "You are not sending any jobs by my way - Sundar to Kathiravan mistri. " It is not uncommon either to see an established mistri go to work under another senior mistri. Informality, cordiality and respectful exchange of ideas and techniques between mistris with different levels of experience generally marks the relationships among the best of them. Graduating from fishing boats to kotias is a big step forward and seals the reputation of the mistri across geographies. That explains why there are only about eight to ten reputed mistris for kotia while there are more than forty for the fishing boats, amongst a pool of around 700 carpenters in Cuddalore.

Roles and responsibilities

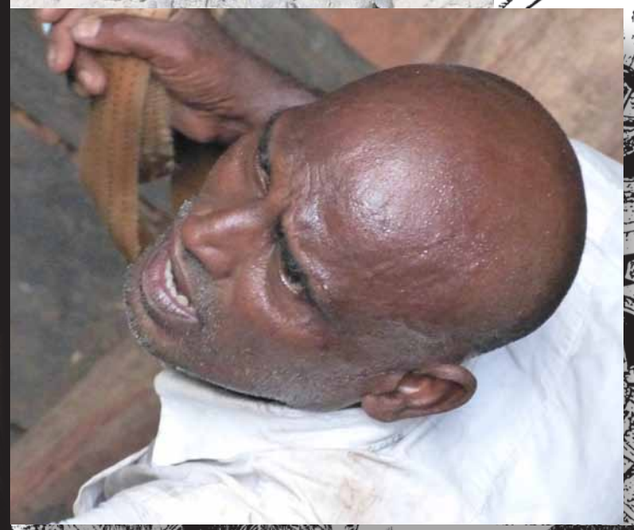
The work scene on the shipbuilding site looks quite chaotic to an outsider, given the immense size of what is being built and the heaviness of the wooden logs that constitute it. There is serious lifting and moving of heavy wood all around and numbers of carpenters are usually working on different things at the same time. All of this requires constant supervision and effective coordination in the yard. Carpenters are given individual tasks to complete on each part of the ship and at each stage, which contribute to the whole process of shipbuilding. So individual role and responsibility is defined for each worker on site. But everyone has ideas to try out at each and every stage of the work

and these are openly voiced. It is common to see a carpenter or an assistant shout a suggestion to the mistri and the mistri coordinate accordingly. So, what externally appears to be chaotic is in reality a tacitly coordinated workflow between mistri, carpenters and assistants. For example, in a specific case that we witnessed, the front curves of the sidewalls had been drawn too narrowly and it had become nearly impossible to bend the planks sufficiently to adjust them to the frame. It is when a problem of this sort has to be solved that the difference becomes clear between the master carpenter, who is a real expert at his job able to draw the frames of the hull without even the smallest mistake, and the one who is less expert. At the same time, each carpenter has to be careful with the minute details involved, which is extremely important and more so during the caulking process. To provide an example, each caulker is assigned an area of five planks high and three frames wide every day and it is his responsibility to ensure that this area is completely waterproof.

The owner and the mistri coordinate and plan ahead to ensure an uninterrupted flow of materials. This is important because finding the desired quality and required quantity of wood is a real challenge, as we have seen and, next to financial flow, is a major reason why work might stop progressing. The owner regularly visits the shipbuilding yard to coordinate with the mistri and they usually travel together to source wood from different and distant places. In the last stages, it is common practice for the future tindal (the captain of the ship) to be involved in the day-to-day progress of the work. He works along with the owner and the mistri to ensure that various features are added or removed according to his requirements. His needs are based on his experience in previous kotias according to which he might ask for some aspects of the ship to be modified: top deck, hatches, top width, etc. Though these are generally only minor changes, they can make a big difference for the crew when the ship is sailing. The mistri is usually happy to implement these changes, especially as he knows he will be cursed during voyages, if not.

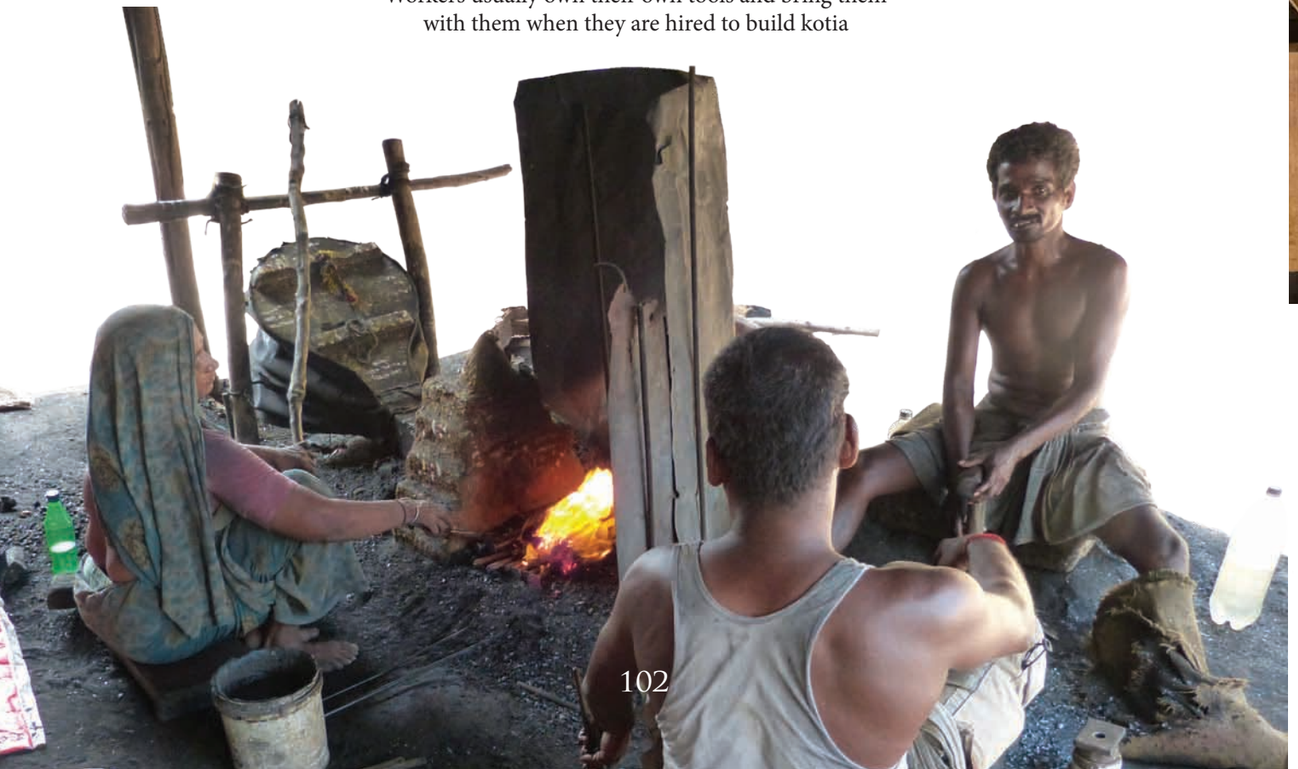
Body at work

Building a kotia is one of the still existing crafts that involve all parts of the body of those who work on it.



Workers and their tools

Workers usually own their own tools and bring them with them when they are hired to build kotia



Carpentry works

Wood preparation

Most of the wood is soaked in salt water before being worked on to avoid shrinkage and pest attacks in the future. It is soaked in the salty backwaters of the river for ten to twenty days, then left to dry completely before it can be used. Apparently, wood should be hardened so much that the time it takes to work on it is almost doubled. The procedure also helps cure the wood and kills any insects in it, which left in situ would quickly rot the wood.

Wood cutting

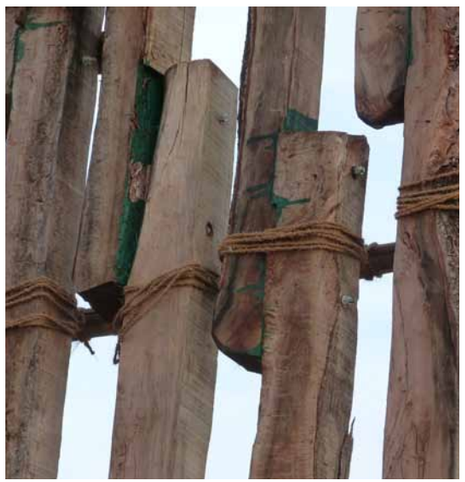
Each piece of wood required to build the main frame of a kotia is unique and needs to be cut by hand precisely to a specific shape. It would be practically impossible to have them cut at a sawmill in advance for many reasons: the measurements and markings are done on each frame at the yard as the work progresses in a phased manner and the frames are too thick and heavy to be transported and then cut with an industrial power saw. Another technical difficulty is the frames for the kotia needing to be cut in curves longitudinally, and in some cases laterally too. The power saws in the sawmills are best suited for cutting along straight lines. So, the huge wooden logs for the planks are sliced to the required thickness at the sawmill and later sawed by hand to the

required width. The rest of the wood is worked upon at the yard with a hand axe or a simple saw. It is impossible not to be impressed by the craftsmanship needed to cut the hard wood with an axe to meet the defined specification giving a particular shape to each and every piece of wood. Hence it is not surprising to see some of the older carpenters carrying out this task. Obviously, it is not their strength that counts but rather their accomplished know-how that qualifies them for this task.

Carpenters shaping a frame with not only the visible 'U' curve but also tapering it on the side to fit into exact shape of the hull.

Joining and assembling

Marine archeologists and historians commonly use the style of joining and assembling wood to determine the historical and regional origin of ancient boats. This part of the coast is known for its plank-stitched boat building tradition, of which remnants are still visible in some pockets. Contrary to this tradition, the specificity of the family of boats the kotia belongs to is that they do not use any kind of stitching of planks. Let us also note that in contrast to previous ideas, maritime historians now acknowledge that the use of nails and bolts in shipbuilding may be much more ancient than previously believed, and also precede any form of European or Mediterranean influence. But to return to the kotias, two adjoining frames are joined together with an overlapping piece that has two cut out projections, which are fitted into the cut slots on each of the two frames holding them together. Then they are bolted together. Towards the top of the frames, two frames are joined to obtain the desired height by placing them side-by-side and bolting them together. In fact, all the pieces of wood in the ship are solidly joined with an incredibly large number of bolts and nails of all kinds of size and very different materials (iron, steel, wood and aluminium).




BOLT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7.8

Iron

Local blacksmiths estimate that it takes approximately 1.5 to 2 tons of iron to make a 300-ton kotia. If only nails and bolts are taken into consideration, this amounts to about 4500 of them. The shipbuilders may buy a certain quantity of these from the hardware shops in Cuddalore, but it is not always possible to find every sort of nail and bolt off the shelf. Prefabricated bolts became common in boat building in this area only after the post-tsunami boom. Otherwise, it is generally preferred to have iron nails fabricated by the local blacksmiths who can customise size and shape to meet the specific needs and demands of the ship builders. Another reason for this preference is that steel bolts can snap under pressure whereas iron nails and bolts custom made locally seldom snap.

It is known that in the 17th century, Dutch merchants brought Swedish blacksmiths to perfect the methods of Indian blacksmiths for making

iron nails and thus be able to employ them at cheaper rates to produce for foreign markets. Regardless of the foreign influences on the working methods of local blacksmiths in Cuddalore, it is abundantly clear that their methods have not changed much for many centuries.

Blacksmiths in Cuddalore find the iron and coal they need in ways that may be surprising. One of them sources his coal from local fishermen who collect in their nets coal pieces that have floated away from an old sunken ship off the Cuddalore coast. As for the iron, it is bought from scrap yards in Chennai, in the form mostly of grill rods from the windows of old houses. It is said that iron from those days is of better quality.

The blacksmith that we knew worked with only the help of his wife and an assistant or apprentice. The wife worked the bellows to heat the metal in the furnace, which is a tiring job and so is that of the blacksmith and his assistant, hammering hot iron the whole day, shaping it into nails and marking cuts to grip the wood, armed with simple pliers and hammers. The work of these blacksmiths is not only tiring and badly paid, it is repetitive and potentially harmful: one clumsy hit and one may easily be incapacitated for life; this is a common misfortune among local blacksmiths. Unable to provide for their families, they risk falling into alcoholism and depression. This was also the main reason we were given to explain why few of them continue in the profession or encourage their children to follow their path. Regardless of the pros and cons, their shrinking numbers would also mean an end to an important element in the technical ecosystem that has allowed the building of kotias to continue till today.

Iron bars from windows of old houses and coal collected from the local seas in a pile at the ironsmith's yard.

The blacksmith, his wife and his assistant

Handling wood and scaffolding

Transporting wood

The transportation of necessary materials for building a ship plays a decisive role in the process of its construction. This is also why most of the building sites were situated on riverbanks or at the confluence of river and sea that allowed wood to be brought in from other regions. Now, even if trains and trucks may be used for transporting whole trees or huge logs of wood, the cost of transportation remains a determining factor.

Amba songs

It is unnecessary to mention again that the shipbuilding process involves the brutal lifting and manipulating of heavy wooden logs. Although not very common these days, occasionally the team of workers involved collectively in lifting or launching the ship could be heard singing 'amba' songs. These amba songs are typically associated with fishermen involved collectively in heavy operations, for example in beach seining where a lot of fishermen and women pull the heavy net out of water together. One person leads the song with others following him with a response, which serves as a coordinating rhythm running through the collective effort. This could be seen at work during the building of kotias where each collective heave is coordinated with the pitch of the short versed songs, which may be about the heaviness of the load or beseech God to lighten it.

Scaffoldings

With the exception of a few steel jacks for supporting the keel, all the scaffolding which plays an important role in the building process is made of casuarina and bamboo poles tied by coir ropes. What is noticeable here, in addition to the erected scaffolding, is the extensive use of the coconut trees that happen to be close to the building site for scaffolding and for supporting the ship itself.

Handling wood

Using ropes, wooden logs, winches and chain pulleys for manipulating heavy objects, lifting them to heights or simply moving them around, may be considered as a basic skill. But this simply is not the case and should, on the contrary, be considered as one of the most skillful crafts one can think of. It is also an ancient craft with a long history. Some local communities in India (the Mappila Khalasis of Kerala, for example) have gained a reputation for the mastery of their own unique techniques for launching ships of several hundred tons, equipped with only rudimentary apparatus of winches, wooden pulleys and ropes. But, independently of such feats, simply knowing how to deploy ropes and pulleys efficiently to move or lift big logs of wood is mandatory knowledge in building a kotia.

Keel, stem and stern

The keel is remarkable for its simplicity: it is a long beam of hardwood, usually iluppai, cut at right angles into a rectangular shape. On our model kotia, the length is 96ft, its width 12 inches and the height 14 inches. It is on the keel that the whole structure of the ship will be fixed and will rest. If it is difficult to find a single log of sufficient length, as in the case that we closely followed, 3 pieces are joined together to form a single keel.

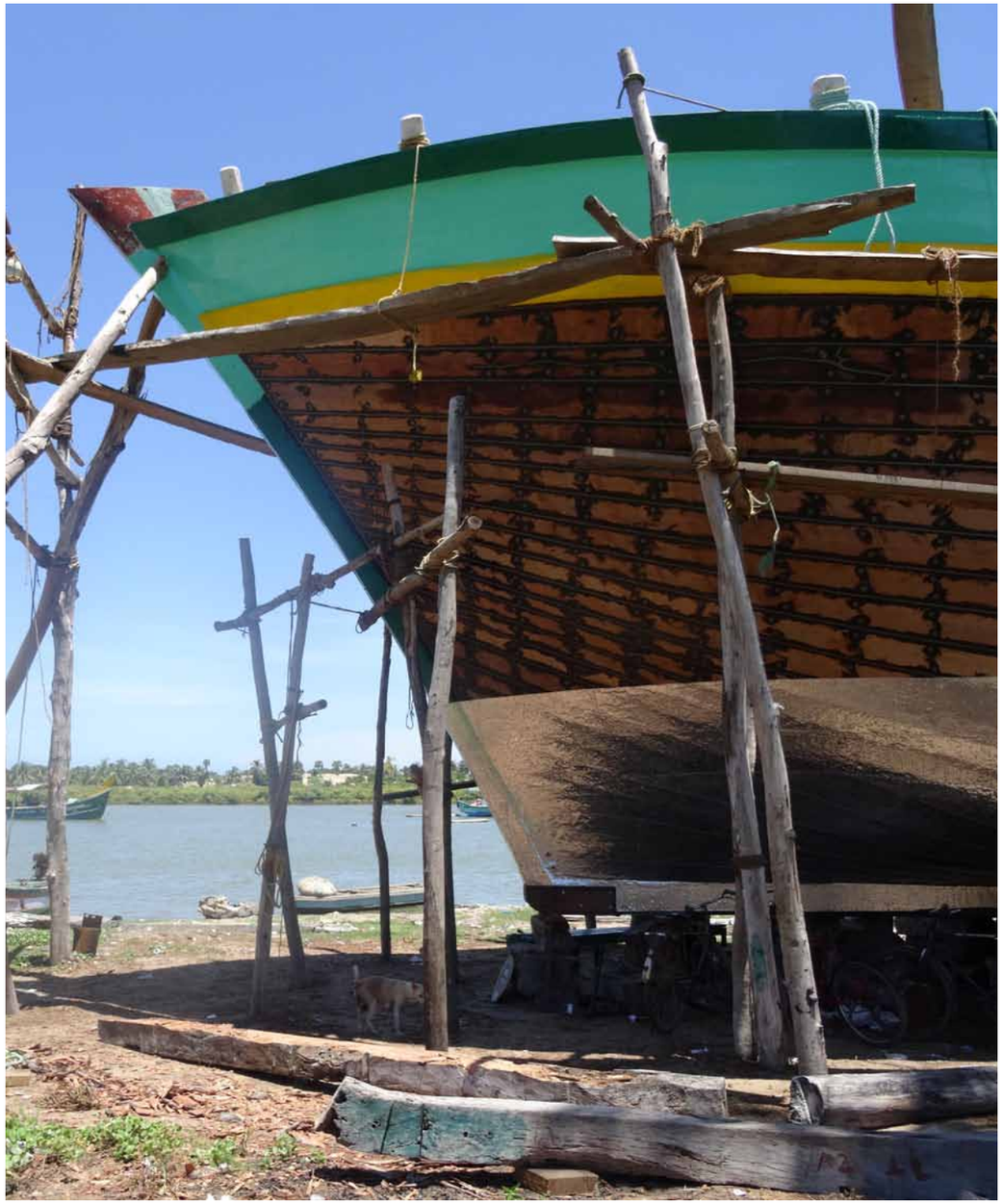
What distinguishes the kotia from other wooden ships of the same size is the flatness of the bottom of the hull which is related to the fact that it is directly inherited from the old barges of Cuddalore port. This is both a great advantage and a disadvantage. The advantage is that it allows the kotias to reach small harbours and jetties, which practically no other cargo ships can reach, and that it allows for carrying bigger quantities

of cargo in its hold. But the disadvantage is that it strongly affects the stability of the ship, causing heavy rolling with side waves and there is a risk of capsizing in high seas.

The front stem is a single beam of wood, cut in a rectangular shape and usually made of Iluppai. In our model kotia the length of it is 27 feet. A box-like cut is made on the keel and a matching box-like projection at the bottom of the stem allows the stem to sit firmly on the keel. The stem has an important structural function because it supports the shaping frames, i.e. the front frames of the hull. As explained to us, the angle of inclination of the stem away from the keel is determined by various factors, i.e. potential load on the stem, seaworthiness and aesthetics. One might like to have a steeper angle for a better look and more seaworthiness but that would mean it would have to support more cargo load by itself without the help of the keel. So, a balance is sought between these competing factors and the stem is angled in such a way that it helps navigation, takes only minimal load and also looks good aesthetically. The horizontal distance between the angled forward tip and keel, measured at keel height is 14 feet in our model kotia.

The rear stern, also preferably of Iluppai, has a length of 25 feet. With the arrival of the engine in the 1980s, the rear of the ship became a bit sharper so that water could flow directly to the propeller. The stern also leaned outwards to facilitate this. The horizontal distance between the aft top and keel, measured at keel height is 3 feet in the model kotia.

A steel projection is provided to avoid entangling fishing nets in the propeller.



The skeleton of a kotia

As explained by one of the shipbuilders, the structure of the hull is quite similar to the top of the skeleton of the human body. To understand how the body is made, one must first understand how the skeleton is built; it is the same for a kotia.

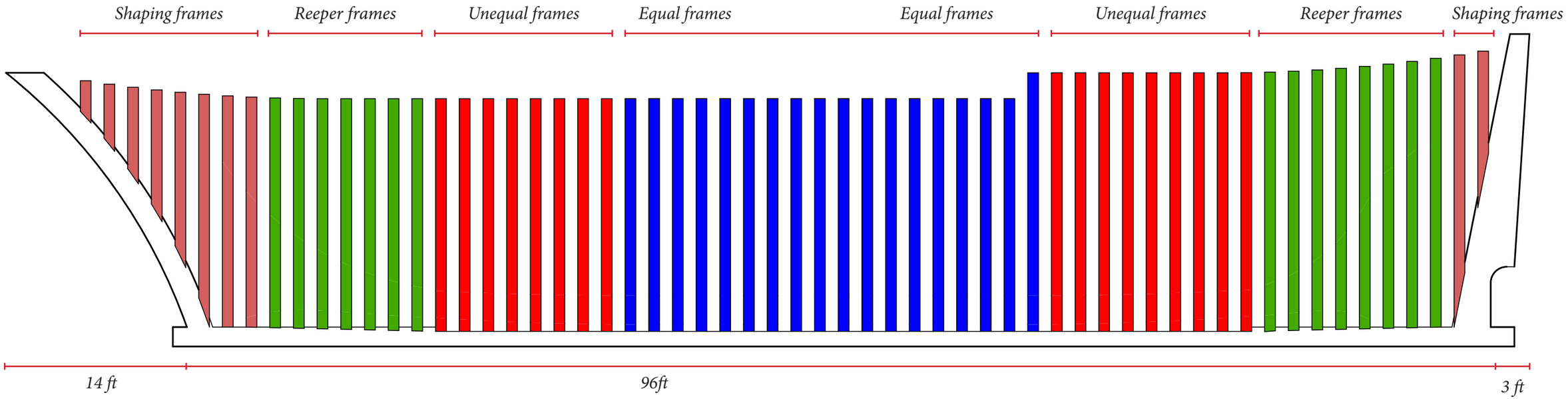
As noted before, a dominant paradigm of research in boat building was to focus on the fundamental distinction between the plank-first and frame-first methods of construction of the hull. Its importance lies not only in the fact that the former was supposed to be more archaic and chronologically preceded the latter but also in the fact that the shift to frame-first technique was also considered as a cognitive revolution. The reasoning behind this was that, in the plank-first technique, there was no necessity for precisely conceptualising the shape of the vessel in advance. But in the frame-first technique, in order to make the structure of the hull with frames before fixing planks onto it, there must be a precise image of how the ship will look at the end. While there is nothing wrong in such reasoning, not enough consideration is given to the intriguing possibility that both methods may always have been combined in practice. Perhaps the best example of this is the making of galleys at the Arsenal in 16th century Venice. We know that carpenters were then using geometrical devices to plan the central part of the hull of the galleys. But they also considered the devices ineffective for making certain parts such as those close to the prow and the stern. This example is significant because the wooden shipbuilding methods employed at Venice were considered cutting edge at that time in the Western world and they are even referred to as precursors of Fordism. Yet, the master carpenters of Venice deliberately chose to mix different methods for constructing galleys, in exactly the same way that maritime carpenters of Cuddalore are doing that today. It's also interesting from the point of view of historiography because it proves that one cannot simply relate the mastering of the frame-first technique to the ability to conceptualise the whole shape in advance.

Significantly, these examples prove that one cannot always take the distinction between the two techniques for granted, as assumed by scholars interested in evolution who presuppose one technique or another. Hybrid methods were seen only as a transitory phase, however long it may have been. But if we reason, as the maritime carpenters did, we should rather consider the two techniques as complementary to each other and consider that the effectiveness of each technique may have been judged according to the part of the hull being built. Such a perspective complicates the question of moving from one technique to another in the historical sense. Moreover, in the case of kotias, there are not two but at least three, if not four, different techniques involved in structuring the hull. As will be shown, one of them completely subverts the conceptual distinction between frame-first and plank-first techniques.

The architectural process of designing frames of a kotia

Mastering the art of designing frames for building a kotia is, as we have seen before, what distinguishes a mistri from his fellow carpenters. It requires him to master a fundamental sum of knowledge about geometrical proportions and diagrams. It also requires him to visualise the hull and crosscheck at every step in order to achieve a coherent design, satisfying the expectations of the owner and the crew. In order to do so, a series of steps are followed. The information in this section is based on the explanations given to us by Kathiravan, one of the renowned mistries of Cuddalore who has built numerous fishing boats and six kotias and became one of our best friends in Cuddalore. As the designing process represents a sophisticated combination of theoretical and practical procedures, it is relatively difficult to describe in words, even with the help of the illustrations. In the following section, we will describe the making of four sets of frames - equal (sari mattam kaal), unequal (kuraindha kaal), reeper (kuchi kaal) and shaping frames (saathu kaal) - that form the total frame structure of the hull. We apologise in advance if the ensuing description demands a bit of patience and attention.

Frames of a kotia



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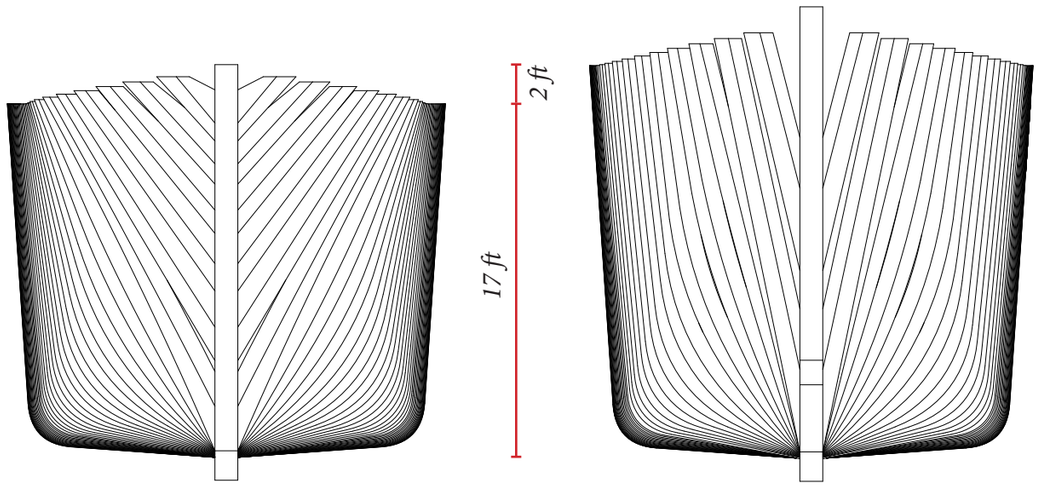
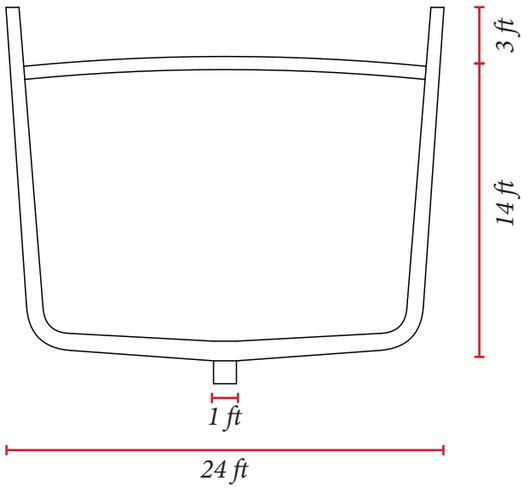


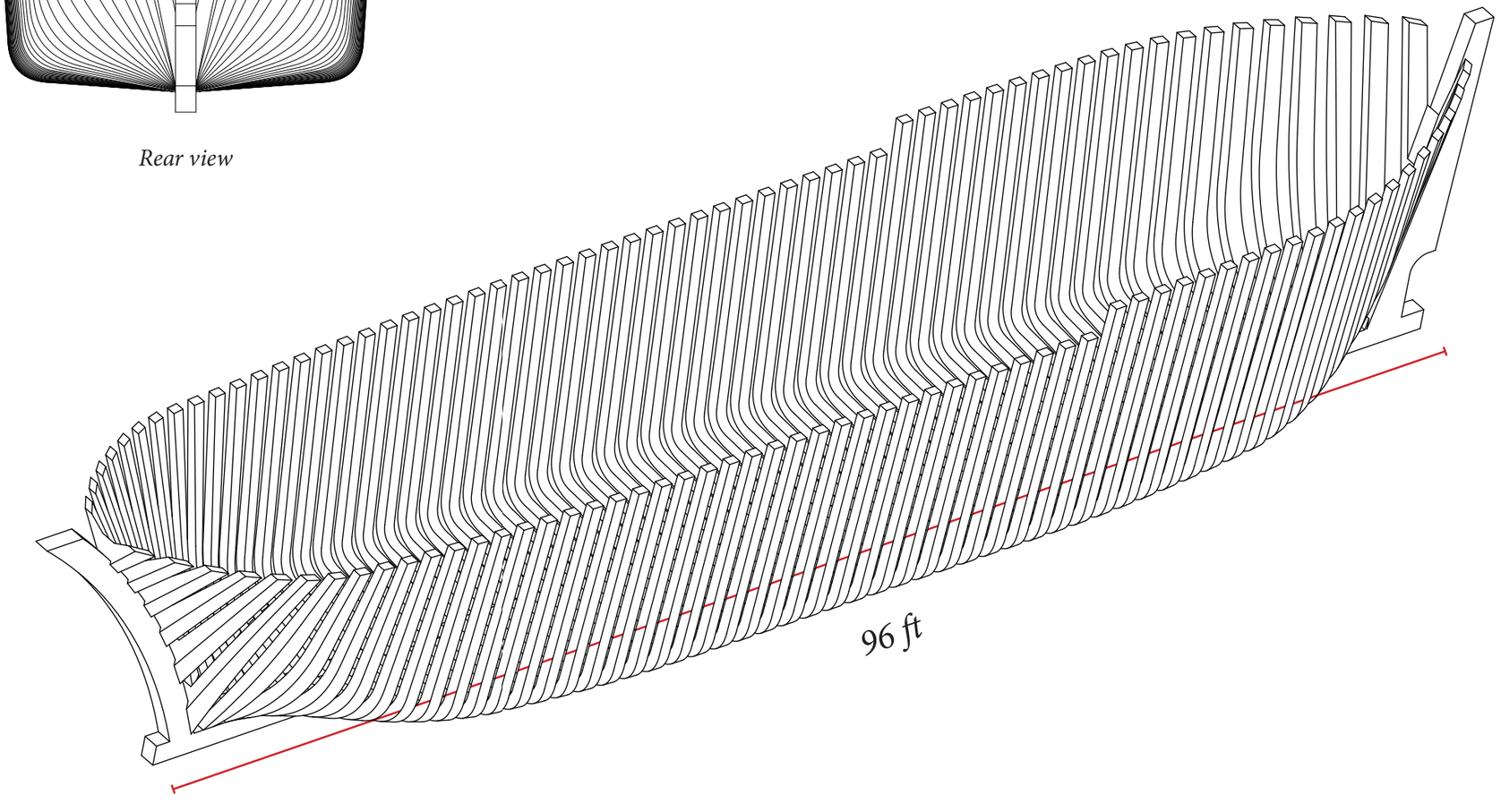
Front view

Rear view

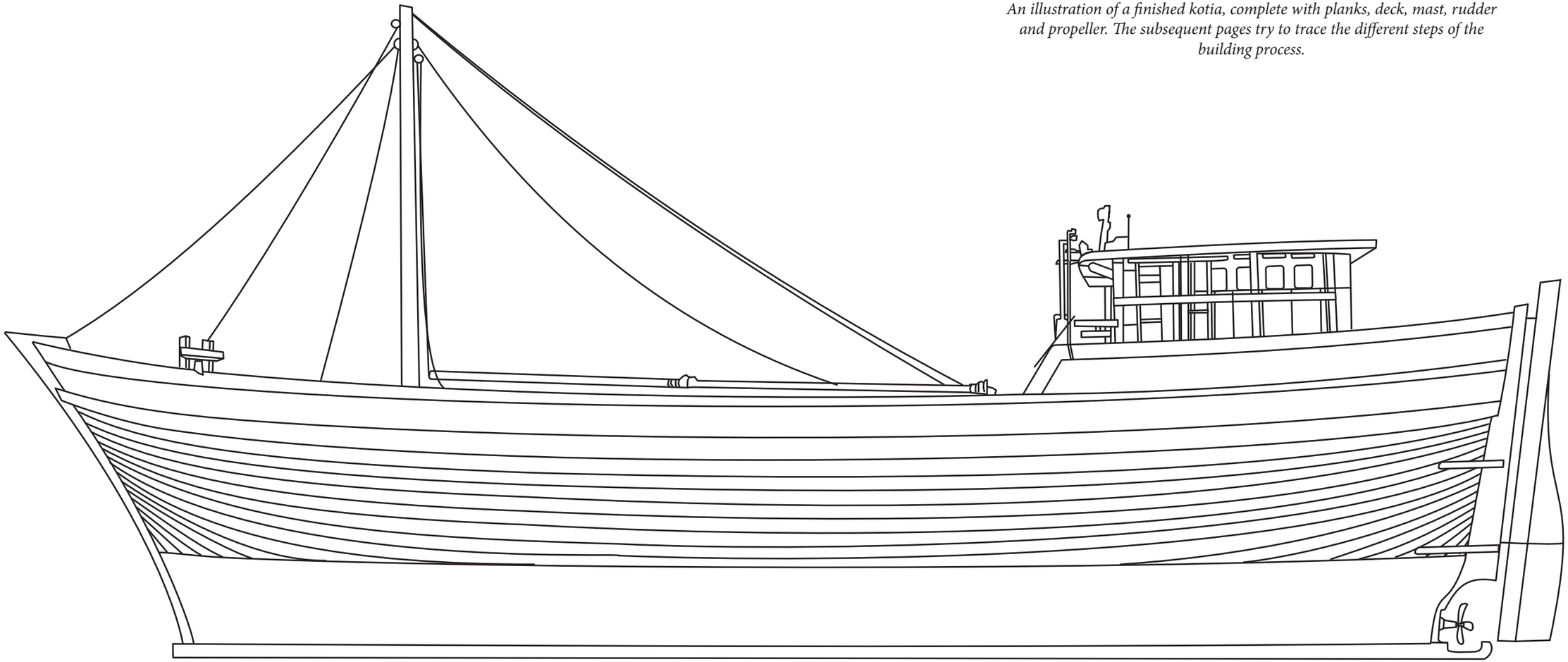
Cross section



In collaboration with Kathiravan Mistry, design engineers developed a CAD model of a kotia. Dimensions are based on actual measurements. Replicating them in computer aided design proved to be a challenge. But it helped us in understanding the intricate complexity of a craft practice.

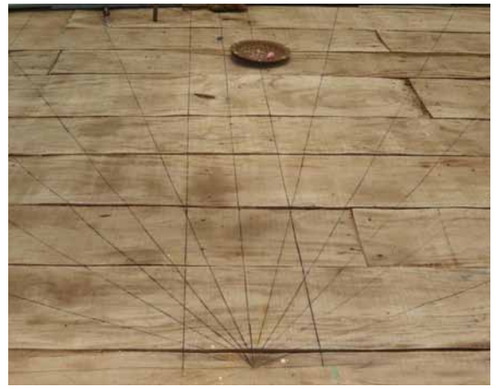


An illustration of a finished kotia, complete with planks, deck, mast, rudder and propeller. The subsequent pages try to trace the different steps of the building process.



The scrieve board

The first step is the laying on the ground near the hull of a large scrieve board (pattarai; meaning workshop in Tamil); wooden planks are placed next to each other on which the design will be drawn; on top of these full size templates for frames will be made and assembled.



For a kotia of 350 tons capacity, the mistri with his tacit learning over years estimates the best proportion of breadth and height of the hull to be 24 ft wide and 14 ft tall, measured up to the deck. On the scrieve board, a rectangle of 24 ft by 14 ft is drawn.

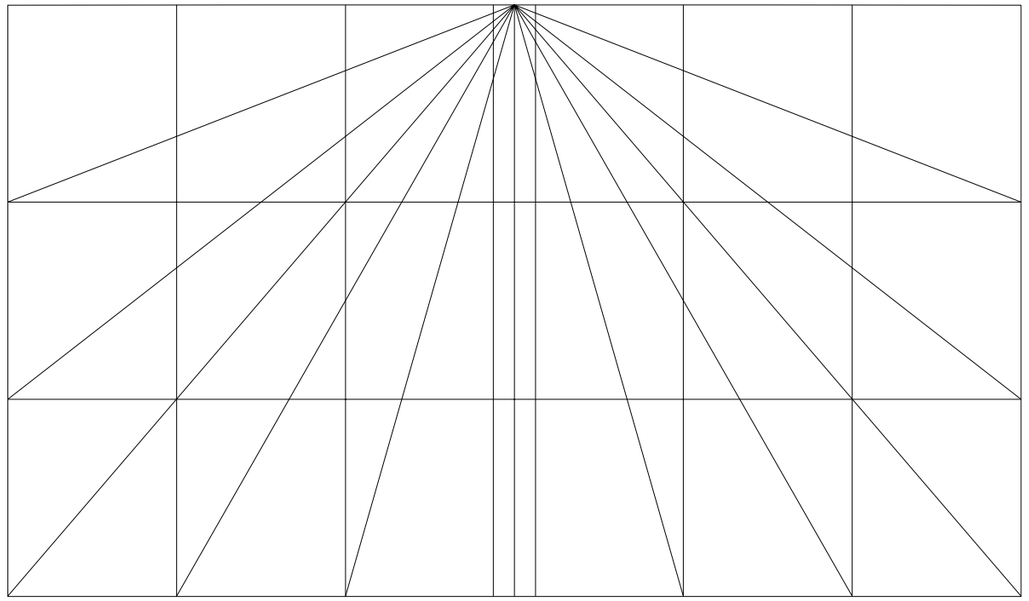


Fig 1: A rectangle of 24ft by 14ft is drawn. At the centre, the keel width of 12 inches is drawn. Various guidelines are drawn to facilitate manipulation of measures. Either side of the keel is divided into three parts by drawing vertical guidelines. The entire scrieve board is horizontally divided into three equal parts with horizontal guidelines. Diagonals originating from top centre are drawn as shown. These diagonal lines help in calibrating the angles and measures for the left and right side of the frames on the scrieve board.

At the bottom of the rectangle, a reduction of 9 inches in height and 24 inches in breadth (12 inches on either side) is made to compensate for the weight of the frames and to provide for slackening of frames over time.

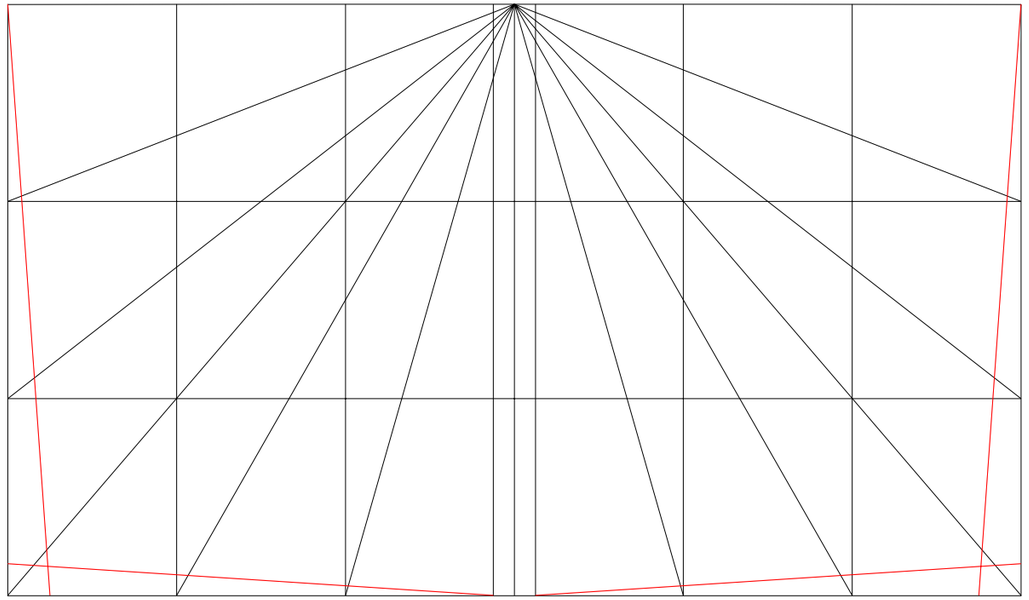


Fig 2: Scrieve board of 24x14 ft - reduced height and breadth by 9 inches and 12 inches on either side.

Once all these basic guidelines are traced, the next step is to mark a few decisive points on the diagonal which serve as references for drawing the frames.

Drawing the equal frames

The equal frames play a decisive role, as it is on the basis of their breadth, curvature and height that other frames are designed, which finally leads to the desired capacity of the kotia. A freehand curve is drawn in the corner defining the curve of the equal frame. This curvature is based on the mistri's experienced estimate considering capacity, draft and speed of the vessel. This forms the shape of all the equal frames.

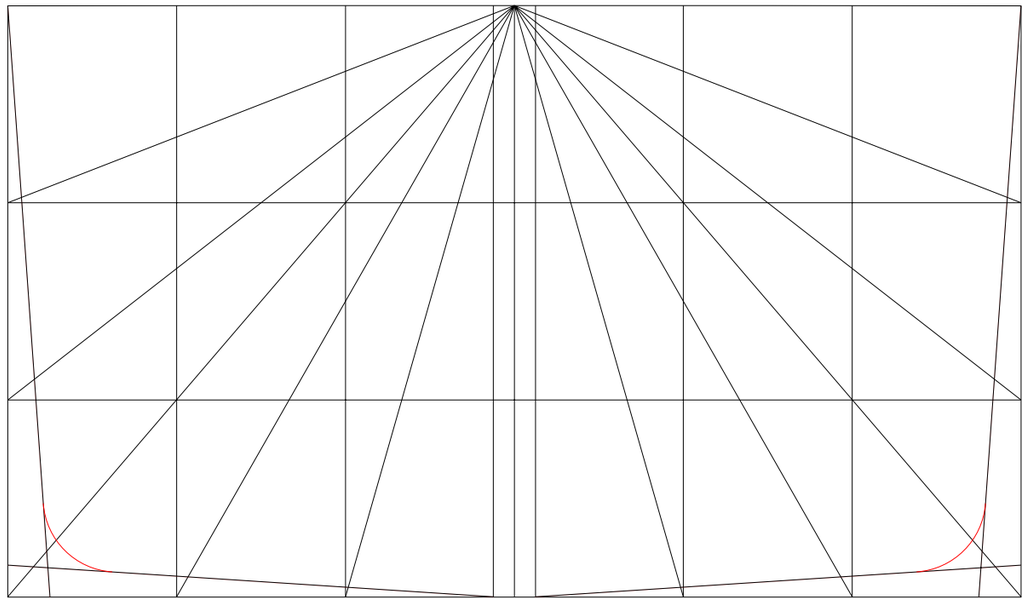


Fig 3: Drawing of the first curve for the equal frame. This is determined based on the balance sought between load carrying capacity and speed. A higher curvature would mean higher speed but less carrying capacity and a lesser curvature would mean more carrying capacity but lesser speed.

The master template

A master template is made matching with the curve of the equal frames. Once the master template is made, it is used to design all the equal frames forming the central part of the hull and used, as well, as an unorthodox kind of compass for drawing the unequal frames of the hull on the scrieve board. They are made as light as possible because they will be used for drawing other unequal frames and so should be easy to manipulate on the scrieve board. Unlike the master templates that are used for fishing boats made of a single wooden piece, the master template for the kotia is made of three pieces: a bottom template (vangu), a corner template (adi kaal) and a top arm (mel kaal). This splitting of the master template into three pieces is necessary because of the large dimensions of the frames and the bulk of the wood to be worked upon.

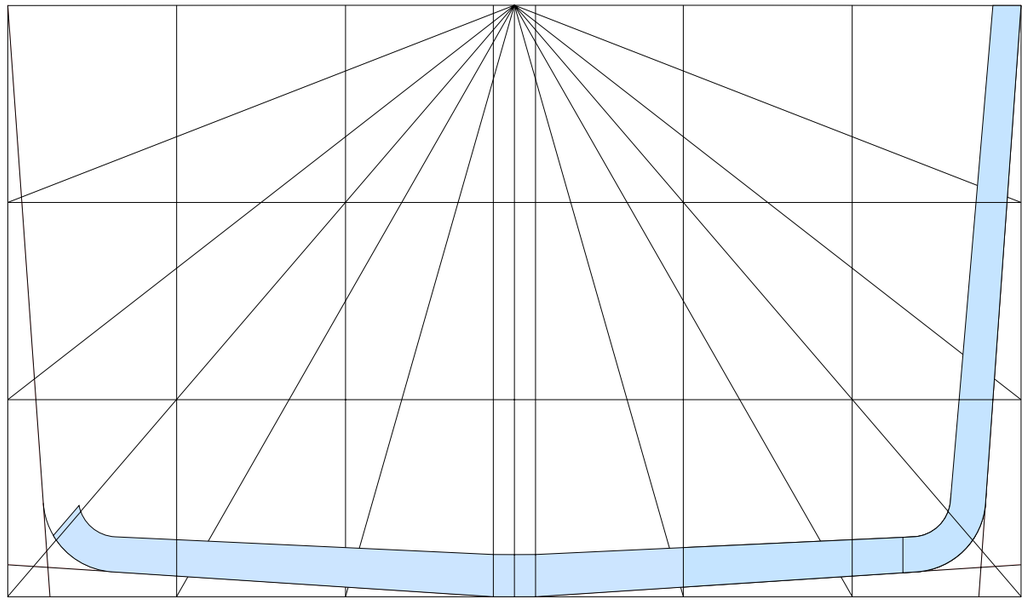


Fig 4: Master template derived from the equal frame. This master template serves in drawing further curves and also transposing the curves to wooden logs. To facilitate this, keel lines and vertical guidelines are drawn on the master template.

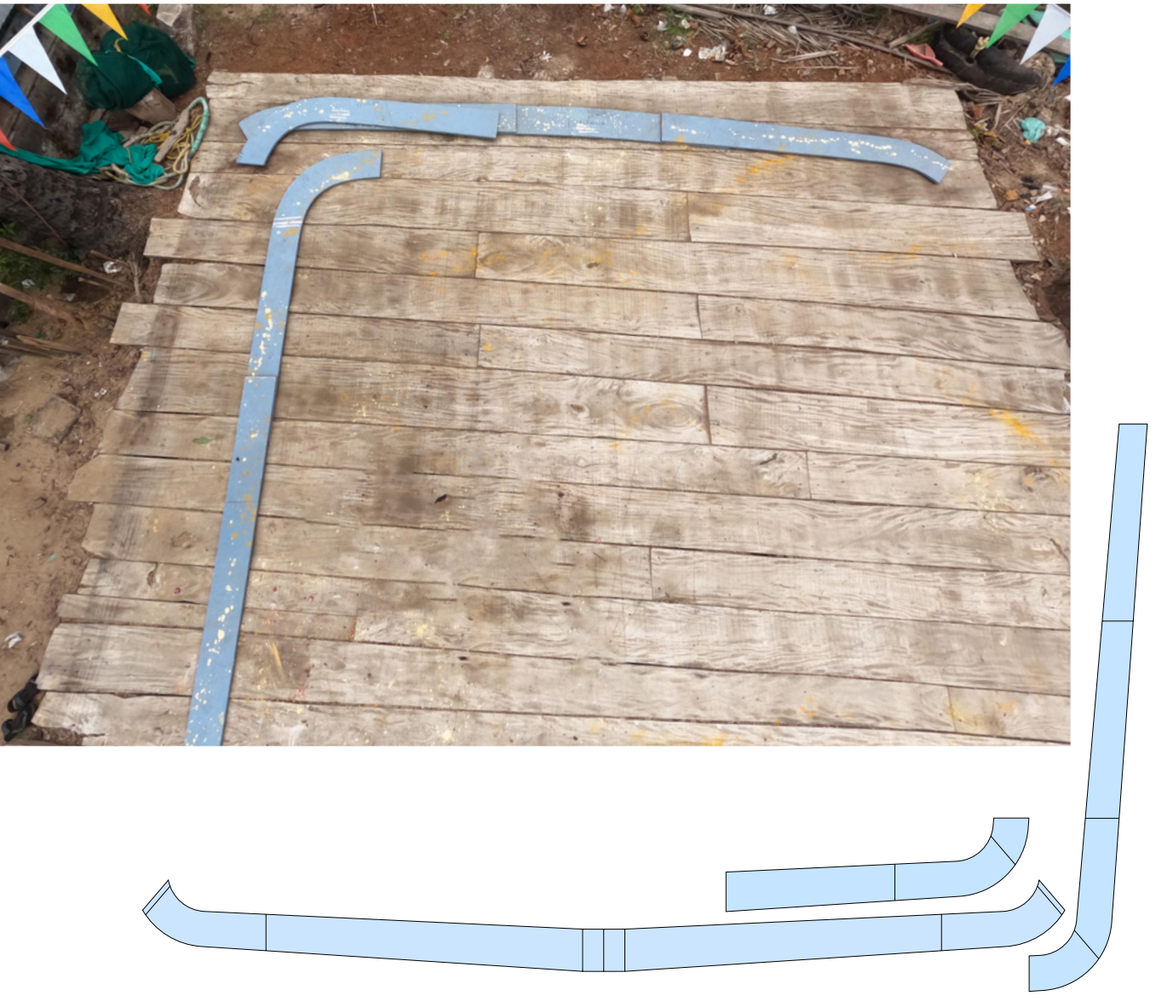


Fig 5: The three-piece master template - (a) bottom template, (b) corner template and (c) top arm. These three pieces form a complete frame, with the diagonal lines helping in their alignment.

Making of the equal frames

Wooden logs with suitable natural curves are selected for the equal frames. The bottom, corner and top arm are made out of separate pieces of log and are joined together to form one complete equal frame. In the case of our model kotia, a total of 17 equal frames were made.

The length of the keel of this kotia was 96 feet, of which 2 ft on the aft is marked out since there will be more load on the aft. Of the remaining 94 feet, a centre point is marked at 47 feet. The two first equal frames are placed 6 inches away from this centre, resulting in a gap of 12 inches between. This distance of 12 inches is maintained as the gap between all subsequent equal frames. The frame itself is 12 inches wide. There are 17 equal frames, 8 in the forward and 9 in the aft. But obviously this number may vary according to the size of the ship and the quantity of goods it is supposed to be able to carry. And, in spite of them being called equal frame, their height is not uniform; carpenters will subsequently add supplementary pieces of wood to equalise their heights to reach the bulwark.

Drawing the unequal frames

The sections of the hull that immediately follow the equal frames at both ends play a crucial role in the shape of the vessel. What characterises the unequal frames is that each of them will have its own shape of curve. The complex process of drawing their shape makes them the most difficult part to design. The ship's seaworthiness and its loading capacity will directly depend on their design. Moreover, the competence of a mistry will be largely evaluated according to his ability to make this design well.

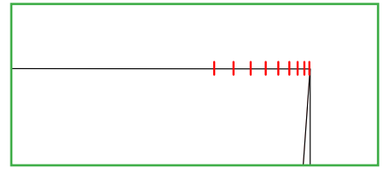
Starting from the curve of the equal frame a series of points are marked on the diagonal reflecting the curvature points of each unequal frame, progressively narrowing so as to define the narrowing forward and aft sections of the ship. They are marked at an incremental distance along the diagonal.

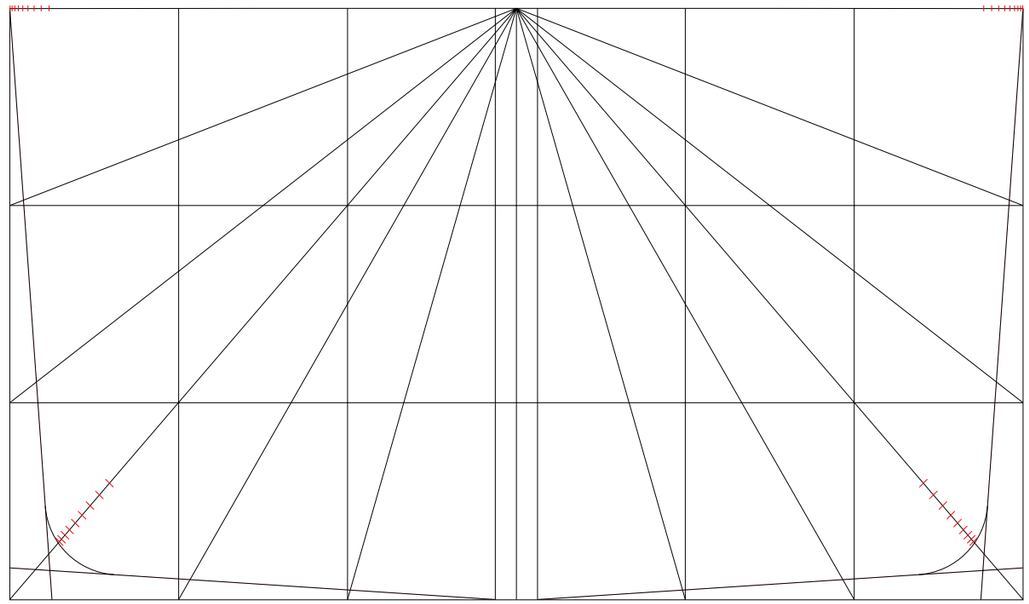
With the curvature of equal frame as base, the first point is marked at a distance of 0.25 inches from the equal frame. The first unequal frame's curve will pass through this point. Subsequently, points for the rest of the unequal frames are marked at the distances mentioned in the table below.

Equal + 0.25 inches = Unequal frame 1 - U1
U1 + 0.50 inches = U2
U2 + 0.75 inches = U3
U3 + 1.00 inches = U4
U4 + 1.25 inches = U5
U5 + 1.50 inches = U6
U6 + 1.75 inches = U7
U7 + 2.00 inches = U8
U8 + 2.25 inches = U9

According to Kathiravan, this progression of distances between the points comes out of experience rather than from any theoretical or mathematical considerations.

A corresponding series of points are marked on the top horizontal line of the rectangle, representing the deck. The principle of defining the distance between these points is that, for an inch of progression on the diagonal, half an inch is reduced on top. For example, if there is an increase of 0.25 inches for U1, the corresponding point on top would move in by 0.125 inches on the top horizontal line.





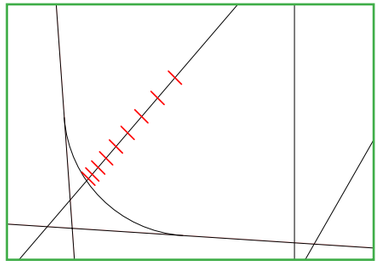


Fig 6: Guide marks are marked to represent the curve for each of the unequal frames. Corresponding points are marked on top horizontal representing the curvature at deck level.

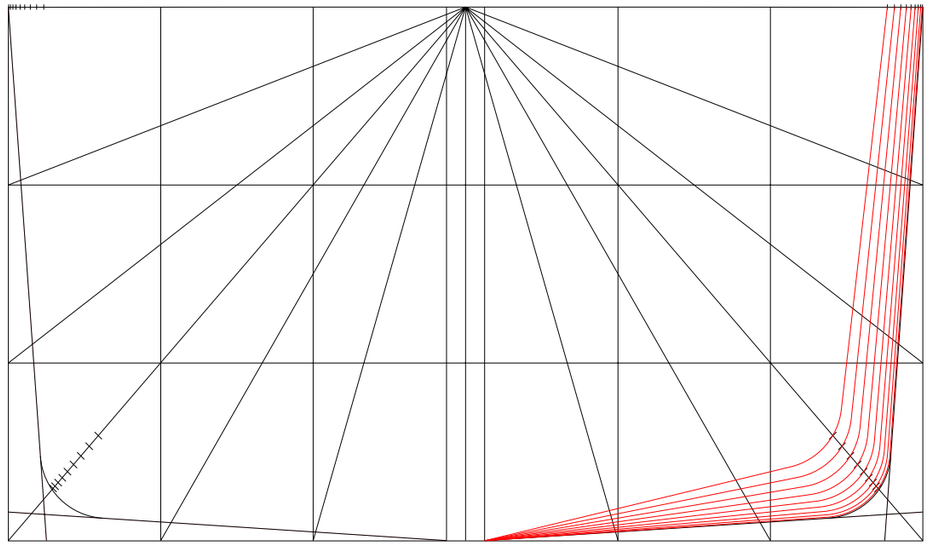


Fig 7: Scrieveboard with curves drawn for all unequal frames.

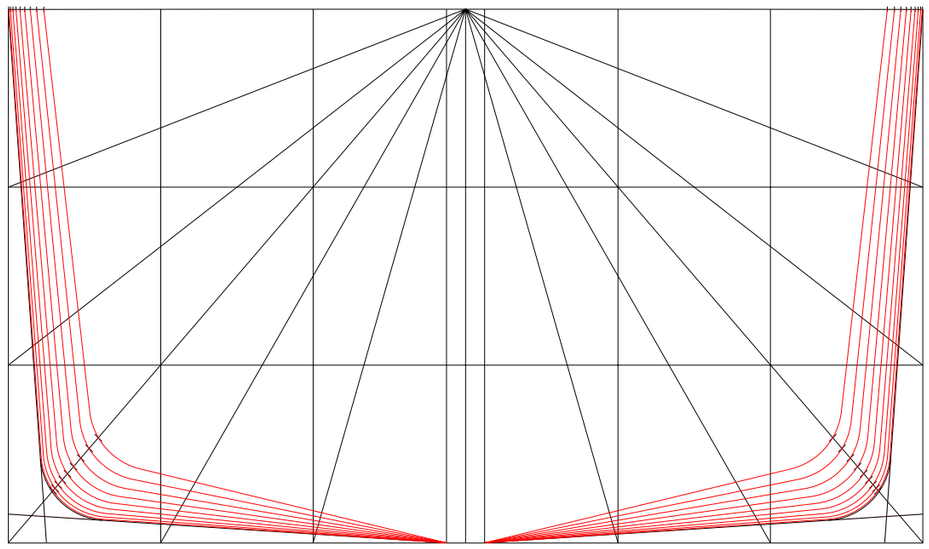
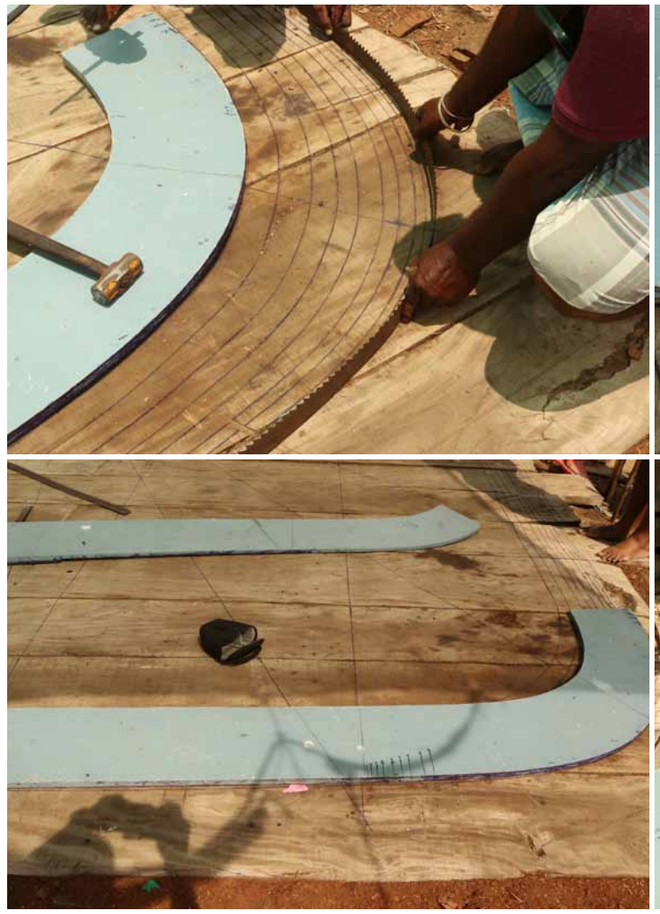


Fig 8: Scriveboard complete with all the curves drawn on either sides. The master template is used in drawing these unequal frames on both sides of the scriveboard.

Once these two series of points are marked on the diagonal and the top horizontal line, curves for each unequal frame are drawn starting from the keel, passing through their respective points on the diagonal ending at their respective points on the top horizontal line (see figure 7). The master template is used to draw the curves of the unequal frames on the scrieve board. Now that the scrieve board provides the complete set of full size frame shapes for all the unequal frames from U1 to U9 it is time to transfer these curves onto the actual wooden logs that form the unequal frames.



Making of the unequal frames

To illustrate the process of transferring the curves onto wood, we will provide one example, that of the last unequal frame U9. U9 is illustrated since every step of the process is visible. The process is the same for all unequal frames. The illustrations are an attempt to explain the principles of design and do not adhere to exact proportions.

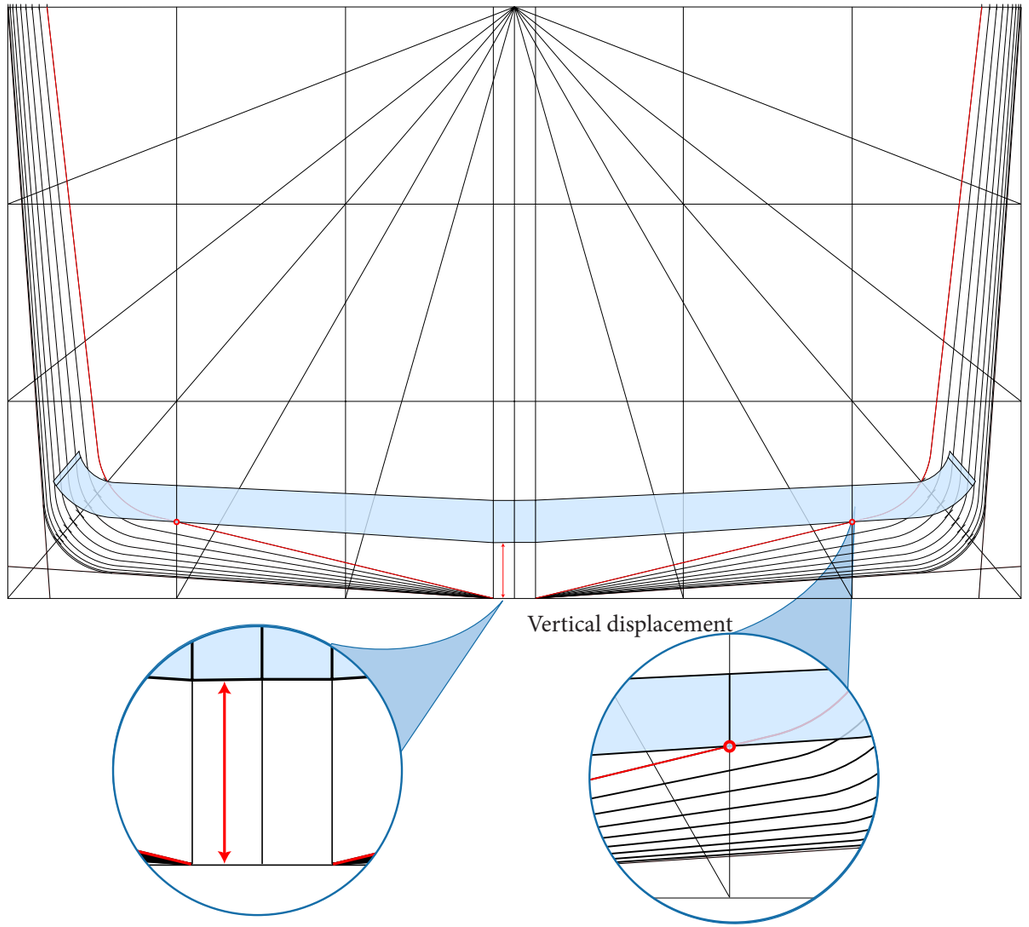
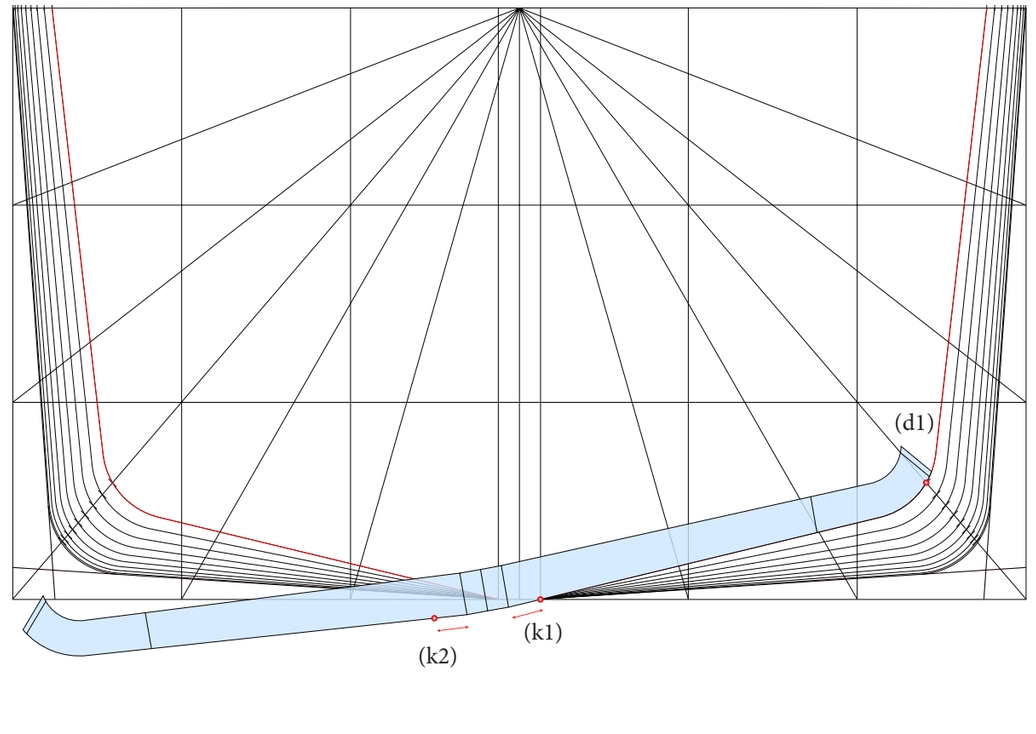
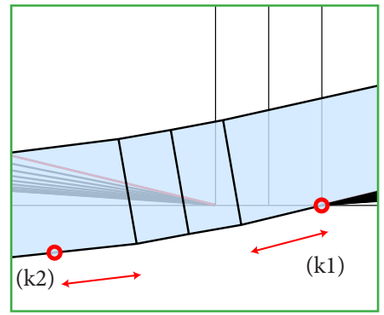


Fig 9a: Transposing the unequal frame's curve to a wooden log. As a first step, the master template is placed aligning with the intersection of the U9 curve and the vertical guideline. Now, the vertical displacement between the keel and the template is measured.





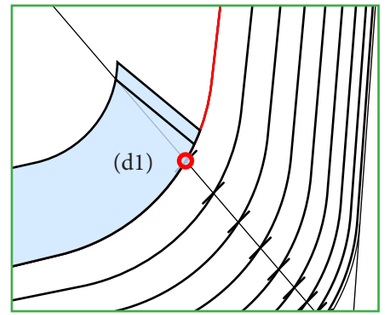


Fig 9b: The bottom template is tilted to align with the curvature of U9. A point (k1) is marked on the template where it meets the keel on the scrieveboard. The distance between k1 and the keel line is measured. The same distance is replicated on the left side and a point k2 is marked. Another point (d1) is noted at the intersection of the diagonal guideline and U9 curve.

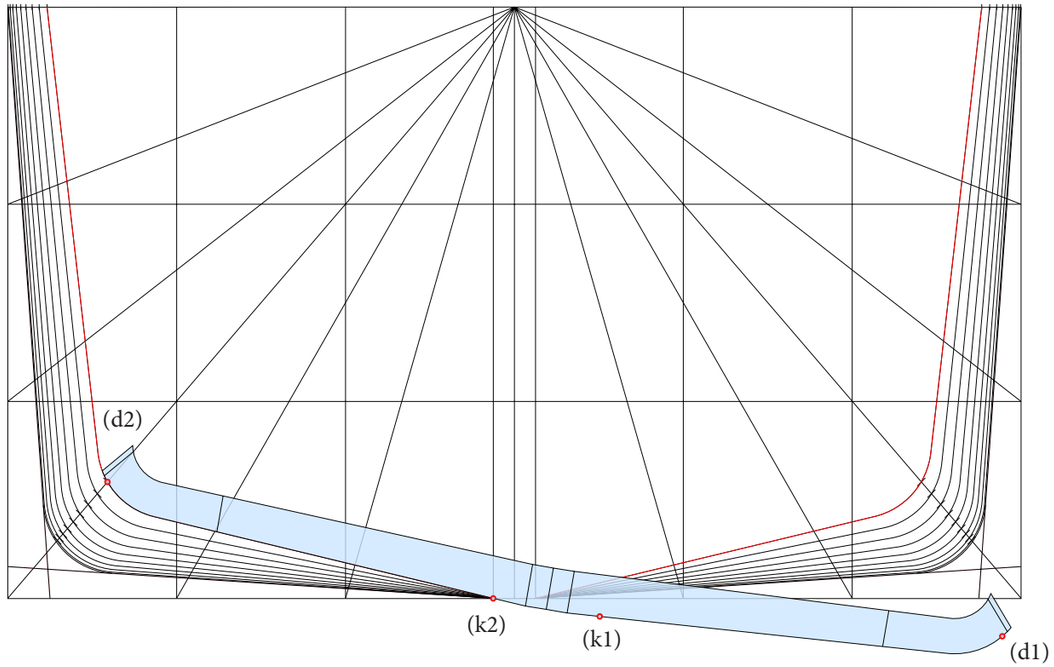
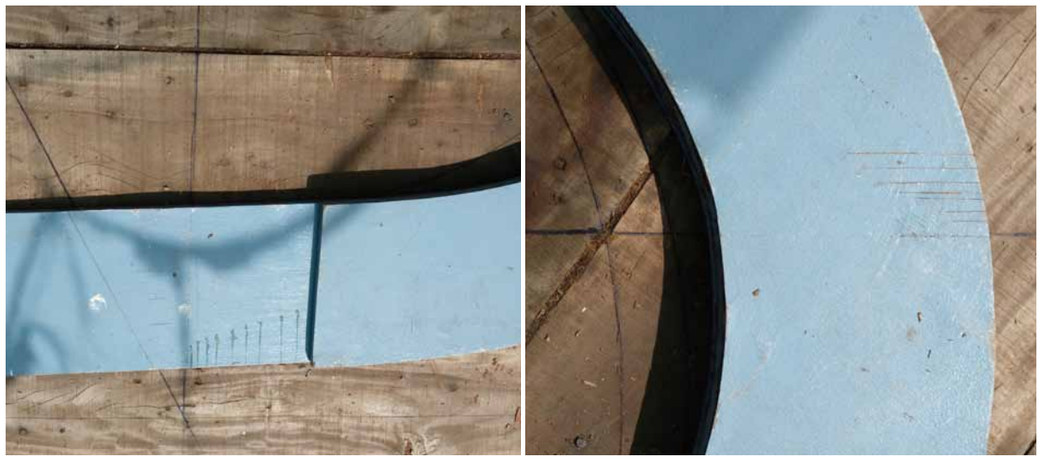


Fig 9c: The bottom template is tilted to the left side matching the k2 with the keel and aligned with the U9 curve. A point (d2) is noted at the intersection of the diagonal guideline and U9 curve.



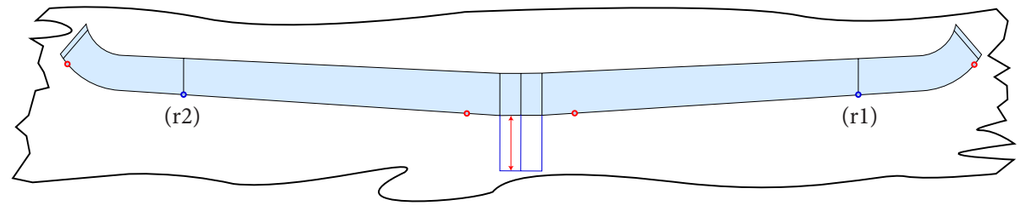
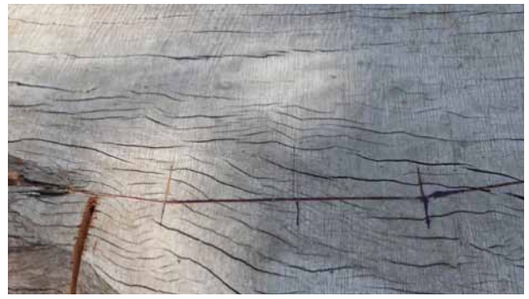


Fig 10a: Now the bottom template is placed on an appropriate wooden log. The keel is drawn on the wood matching with the vertical displacement measure arrived in Fig9a. Two reference points (r1 & r2) are marked on the wood matching with the vertical guidelines of the bottom template.



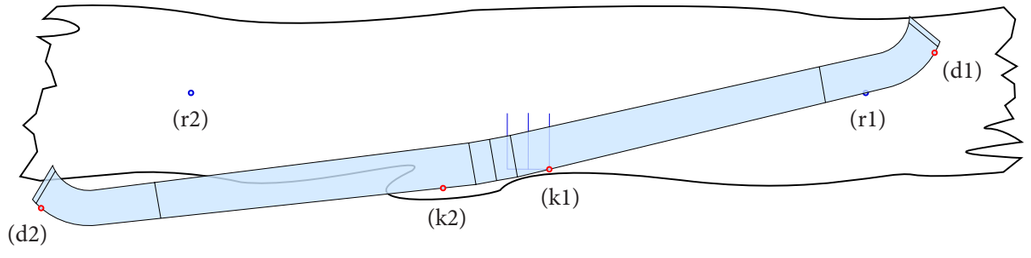


Fig 10b: The template is tilted so that k1 aligns with the keel on the wood and touches r1. The frame's bottom outline is drawn along the template up to the point d1. The top outline is partially drawn.

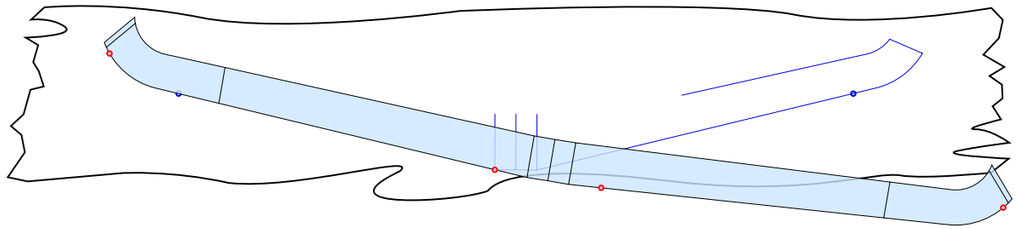


Fig 10c: Similarly, the template is tilted on the left and the outline is drawn on the left side.

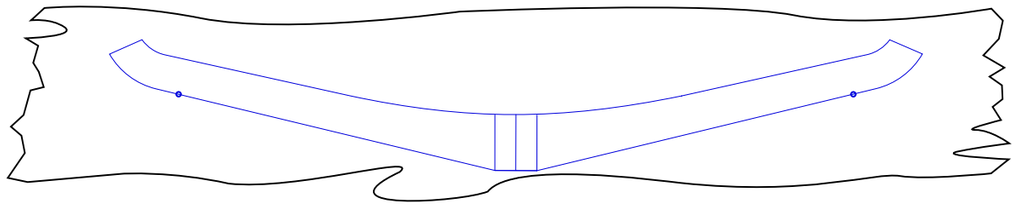
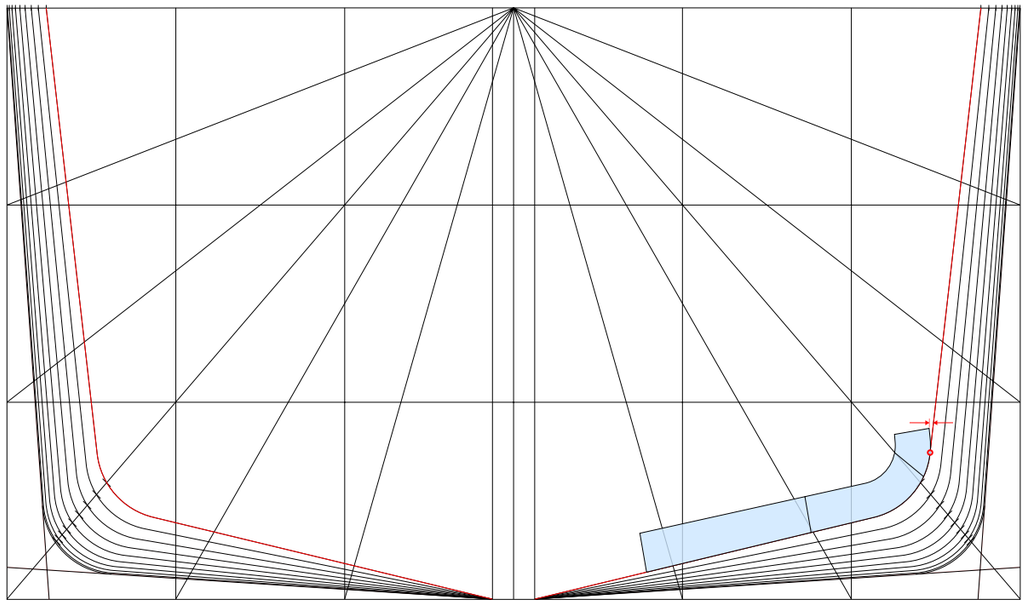


Fig 10d: Now the outline is complete. Now the centre of the frame has raised to almost 4 inches more than the first unequal frame. This height increases gradually throughout all the unequal frames. The bottom piece of the frame is obtained by cutting along this outline.



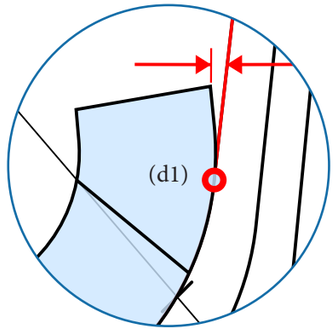


Fig 11a : Making of the joining frame: The corner template is placed on the scrieveboard aligning with the U9 curve. A point (d1) is marked where the template starts deviating from the curve. Here the distance of deflection is measured.

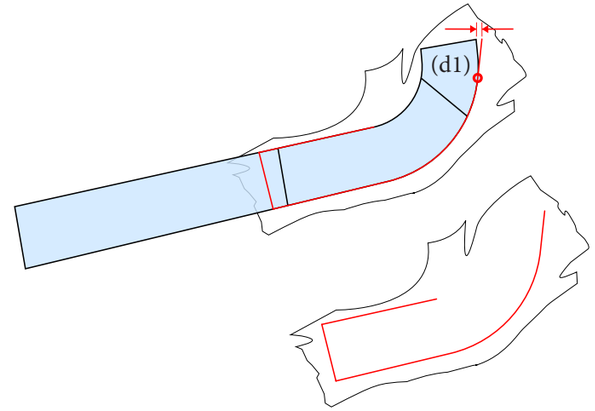


Fig 11b: The corner template is placed on an appropriate wooden log that would fit the curve of the joint. A partial outline is drawn along the template up to d1. From d1 the curve is extended taking the deflection distance into account.

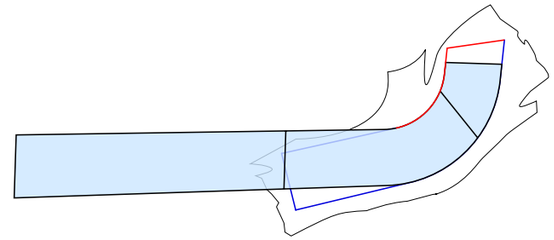


Fig 11c: The corner template is tilted so that the whole outline can be completed.

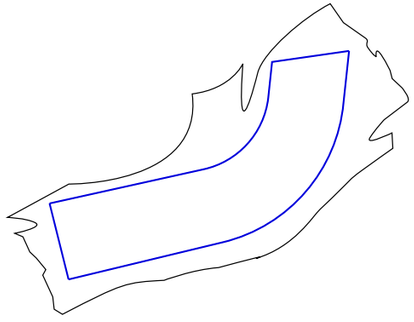


Fig 11d: The joining frame is cut out of the resulting outline.

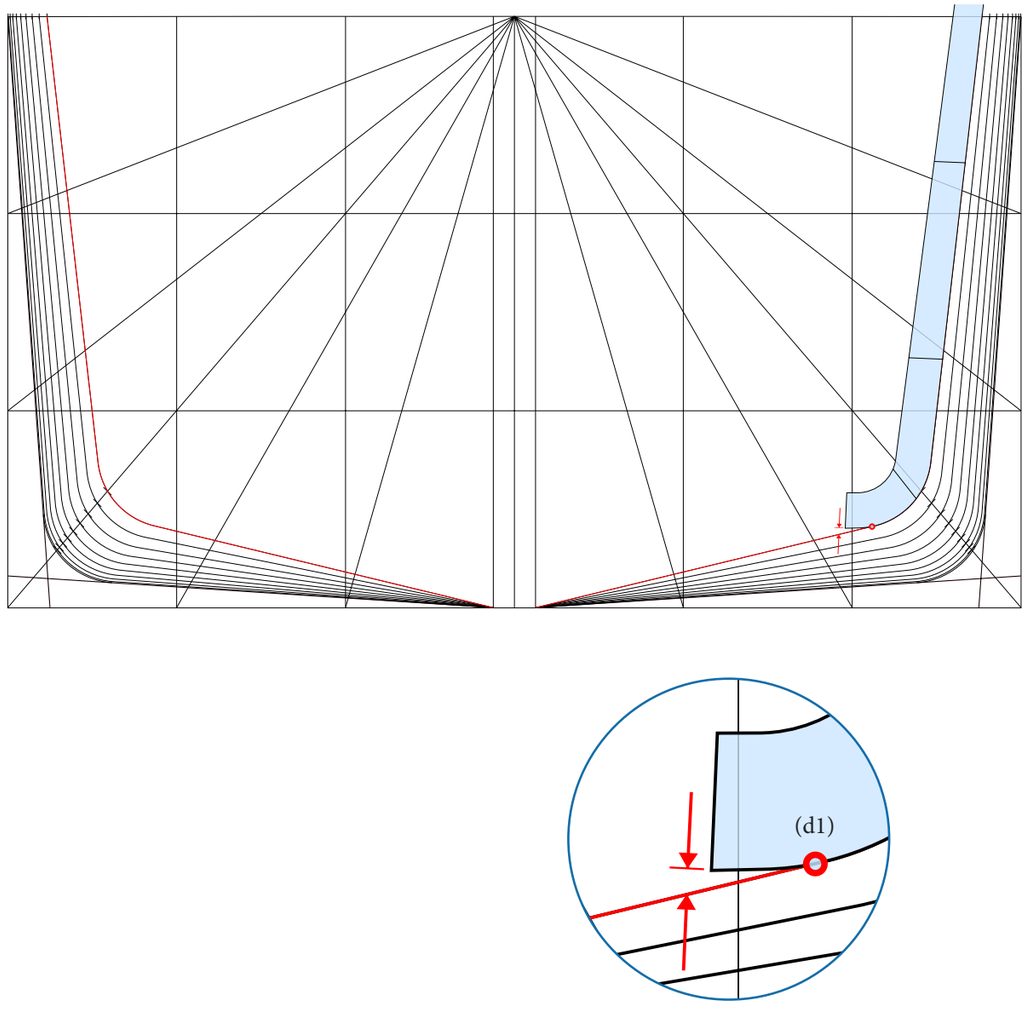


Fig 12a: Making of the top frame: The top template is placed on the scrieveboard aligning with the top part of the U9 curve. A point (d1) is marked where the template starts deviating from the curve. Here the distance of the deflection is measured.

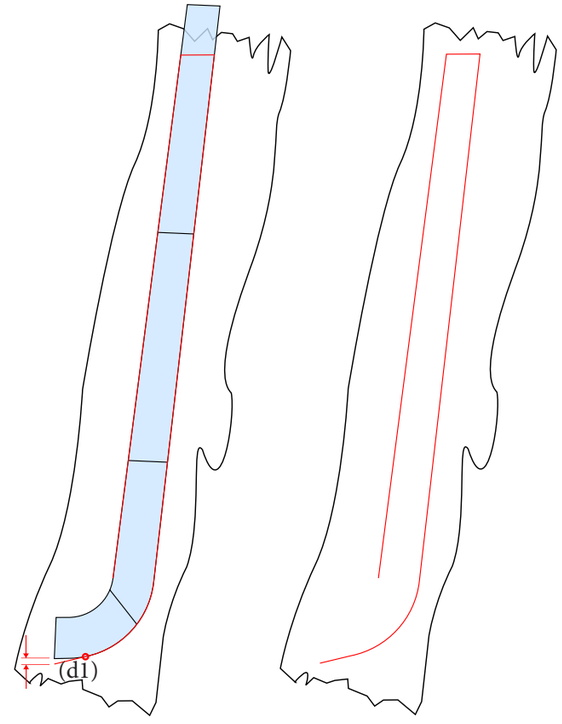


Fig 12b: The top template is placed on a long enough wooden log. The outer outline is drawn almost all along the template up to d1. It extends a little further accounting the deviation distance measured from the previous step.

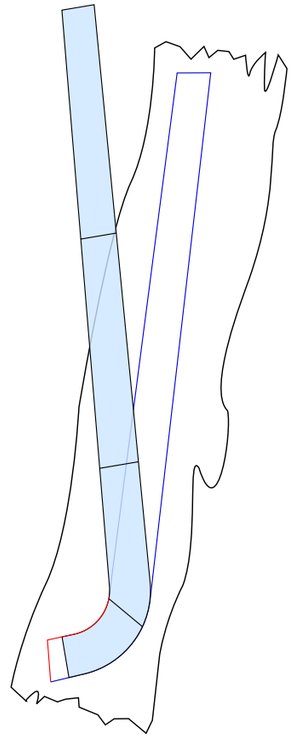
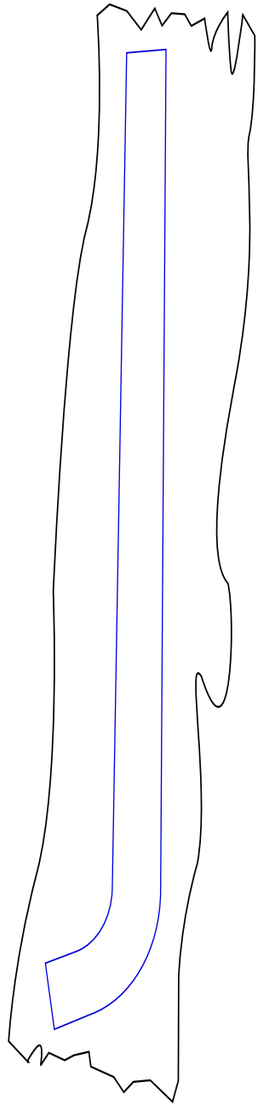


Fig 12c: The top template is now tilted so that the rest of the outline can be completed.



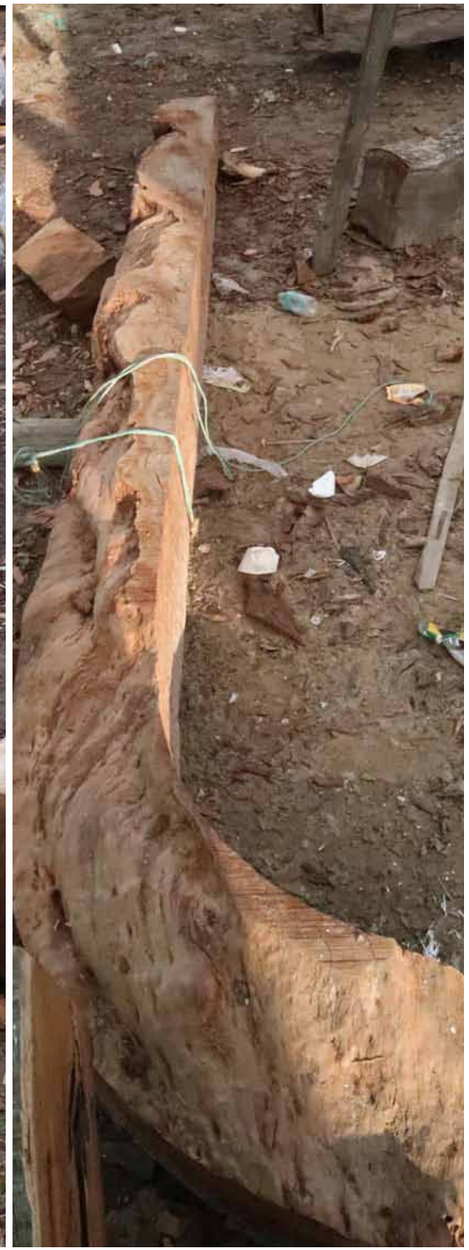


Fig 12d: The completed outline is used to cut the shape of the top frame.

Thus the five pieces - one bottom frame, two joining frames and two top frames - of a complete unequal frame are drawn and cut. They are then brought to the scrieveboard, assembled on top of it verifying their alignments, disbanded, taken as separate pieces to the hull and assembled again on top of the keel. There are a total of 17 unequal frames, 8 in the forward and 9 in the aft. Like equal frames, they are 12 inches thick and are placed at 12 inch intervals over the keel.

Reverse engineering of reeper frames

Once the equal and unequal frames are fixed on the keel, the remaining ones are not made to a prior design as the preceding ones are. What the carpenters do is define the shape of these frames directly on the existing structure of the hull. We call this reverse engineering, as it resembles the process of extracting design from an existing object. A lightweight grid of bamboo reepers is built in the anticipated shape of the hull. Templates made of simple lightweight plywood planks are used to define the exact full size shape of the exterior of each reeper frame. The long templates are placed inside this reeper structure and their curved shape is designed following the shape of the reeper structure itself. These templates are then brought down to mark their exact shape on the wooden logs and cut to that exact shape. The fascinating thing to notice is that the templates are used in two completely different ways: in the case of equal and unequal frames, they are used for reproducing geometrical shapes and lines designed a priori in an abstract sense on the scrieve board; in the latter, they are used for reproducing shapes in a purely empirical manner, in contrast to the former. This fundamentally means that, contrary to what most studies of maritime archeology seem to imply, it is perfectly possible to build a significant part of a ship frame-first without conceptualising or designing it in advance. If such a possibility had never been described or its due importance ascribed from an historical and theoretical perspective, there may be a simple reason for this. It is the fact that such a process leaves no trace with its quickly dismantled bamboo reeper structure, unless someone is present to observe and describe it.

Let us also note that in our model kotia, similar to the unequal frames, 8 frames were fitted on the forward side and 9 on the aft side. But these frames are seated on a gradually rising wooden beam fitted on top of the keel.


1


2


3


4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7


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11

Shaping frames

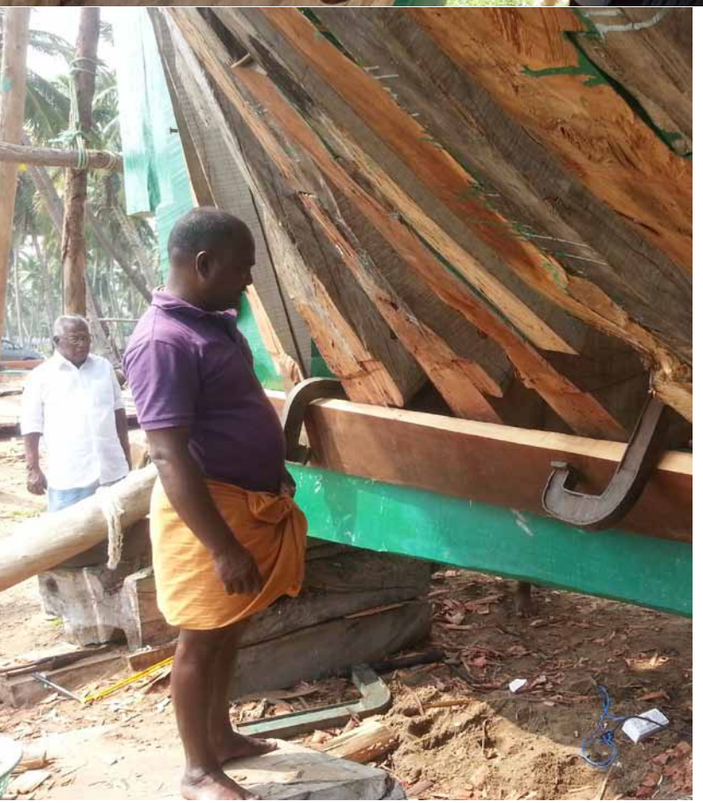
Finally comes the making of the two last groups of frames closer to the prow and the sternpost. This is an easier part of the work because these frames are straight, no longer needing to follow a specific curve. Still these frames obviously need to be of the correct size and the 'V' angle plays an important role because it will define the shape of the prow and the stern. The difficulty is then to make them at the correct angle, which is derived by using the templates directly on the structure, but without the use of the bamboo reeper structure.

Planking

The Planks

Bending the planks

Planks are the only parts of the hull that are cut in the sawmill before they arrive at the shipbuilding yard. Before using them it is necessary to soak them and also to bend them to conform to the curved shape of the hull and a traditional method is used for this purpose. A coat of low combustion neem oil is applied on the part of the plank where the bend is needed. Both ends of the plank are firmly tied or clamped by stones to provide the required tension. Then a fire is lit under the area coated with oil; the heat is retained and helps bend the planks. The tension is increased gradually with increasing intensity of heat till the sufficient curve is achieved. Then the plank is left to harden; it will retain the curved shape indefinitely.

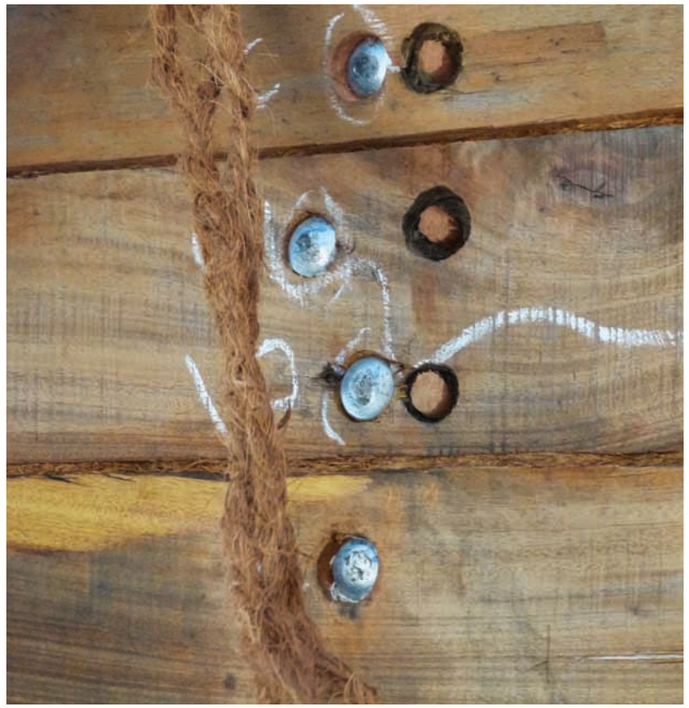


Fitting the planks

Carpenters have to work hard and use a series of clamps to hold the planks in place as well as an impressive number of nails to fix the planks to the frames forming the hull.

Caulking

Caulking, after the making of the hull, is the paramount task, and another laborious one in the process of building wooden cargo ships. Specialised craftsmen inspect the external and internal surface of the ship in detail, an area that can easily be several hundred square metres. Even the smallest flaw in the hull must be identified, marked and sealed to avoid any future leak. The seriousness of such a risk explains why caulking has become a specialised craft in its own right. And the craft has gradually refined over centuries, never hesitant about appropriating newly appearing materials into the process. In Cuddalore, caulking involves no less than eight successive steps, the first of which ensures the impermeability of the hull while the rest focus on the bottom part of the hull, which will remain mostly submerged under water. In all, the hull can be expected to maintain its integrity for at least fifteen years if the caulking is done well.



Preparing the wooden surface

The wooden surface of the planks, particularly the space between two adjoining planks, is shaved to facilitate caulking. Cracks and joints through which water could possibly infiltrate, first need to be widened so that coir or cotton may easily be fixed inside. This has to be done before the actual caulking can begin.

Coconut coir

The gap between the two adjoining planks is filled with coconut fibre or loosely stranded coir. After enough coir is tightly rammed in, nails are placed on the outer edge to hold the coir in place.
The coconut fibre is sourced locally from parts of Cuddalore Old Town. A few families near the port work on producing the loose strands of coir used for kotias, which they bring to the yard. There is also a state cooperative (the Cuddalore Coir Workers Industrial Cooperative Society Limited) just a few kilometres from Thaikkal. The 2011 Thane cyclone destroyed a very large number of coconut groves in the district. Because of this and also because of competition from better equipped private companies in Cuddalore there has been a decline in trade for the cooperative. There were only five women workers present during our study, who sourced the coconut husks from the groves, soaked them from two to six days and fed them into the machine to produce coconut fibre.

Cotton

Cotton yarn is used to fill the small cracks on the surface of planks where thick coconut coir cannot be used. The plank joints above deck level and those on the deck are caulked only with cotton yarn. Another astonishing use of cotton is its being wrapped carefully around the nail heads before they are nailed into planks to compactly seal them. It is difficult today to imagine any other profession where such meticulous work at this scale happens. But it serves as a key to understanding artisanal practices before the industrial revolution, which involved concentration for long hours on such meticulous tasks.

Tar

A petroleum by-product called pichukatti, that resembles bitumen, is heated along with kungiliyam, a tree extract, and sometimes with animal fat, and is applied on all plank joints. The brushing tool is prepared by caulkers by attaching thick cotton braids to a long wooden stick.

Applying this hot tar solution can be seriously dangerous and one should be careful while moving and balancing on the scaffolding. The hot tar can cause serious burns; when one such accident happened during our research, the workers were told to wear protection, of a rather rudimentary sort.

Leppam

After the stages of coir, cotton and tar a paste called leppam is applied on all plank joints and on nail heads. In Cuddalore this paste is prepared from an extract from a tree called kungiliyam, heated along with neem oil or fish oil, a little lime to help it stick, a little white cement and, finally, some chalk powder is mixed in to get the desired consistency. The caulkers take a handful of the leppam paste, knead it well with their hands and carefully apply it along the plank joints and on top of nail heads. The leppam dries and sets hard on the surface of the hull. Like caulking with coir, the use of such a mixture is traditional. There is historical proof of its existence from fourteenth century China, for example, where 'a putty made of jute fibre, shredded bamboo, lime and tung tree oil (chu-nam)' was used. There is also archeological evidence that such a mixture was applied, exactly as today in Cuddalore, to seal the heads of planking nails.

Cotton and tar linings

Once the entire hull is sealed, attention is given to its bottom section, which will remain submerged under water. Three additional layers of protection are inlaid on top of one another to ensure the waterproofing of this important part of the ship.

Not all caulking mistris consider it necessary to dress the hull with fine cotton cloth, explaining that such a layer doesn't really protect the hull but just clings to the surface and may easily disintegrate in the sea. But the practice of applying a layer of rough cotton cloth (Kaada cloth from Cooptex) on the hull nevertheless continues. A layer of tar sheets is stuck over the cloth and the caulking process is completed with a final layer of aluminium sheeting.

Aluminium sheeting

The idea of protecting the bottom of the hull with metal dates back to antiquity. Lead was used initially but the practice widened after copper began to be used during the eighteenth century, in Europe and India. It is only recently that aluminium has replaced copper. In Cuddalore, however, animal fat with neem or fish oil was used as a protective layer for the hull bottom, as can be seen in the Persian Gulf, and it was only when aluminium became common that this was adopted in Cuddalore too.

Aluminium sheets are lighter and cheaper and make it easier to rub the barnacles off without touching the wooden surface. However, fixing the aluminium sheet can be tedious. The workers must begin by making holes in the sheet where not-so-strong aluminium nails will be fixed. Then comes the laborious process of hitting the aluminium sheets with wooden mallets to make it stick closely to the hull surface. This relentless banging is time consuming and the caulkers employ many common labourers to help them with this task.

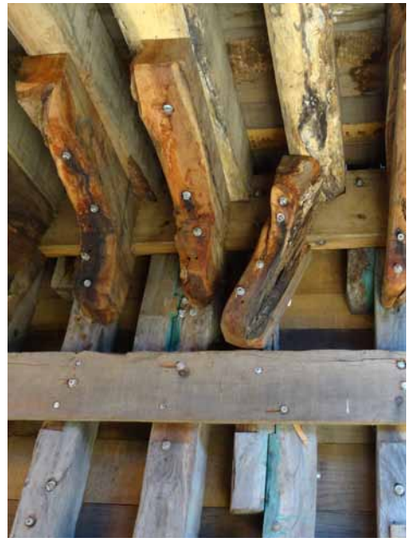
Once the caulking of the exterior is completed, some work on the interior of the ship is also carried out such as covering nail and bolt heads with leppam.

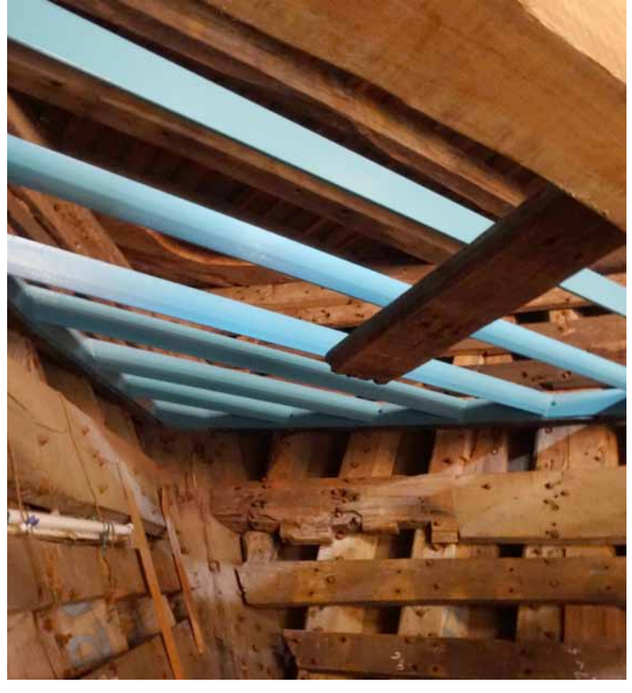

RBK

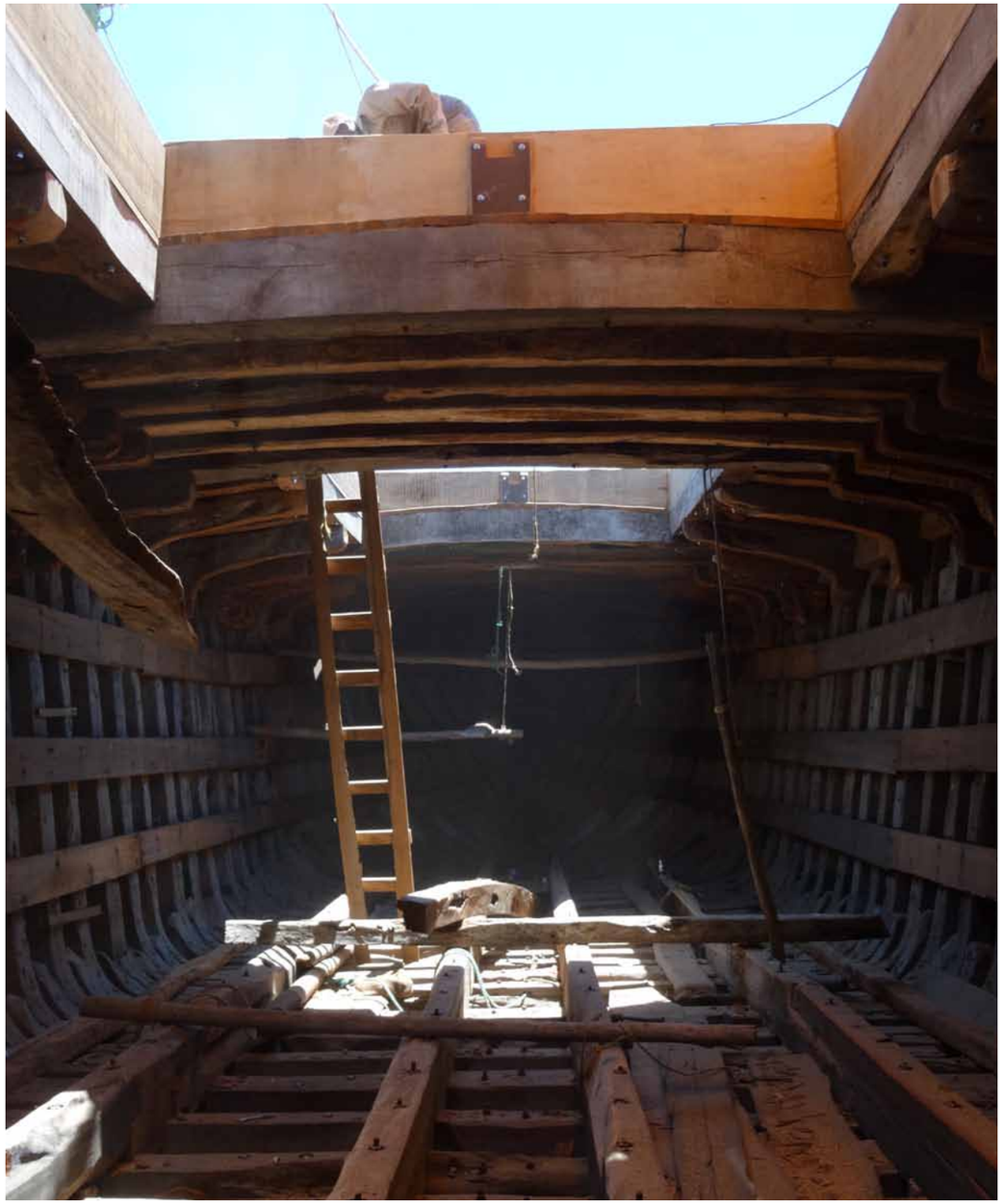
Interior Structure

The primary function of the interior structure of the kotia is to store goods that may vary from cement and steel to cattle. The interior structure should be made to carry the goods safely but without the goods endangering the vessel. Once the overall structure is made and the quantity of load that a vessel can handle is defined, and once the planking and caulking has been made to ensure it is water tight, the next task for the carpenters will be to plank and strengthen the interior structure of the ship. Many rows of planks are stitched horizontally with the number of internal planks varying from one vessel to another, depending on the owner's budget.

Four long beams of wood, locally called dockers, are fastened to the bottom deck. Different types of steel reinforcement may be also deployed nowadays along with deck frames to keep the hull shape from widening over the years. The interior aft section is further strengthened as it houses the engine and fuel tank, which means it carries a heavier load and should, as well, be able to handle the vibration of the engine.





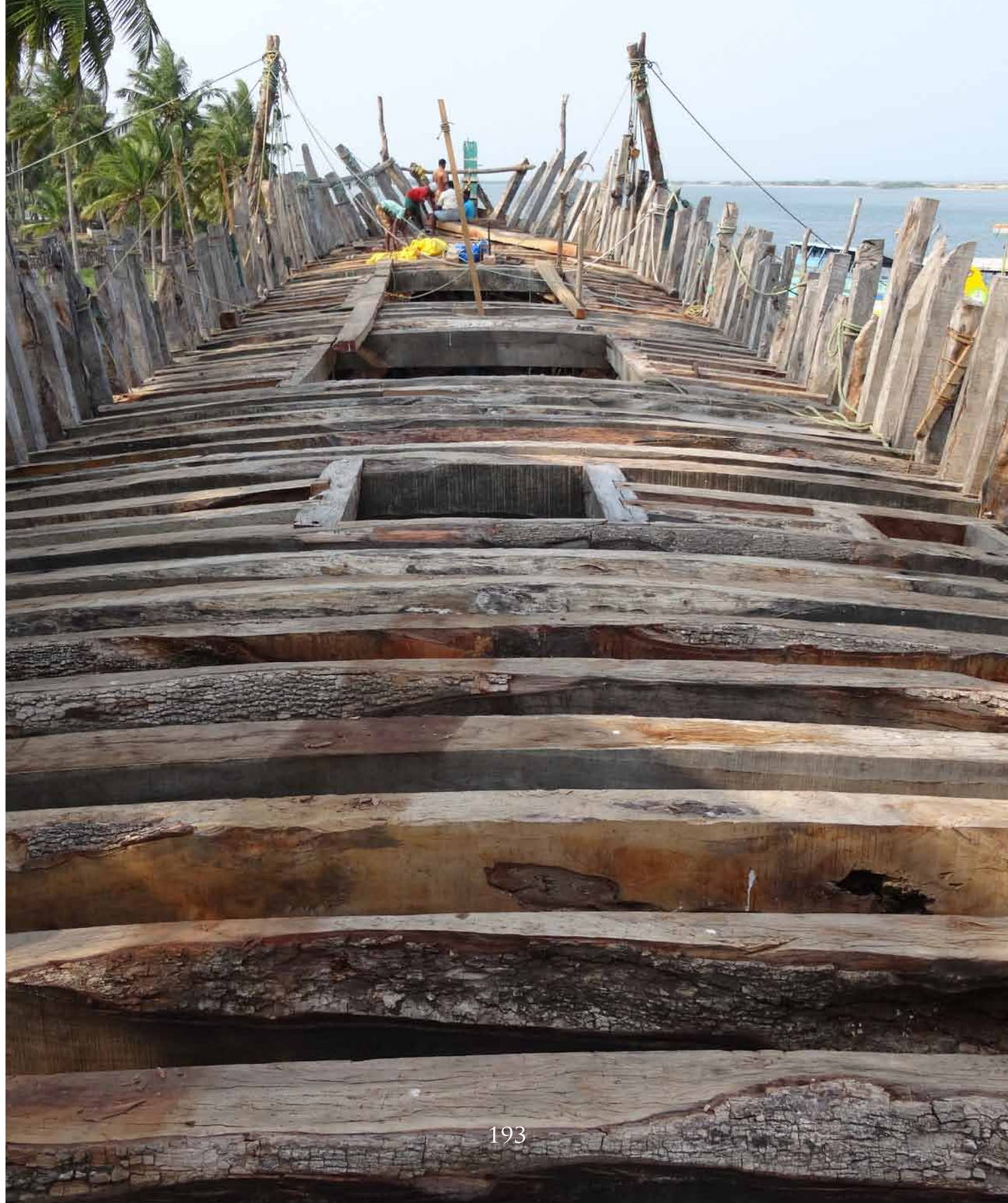


Deck

The structure of the ship can change even at the stage of decking. Kathiravan comments that *'there is a big difference between what is drawn on the scrieve board and what actually gets built. Things keep changing during every stage of building and what results may be completely different from what was originally planned and drawn for.'*

To give an example: the frames extending from the bottom can be further extended at the request of the tindal, who would like to have some additional manoeuvring height to easily load and unload goods. Or it could be the owner who would like to be really sure about the capacity or even increase it. So, the frames on top are pushed wide and held tightly together by the deck frames. These deck frames are levelled to evenly fit the decking planks, which are two inches thick. Hatches are finalised at this stage.

The decks of kotia have also evolved over time. The wooden barges or vattals had no decks. So, when the paai vattals evolved into kotias with engines, a deck was added both aft and forward. The lower deck was used for loading goods and the aft top deck to accommodate the crew; on top of this the cabin eventually came to be installed. The size of the forward deck was reduced because it was not considered as important by the shipbuilders.



Hatches in final stages of deck construction.

Facing page: Deck gets filled with equipment and ropes, getting ready for sailing.

Top right: A box hanging just outside the hull serves as toilet for the crew.

Right: Cabin designed often to the preference of the captain and the crew. Larger cargo hold made possible by the flat bottom of the hull is an important reason for their economic viability.

Cabin

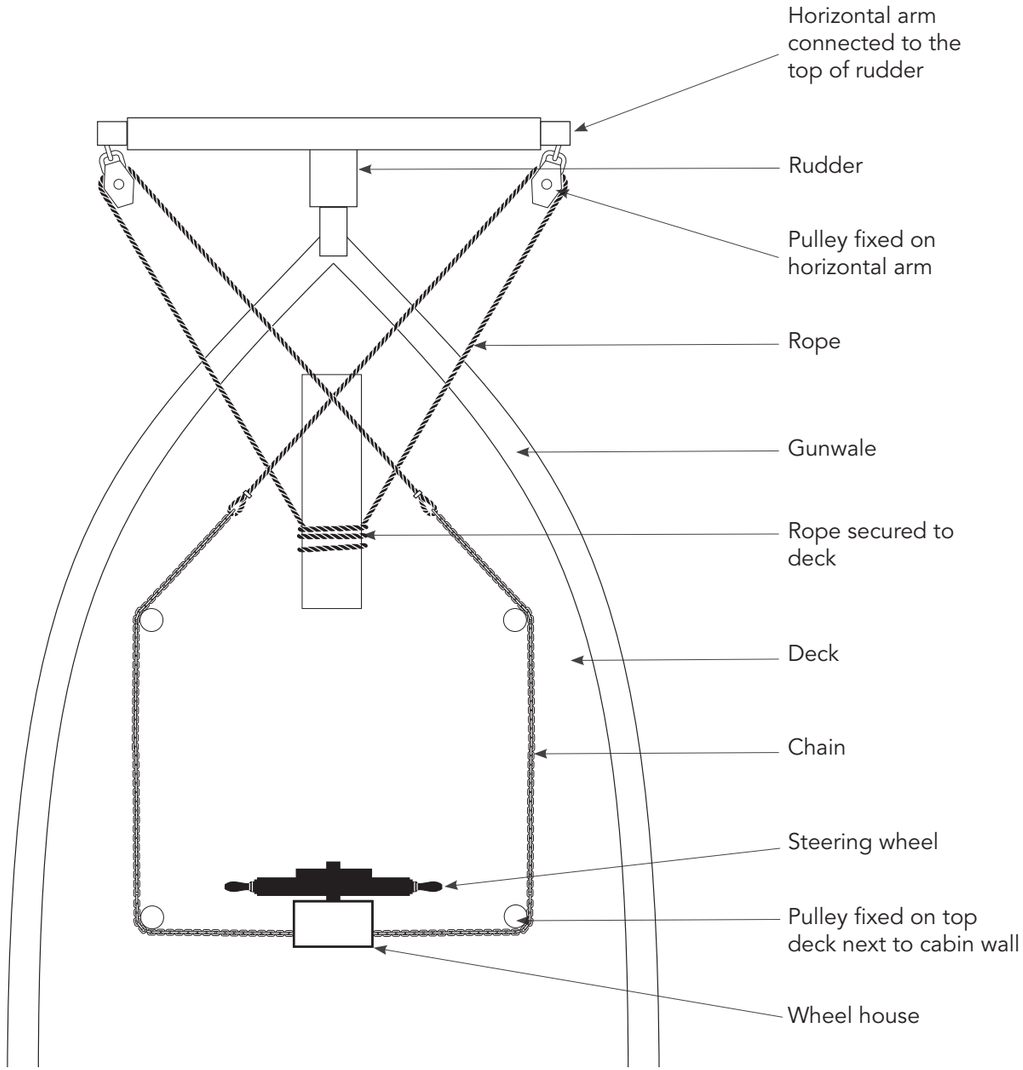
The poop deck cabin is one of the most visible parts of kotias today and is also its most recent addition. In Cuddalore, it was only in the late 1990s and early 2000s with the use of the steering wheel becoming common that wheelhouses were installed, which grew in size to become today's cabins. Some owners were resistant to this, apparently because it would make life easier for the crew on board and cause them to lose focus. Whether this is true or not, cabins have certainly become an integral part of the kotias.

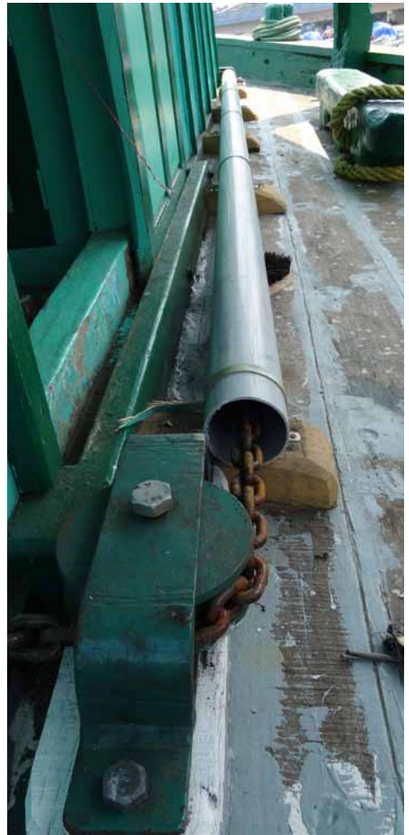
Cabins are usually made by furniture carpenters and not by those involved with shipbuilding. Mostly left over wood from frames is used and thick cardboard for walls. The whole cabin is covered with fibreglass and later painted. Sathish mistri who had built cabins for five to six kotias explained to us how he had progressively changed different aspects to make the cabin more spacious and comfortable. He had also tried vertically sliding in window doors instead of horizontal ones. We were able to witness how a tindal (Tindal Antony Ignaci) could be very particular indeed regarding his specific requirements for his vessel.

The rudder

The rudder assembly of a kotia is an imposing piece of carpentry made with a long and solid frame of wood attached to the stern. A strong iron pole is fixed to it that holds together three huge planks of wood constituting the rudder. A number of hinges are placed to rotate on the iron pole with clamps running horizontally over the rudder planks. The rudders of some kotias are fibreglass coated on the area where they will remain submerged. It was reported that a few kotias have been fitted with steel plate rudders but unfortunately we did not encounter any of these.

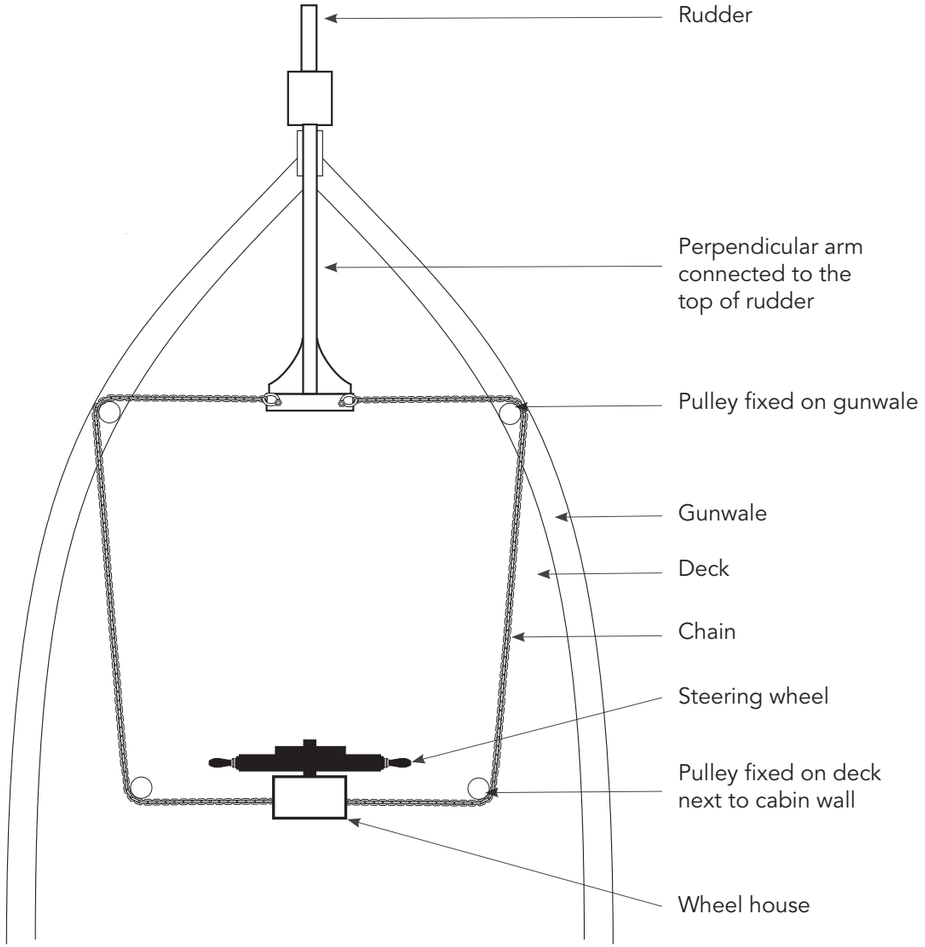
The rudder was initially operated with a wooden tiller log on the first kotias, similar to vattals and fishing boats. With the arrival of the steering wheel, two ways of controlling the rudder evolved, both with their own supporters. On most of the kotias, a horizontal wooden beam is fixed on top of the rudder, the two ends of which are connected with ropes and chains to the steering wheel, running down the cabin walls and into the wheelhouse. In some, an iron arm is fixed extending





Pakkiri Tindal, The captain of one of the kotia built during our presence, sitting on the horizontal beam on top of the rudder as he sets up the rudder mechanism.

perpendicularly from the top of the rudder; at the end of this, chains are connected to the steering wheel running down the cabin walls. No one we met agreed on the advantages of either method and it provoked a heated debate at the net mending social club of Thaikkal. In the former method with horizontal beam, the top of the rudder has a hole to insert a wooden tiller in case of any mechanical failure. The argument for the latter method, conceptualised by Kannan, a Cuddalore mechanic, was that the perpendicular arm is quicker to manoeuvre and can also be turned by hand similarly to the wooden tiller of olden days in case of mechanical failure.



An orange vertical iron arm protruding from the rudder (above), controlled by pulley-chain mechanism (left). Both techniques are in vogue.

The mast and the sails

While most of the thonis of Tuticorin had three masts, the sailing vessels of Cuddalore even in the 1950s never had more than two. Certainly, for a long time now, at least since engines were introduced they have all been built with only a single mast. Up to the 1990s, and for a few boats even in the early 2000s, their main function was to support an impressive array of sails, which could number up to twelve or sometimes even more. But nowadays, there is only one sail and it is used only occasionally or in case of engine failure. When we began our study in 2013, we met sailors who had been regularly using sail in complement with the engine to save fuel. Most of the older sailors speak with nostalgia about the old days of sail and complain about the laziness of the younger ones. Even today, some tindals claim that they use sail when there is a favourable wind, which not only helps save fuel but also enables them to reach their destinations faster; which in turn means more trips for the kotia.

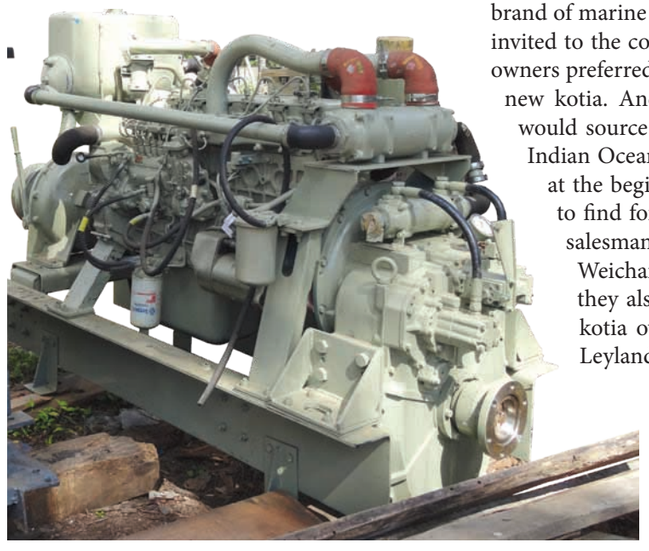
Three kotias at the quay in Thaikkal, Cuddalore.

Earlier, we mentioned the legal requirement to have a mast and sail to qualify as an indigenous vessel, exempting owners from employing formally qualified crew which would destroy the viability of this industry. But the masts, too, have pragmatically gained a functional role. They are used to mount derricks for loading and unloading goods as only a few of the harbours and ports that these kotias visit have the necessary infrastructure, such as cranes for loading and unloading. This lack of port infrastructure suitable for kotia trade is another cause of bitter complaint among the kotia owners.

Engine, shaft and propeller

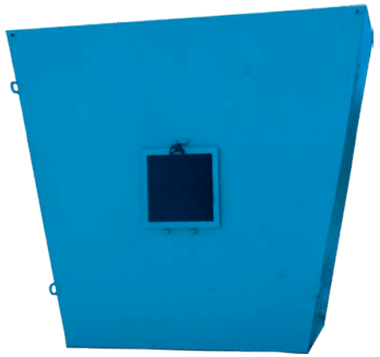
It is not difficult to understand why maritime historians tend to consider that the motorisation of cargo ships in the Indian Ocean signalled the end of an era. Yet the reality is more complex. In the case of kotias, the crucial fact that their best period of prosperity and profitability was the thirty years following motorization (1985 – 2015) cannot be ignored. Moreover, it should not be the use of sails and traditional vessels that holds the exclusive attention of maritime historians. It is certainly fascinating to observe—especially from an anthropological point of view—how the local people adapt fishing and cargo vessels for engines and also how they manage to adapt engines, if unable to obtain those best suited for their needs.

During the initial phases of the motorisation of fishing boats through state initiatives, imported engines such as Ruston & Hornsby, Meadows and Benz were found to be unsuited to local conditions, such as prolonged use with salt water or were not powerful enough. As Kannan of Mohan engineering in Cuddalore Old Town explained to us, some local mechanics adapted second-hand Leyland truck engines, recombining them with available gearboxes, customising the radiator to use salt water and deploying them successfully on fishing boats. Later the engine companies realised the market potential and adopted this design to manufacture their own brand of marine engines and spares. Some of the mechanics were even invited to the companies' research lab for product testing. What kotia owners preferred to do for a long time was to fit an old engine in their new kotia. And during their initial trips, whenever possible, they would source better foreign engines from their destinations in the Indian Ocean, especially from the Gulf. As also mentioned briefly at the beginning of this book, it has become possible nowadays to find foreign engines as demonstrated by the Chinese engine salesman we met earlier in the book. Chinese engines like Weichai are cheaper and more powerful than Indian ones but they also consume more fuel. So, most of the fishermen and kotia owners still prefer to buy indian ones, such as Ashok Leyland engines, even refurbished ones. It is another strong point in favour of Leyland engines, that they can be repaired, and refurbished easily by local mechanics and spares are readily available. Two of the kotias that were built at the time of our study were fitted with new Ashok Leyland engines despite the competition from Chinese engines.



The engine shaft and propeller are custom made for each kotia. The local mechanics make the shaft to the length specified by the mistri and he supervises the alignment of the shaft at the aft of the kotia. Propellers are cast in the foundries of Rameswaram and usually a three-leafed propeller is preferred over two or four leaves. Propellers can be a cause for concern as we saw on one new kotia where its propeller had to be recast; this was again done at Rameswaram, where the kotia stopped on its maiden voyage to the West Coast.

A huge trapezoid shaped diesel tank, coated with fibreglass of anywhere between 4000 to 7000 litres capacity is installed just above the engine at the aft. Another kotia owner preferred to use prefabricated plastic tanks typically used as home water tanks to save costs.



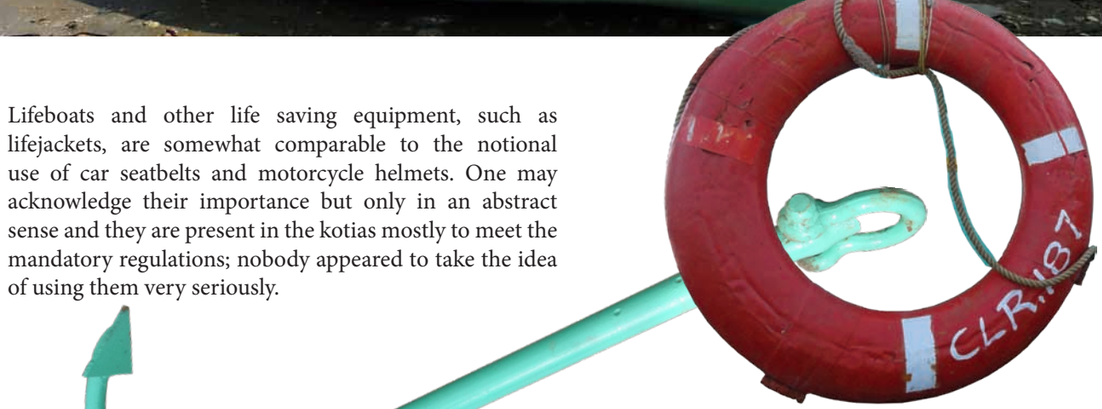
Mechanical equipment

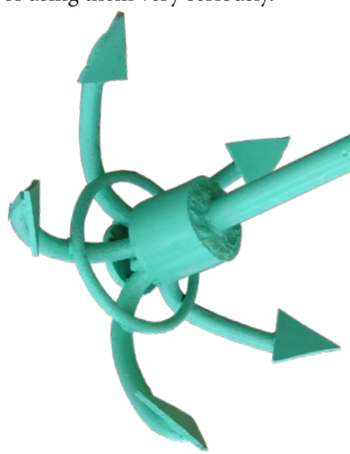
The mechanical equipment on board consists of a steering box set connecting with the rudder, derricks and winch with a small engine to operate it. The most significant aspect as regards the mechanical equipment is how it capitalises on the locally developed technical ecosystem mostly because of the importance of the fishing activity. This ecosystem of self-trained engine mechanics, fitters, lathe workers and various other associated technical craftsmen who are able to modify, recombine, reverse engineer or fabricate various mechanical equipment has long served the fishing fleets along the coast. It is because of this that the mechanisation of kotia became possible without huge costs. Most of the equipment could be sourced locally and customised to the exact specifications of a particular kotia.

Lifeboats, ropes, anchors

Making ropes with coir for use in boats is an ancient practice attested by early Greek writers. The biggest advantage of coir is its resistance to salt water, hence its use in the caulking process and in making heavy ropes, which are essential to maritime transportation. The coir is sourced locally and the ropes are made in local workshops, where a handful of women can be seen weaving them using elementary machines.

Lifeboats and other life saving equipment, such as lifejackets, are somewhat comparable to the notional use of car seatbelts and motorcycle helmets. One may acknowledge their importance but only in an abstract sense and they are present in the kotias mostly to meet the mandatory regulations; nobody appeared to take the idea of using them very seriously.

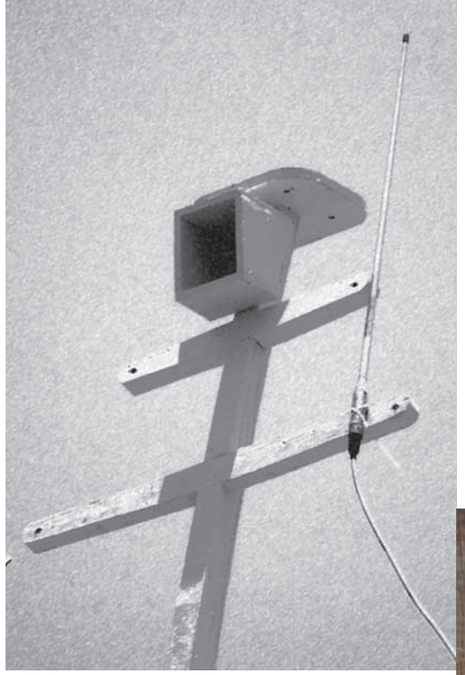




Like most other mechanical equipment, anchors are made by local blacksmiths and mechanics and there are generally two anchors, one big and one small.

Electronics

The basic items of electronic equipment that have appeared in succession are the VHF radio, GPS and more recently the automatic identification system (AIS). AIS uses a VHF transponder to transmit essential information about the vessel such as its registration, dimensions, tonnage, call sign and its navigation course, which helps to prevent collision with other vessels. This is particularly useful when kotias cross the lanes of very large vessels. These three pieces of equipment have largely contributed to the changes in the very nature of the work of the tindal, whose competence, nevertheless, remains an asset essential for the smooth running of the vessel at all times.



Painting and finishing

As we have seen, kotias can be built quickly within two years but, more often than not, it will take four to six years to complete one. There are even some kotias that may be abandoned mid-way and its frame sold off to be dismantled and its wooden pieces re-used in other kotias. So, when the work arrives at the stage of painting, there is a sense of great relief though it is a relief combined with anxiety about the next crucial step of launching the boat into the water and testing it on the sea, which is the real litmus test in the building process of a kotia.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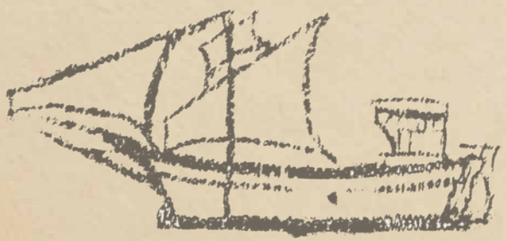


4

At sea

Empirical testing and bureaucracy

Sails and wooden hulls remain as the most characteristic features of the kotia today. If they continue to be present, it is not simply because of the long tradition or for economic reasons. These aspects are important but, as we have seen, they are intimately connected with legal and bureaucratic factors that have a direct impact on the survival of kotias. Without the sails and wooden hull the owners cannot capitalise, as they very well know, on the administrative niche from which these kinds of ship benefit and which play an essential role in ensuring their profitability. This does not mean the owners avoid an important number of administrative checks and regulations that any kotia must clear before it obtains the right to navigate the seas. Some of these checks are straightforward and essentially empirical in nature, involving a logic which is not purely bureaucratic and whose importance it is difficult to deny.

Perhaps the best example of this is the sort of administrative check made to ensure the impermeability of the hull; this is done in a rather concrete manner by partially filling the interior of the ship with water and splashing water on as much of the hull as possible. An inspector from the port authority is present on the occasion, whose task is to verify that there are no leakages in the outer hull and officially certify the clearance of the leakage test. This is basically an administrative test but it is also clear that it has a practical use and concrete implications for the ship, so the mistri watches the process rather anxiously.

Other administrative steps, however, bear a more ambiguous status. As is the case for one which plays an important role in the profitability of the vessel. An official will estimate a posteriori the capacity of the vessel in tonnage when it is filled to its authorised maximum, up to the load line. But given the irregular shape of the interior, it is a difficult calculation to make. Since the amount of port charges are directly dependent on the tonnage of the vessel, the owner wants to keep official tonnage as low as possible, with all the implications—sometimes slightly dubious ones—that it may have on the official estimating process.

Water testing in progress, revealing tiny leaks which are caulked well with cotton again. Water is released after a satisfactory testing of the hull is achieved.

Rituals and prayers

One cannot help but be impressed by the subdued sense of religion and also of tolerance among the different religious groups working together in Tamil Nadu or on the West Coast where kotias are built or repaired. In Thaikkal, as we have already mentioned, the largely cordial relationships between Hindus and Muslims are underlined by some Hindu features integrated into the dargah festival and by Hindus paying regular visits to the dargah. There is no better demonstration of this than the combination of the rituals that are performed during shipbuilding whenever people of diverse religions work together. This was the case with one of the kotias whose construction we closely followed.

The owner and his representatives were Christians, the master carpenter and all the workers on the building site, Hindus.

As the work neared successful completion, we were lucky enough to witness a combination of rituals of these two religions, organised before the launching. An interesting point to notice, however, is that the two rituals were clearly planned but also performed totally independently of each other.

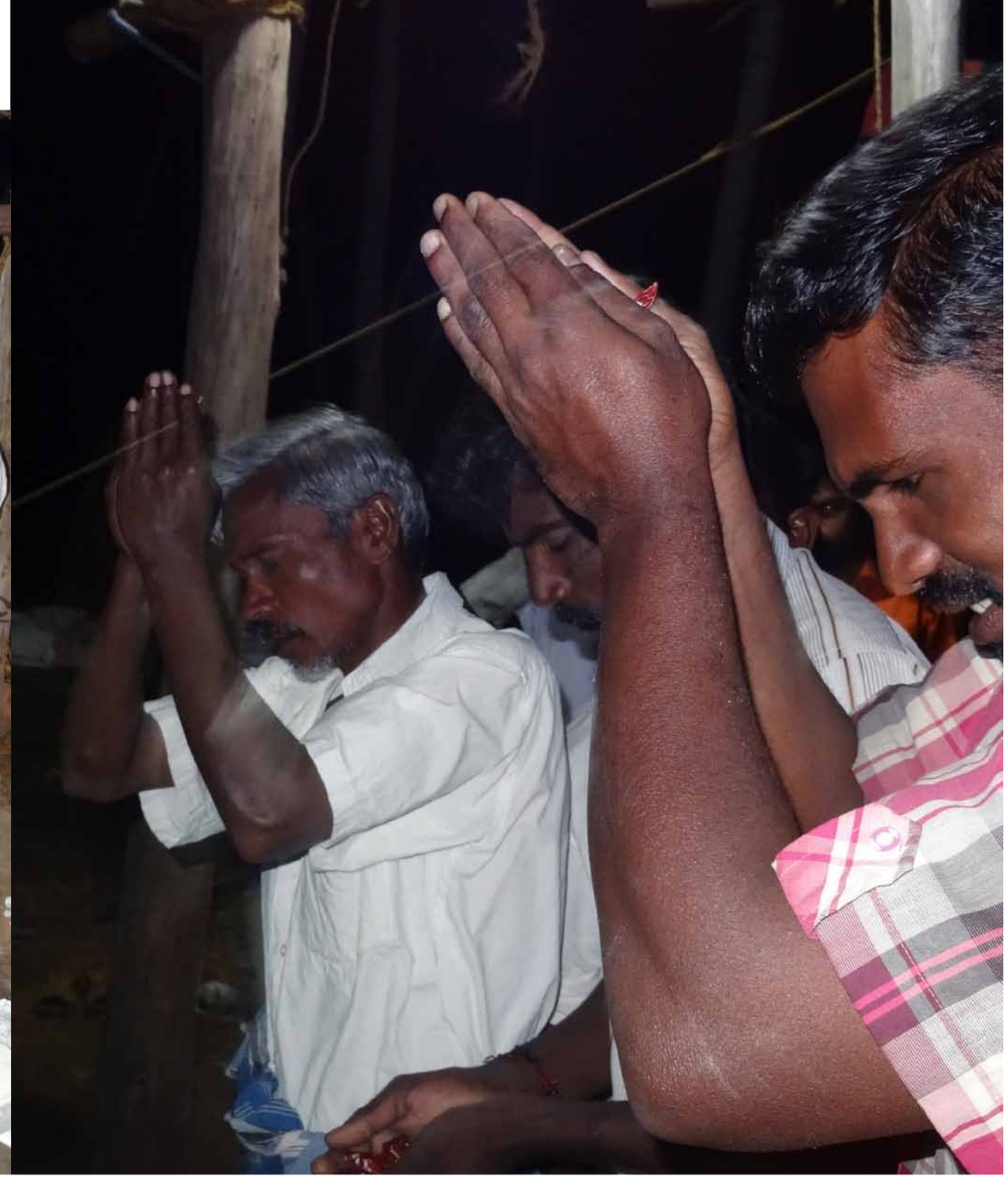
The first was done at night and was a Hindu ritual involving animal sacrifice. It was led by the mistri with the participation of the carpenters, all of them of the Hindu faith. Called theetu kazhippu or 'warding off impurity', it belonged to a very common family of rituals in Tamil Nadu, its purpose here being more specifically to protect the ship from any impurities, harm or evil which might be associated with the wood, from its felling to construction of the ship. Similar rituals are used for house building or carving a temple statue and, in fact, whenever wood is employed. As the carpenters explained to us, this ritual is necessary as wood is sourced from different places and there is no way of knowing what impurity or evil might have been associated with it in the forest. Moreover, as felling trees is considered a sin the ritual serves as a human apology for cutting them and a prayer for the casting away of all evils from the ship before it ventures into the sea.

During the ritual, a banana leaf offered with puffed rice, jaggery, dal, bananas, biscuits, rum, country cigar is spread in front of the keel along with a sandal paste cone representing divinity, a large pumpkin dotted with kumkum, lemon and a chicken to be sacrificed. The future tindal of the kotia is requested to place some token money with the offering. A fire pot is lit with camphor and all the carpenters take a fistful of salt and red chillies, wave it around their heads and around the ship and throw it into the firepot. The master carpenter, resplendent in a new dhoti, carries the

fire pot around the ship, followed by a carpenter with a long wooden stick who hits the wall of the ship with it as they go around it, as if to chase away all evil from the ship. The chicken is killed and thrown away and the fire pot is left in the river. Everyone wades into the river, washes their hands and feet, and sprinkles water on their heads as they walk back to the shore where a mixture of puffed rice, dal and jaggery is distributed to everyone.

The second ritual performed the following morning was a Christian one, which was led, this time, by a Catholic priest and patronised by the kotia owner.

The owner, Joe Villavarayar, his nephew and his second son, Celestine Villavarayar for whom the kotia was built has come from Tuticorin to participate in the ceremony. The site has been cleaned up and a makeshift tent erected with neatly arranged chairs set for the invited local village elders. A huge garland is hung on the stem and a bottle of holy water hung against it. A table is set against the stem with garlanded photographs



of Tuticorin's Our Lady of Snow with a sailing ship, and another of a sailor holding the wheel with Jesus guiding him in rough seas. The ship has been christened MSV JPV Star with registration number CLR 193, which has arrived in time. A Christian priest from a local church leads the prayer in Tamil along with the owner's family while others politely stand by watching. Some remnants from the previous night's ritual, such as the stuck cigar and cut lemons lie near the keel. The priest then goes around the ship sprinkling holy water with the tindal in tow. One more round of prayer for the safety and prosperity of the crew and the work is done. The priest and the owner's family make a cross with sandal paste on the stem. The village elders are invited to apply sandal on the ship and Ayyadurai draws the typical three stripes with a red kumkum dot its centre. Some take sandal paste in both their hands and slap it on the sides of the stem. Celestine Villavarayar, the intended owner, the tindal Anthony and the mistri Muthulingam climb on to the deck and pour water and milk on the stem. The priest breaks the hanging holy water bottle against the stem, the owners distribute clothes as gifts to the actual mistri, then to the former one, and all the carpenters, assistants, ironsmith and the cabin maker and to those who have supported them during the process, such as Ayyadurai and Kathiravan mistri. The owners politely salute everyone, thanking them for participating in the ceremony and leave the site.

What is fascinating in both cases, is not only the fact that Hindus take part in Christian rituals and vice versa without any problems but, that there may, as well, be some sort of fundamental structural complementarity between the two rituals.

Top: Celestine Vilvarayar drawing a cross on the bow.

Above: Ayyadurai applying sandal paste on the side of the bow.

Right: Priest sprinkling holy water around the hull.

As was famously shown by Van Gennep, most rituals combine three successive phases. The first is to separate someone or something from its past, the second corresponds to a liminal state and the third one is a process of reintegration by conferring a new form of identity on the person or object that is at the core of the ritual. So here, while it may not be deliberately intended as such, the two consecutive ceremonies seem to perfectly emulate this very logic. The Hindu ritual of the night before had all the main features of a ritual of separation from the past, the intervening night may be related to the liminal state; the Christian ritual on the following morning had all the features of integration with the ship acquiring its new identity.

Independently of their details, it was also noticeable that such rituals had an ecumenical character. Not only were the Hindu carpenters and village elders invited but they participated by adding typical Hindu symbols onto the ship during the Christian ritual. Moreover, in another instance we were told that until recently the fishing boats and kotias of Thaikkal flew a small green flag blessed at the dargah as a symbol of protection.

Various methods of launching ships

As our reader may now realise, building a ship is clearly an intricate and laborious process. Paradoxically, however, there is a wide consensus among shipbuilders that the launching of a vessel may well be the most risky and complex task of all, as whole years of careful labour might be endangered in just a few fateful moments.

This explains the well-deserved fame of the Mappila Khalasis dockyard workers we mentioned earlier. Natives of Beypore and the surrounding areas on the West Coast of India have for centuries been reputed for their astonishing expertise in launching ships of hundreds of tons and heavy materials with the help of only a few wooden rollers, winches and pulleys. Ethnographers have also documented the famed songs, which traditionally accompanied their work. Thes dockyard workers may only rarely be seen in action today in Kerala, most of them having shifted to less demanding and more remunerative professions.

Unfortunately, however, the shipbuilders of Tamil Nadu could not draw upon the kind of traditional expertise of Mappila Khalasis, so, whether in Cuddalore or Tuticorin, they often had to improvise new ways of launching the ship into the water. As we witnessed, in spite of all the care and good will in the world, the process was anything but smooth.

Some well established techniques to launch a ship

Whether they are standing parallel or perpendicular to the bank of the river, even if just a few feet from land, there are only two methods of launching a ship into the water, considering the fact that the ship may weigh anywhere between 300 and 1000 tons. An attempt may be made to push it but, because of the weight, this is easier said than done and is, in fact, nearly impossible with a ship like our kotias. A more realistic way to launch it is by pulling it into water over a slideway. Though this may seem a more realistic option, it's not exactly obvious; considering the weight of a kotia; it implies, at least, two preconditions.

- the surface over which the ship will be pulled should be sloped just enough so that after a certain point the vessel can slip into the water under its own weight

- the second and the fundamental precondition is that the surface should offer the least possible resistance while the ship is being pulled.

In the absence of slipways and dry docks, this method that has been used since antiquity to displace heavy loads is by pulling them on wooden rollers and this method is still used in India. In order to do this, a series of successive steps has to be carefully followed.

To minimise the displacement the ship is moved onto the groundway parallel to the bank of the river. The first step is to build a temporary slideway made of wooden planks, to the keel from the bottom of the vessel inclining into the water. On top of this slideway a series of wooden rollers are placed parallel to the keel. On top of the wooden rollers two enormous wooden logs are placed at the two ends of the keel perpendicular to it. The ship will then rest completely on these two logs and the whole setup will resemble a sort of giant sled. Strong iron ropes or chains will be tied to the two enormous logs. Now comes the stage of pulling the two logs carrying the ship into the water.

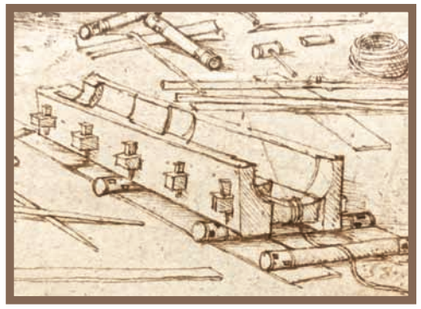
The first precaution to take is to tie the ship with ropes around it to a support on land so that it does not accidentally jerk or slip while being pulled. All that then remains to do is to pull the wooden logs a little in the hope that this will give sufficient impulse for the ship to slide on the slide way. But a new difficulty arises: from where can the boat be pulled if the destination is only a water body just in front of it? As will be shown, there are different ways to solve this problem.

A possibility is to select a building site on the bank of a river, which is not too wide so that the ship can be pulled from the other bank. If this is not possible, another option is to install a sufficiently strong and stable object in the middle of the river, hoist a pulley and pull from the same bank. Obviously, the difficulty is to find and install an effective object that is sufficiently strong and stable. Once that's done, the ship still has to be put into the water. The traditional way to do this is to use a winch turned by hand by as many people as one can collect and afford to pay. If all the preparatory stages are properly done, it requires less physical strength than one would imagine but, for it to be less of a strain, it is necessary to possess the kind of know-how in which certain communities like the Mappilas of Kerala have long specialised. If one is pushing the ship rather than pulling it, however, better pray for luck, as there are no standard methods for doing this and a lot of ingeniousness and hope are needed. Finally, whatever method is employed, it is lucky if, after a few days or nights of work, the ship is in the water and in one piece.

Urus and yachts in Beypore

Using only winches and rollers for launching the ship was considered an 'archaic' way in fourteenth century Venice. But when we witness the technical skill and the economy of means with which such a technique is still used today, we are struck by the technical ingeniousness and resourcefulness involved. As a matter of fact, the shipbuilders at Beypore tried at some point to replace the traditional method with a mechanical slipway, but it was abandoned as it was not nearly as efficient.

Simple wooden rollers are a common feature on both the coasts in the launching of the ships. Some are rolled with iron cover for strength and protection.



Below: An uru being launched using the traditional winch method in Beypore.

Tuticorin

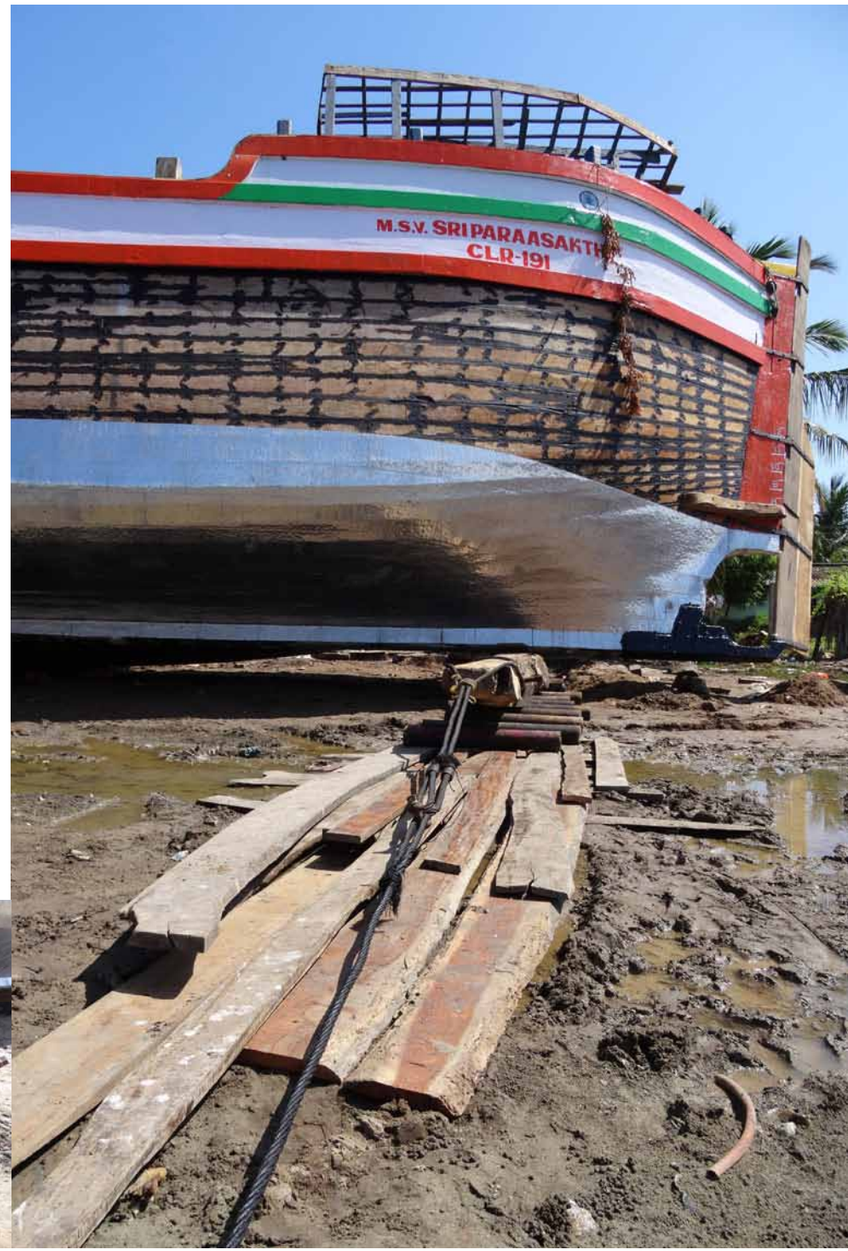
To have an old wreck of a thoni lying in the waterfront of a port is rarely considered a blessing but in this particular case, the traditional shipbuilders of Tuticorin saw it as a real asset as it allowed them to use it as a 'sufficiently strong and stable' object in water in which to stow the pulleys and ropes used to pull their ships into the sea.

An abandoned thoni is used as an anchor to help in the launching process at Tuticorin.

Cuddalore

In this case, an advantage is that a winch could be set up on the opposite bank of the river to pull the ship into the water.

Note that, like in all the other methods, the bed of wooden rollers play a decisive role to slide the kotia into the water.



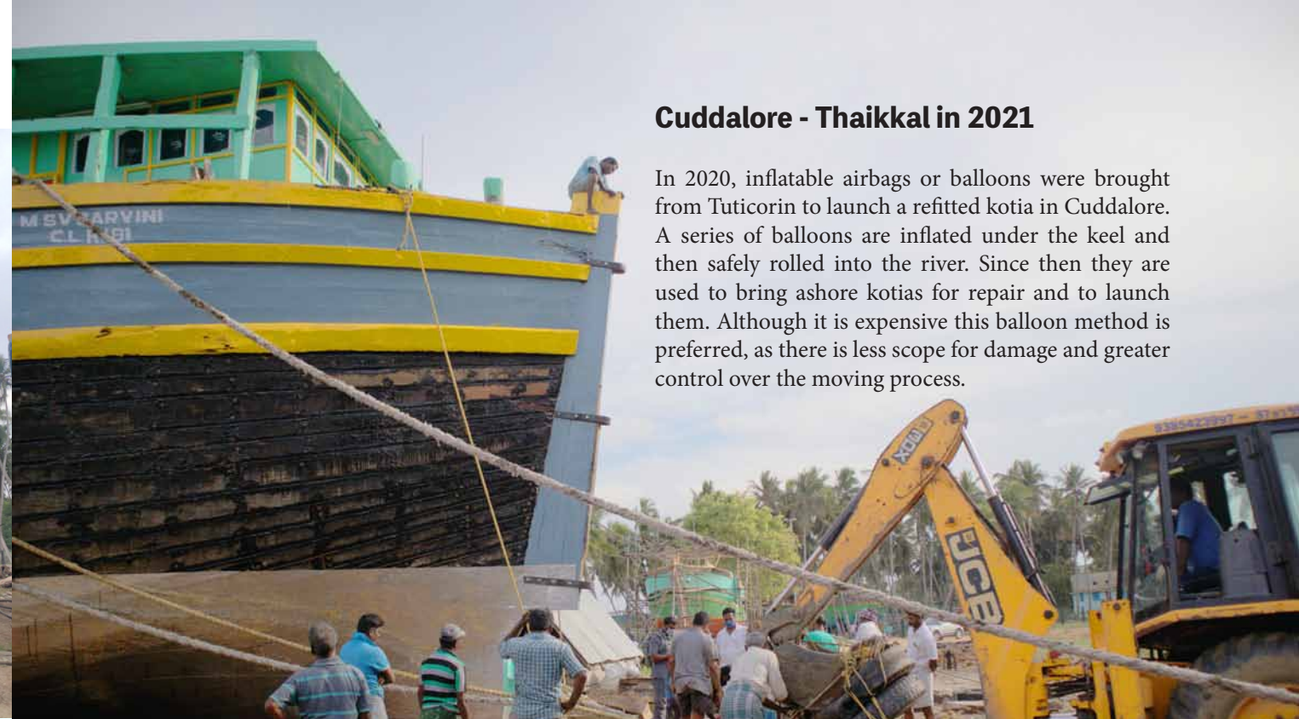
Cuddalore - Thaikkal

Launching a ship of such dimensions will always be tricky, even in the best of cases but, in this particular case, it is a pity not to have made a documentary film, a theatrical play or a book of photography to capture the whole drama of the 36 hours needed to launch the ship of our friends Stanley, Antony and Joe Villavarayar. On the first try, it was pushed into the water with the help of two earthmovers with many helpful ideas sprouting up constantly. Danger was very much in the air: the danger of severe damage to the hull or that of submersion of the earthmovers. And when, after two long days of effort, the ship was finally lying on its side in the water, everyone was anxiously watching for it to straighten up and float on the high tide.

Since there was no convenient space to place a winch as the opposite riverbank in Thaikkal was too far and a mid-water tree anchor (as was the practice) would be too tedious to set up, Kathiravan mistry decided to try a new method of pushing the kotia into water rather than pulling them with a winch-roller mechanism. He hoisted the kotia on two main logs with rollers beneath them leading into the river which was only 15 feet away. He decided to experiment with earthmovers for pushing the two main logs. First he ordered for just one of them but finding that it wasn't enough, he ordered for two, each for one of the main logs. But as the main logs inched slowly into water, it became difficult for the arm of the earthmovers to reach the main logs at the bottom which were submerged by then. With earthmover breakdowns, not enough light, with many shouting conflicting impromptu ideas, cursing the new idea of the mistry but still jumping into water to complete the launch, it was a scene of chaos but coordinated intense work which did launch the ship safely into water. Kathiravan mistry mastered this technique with a second launch, that of our model kotia a few months later.

Cuddalore - Thaikkal in 2021

In 2020, inflatable airbags or balloons were brought from Tuticorin to launch a refitted kotia in Cuddalore. A series of balloons are inflated under the keel and then safely rolled into the river. Since then they are used to bring ashore kotias for repair and to launch them. Although it is expensive this balloon method is preferred, as there is less scope for damage and greater control over the moving process.



First trip

Once the ship is launched safely into the river in Thaikkal, everyone's focus turns to taking it to the West Coast as soon as possible to join the trading season. Before that can be done, the ship has to be taken to the port premises for various inspections and to obtain clearances for sailing. A big fishing boat tows the kotia from the Paravanar River in Thaikkal and enters the Gadilam River at the nose point of the confluence of two rivers. In a way this small trip of about a mile is by itself a test on how the kotia has been built, its stature, navigability, buoyancy and the levels of submersion at forward and aft. It is a short but tense time where everyone pitches in to ensure a safe passage through the river. It is also the moment the captain (tindal) assumes responsibility for the kotia for the first time, directing it to the port.

Once the clearances from the port authority are obtained and the crew recruited the day of the maiden voyage is fixed. The family of the owner is generally present for a small ritual and sweets are distributed to everyone. Mechanics arrive to do a last minute check on the new engine. After everything has been verified, the kotia is towed by the fishing boat out into the sea. As a trial the kotia first travels north for a few miles while the engine is throttled to check its performance, after which it turns around to travel south on its maiden voyage. During such a trial of our model kotia, it was discovered that it could not, unfortunately, achieve more than 5 knots of speed. It was difficult to determine whether this was an issue with the engine or the angle of the blades of the propeller. But the captain (the tindal) decided to go ahead with the maiden voyage and the owner arranged for a mechanic to inspect the engine at Nagapattinam on the way. Similarly, another kotia that we followed had an issue with the propeller, too, and it stopped at Rameswaram, on its way to have its propeller recast in one of the foundries.

A tense beginning for Pakkiri Tindal on the maiden voyage from Cuddalore to West Coast.

Another aspect that must be taken into account during the maiden voyage is the crossing of the Pamban bridge in the Palk straits. The Pamban railway bridge has a manually operated double-leaf bascule which is opened on request and for a fee on specific days for the passage of ships. So, the kotias try to travel together to share the fees and time it exactly to be there on the day the bridge will be opened. After crossing Pamban, the next challenge is to cross over the Cape at Kanyakumari (Cape Comorin), the southernmost tip of peninsular India. As a meeting point of Bay of Bengal, Indian Ocean and the Arabian Sea, the currents can be strong and when a kotia is empty it may roll a lot in this area. Once this crossing is negotiated the kotias enter the West Coast looking forward to starting their long lives as cargo ships.

MSV Sri Parasakthi CLR 191 on its maiden voyage to West Coast.

Timing to cross the Pamban bridge always figures as a factor in deciding the departure date of the ship. So much so on its maiden voyage, that it merits a photograph for the owners of the Tuticorin kotia built in Thaikkal.

Historical knowledge about thonis

James Hornell

James Hornell (1865-1949) was a colonial administrator but was also among the most dynamic and endearing scientists of his time in marine biology and shipbuilding history. He was one of the leading scholars in this domain to highlight vividly the importance of looking beyond the West in order to make sense of naval history; and he acquired, among his other activities, an extensive knowledge of the local traditions of shipbuilding in the Indian subcontinent, and more particularly in South India. While he referred briefly to the existence of the traditions of the ships that are studied here, he was not especially interested in them because he did not find them sufficiently emblematic of existing indigenous traditions. He thought that some of the features of the thonis had been initially inspired by British lighters introduced by the English in Thoothukudi, while acknowledging, as well, that such foreign features had been progressively modified and indigenised over time. More significantly, however, he suggested that it would be difficult to find a better opportunity for observing 'the successive steps in the evolution of a new and dominant type of craft'. And in many ways, this is precisely our objective in reconstituting in this book the history of the Kotias and Thonis of Tamil Nadu (Hornell 1923; 1946).

Clifford W. Hawkins

We owe him the only detailed ethnographic description available on thonis in the 20th century. He investigated them during the second half of the 1970's, at a time where thonis had not yet been motorised and still used sails exclusively. He gives in his writings some interesting details on the manner in which they were built. One of the main interests of his description is that it shows how little difference there is between the construction of thonis at that time and the way kotias are built today. The making of the hull as well as the caulking of the ship seem to have been very similar to what we have been witnessing ourselves. Perhaps the only noticeable difference is the fact that no heat seems to have been used at the time for bending planks for the sidewalls of the ship; and different sorts of wood were used for the construction of the ships: Karumarudu, a very hard sort of wood was used for the keel, the stem post and the stern; venteak, an inferior sort of teak was used for the planking; and, apparently, no fewer than 400 babul trees (for a 300-ton thoni), which somewhat resembles acacia, were used for the general frame of the hull. Hawkings gives other interesting details—mostly only of historical interest nowadays—on the rigging and the sails of the actual thonis which could have had up to twenty (some even say thirty) sails at the time; and it is also interesting to learn that 15 sailors on average worked on each thoni and that some of the ships had up to four masts. Hawkins also gives some information about the history of the development of thonis at Tuticorin and the coastal trade with these ships up to the 1870's (C. W. Hawkins 1965; 1977).

The other place - Tuticorin!

Cuddalore people see the development from barge to kotia which took place in their vicinity as a unique episode of local history. But, as we discovered later, a quite similar history had, interestingly, happened in Tuticorin which is situated 300 km south of Cuddalore before it happened in Cuddalore.

Thoothukudi, still known today as Tuticorin, is a very ancient port, having been involved from antiquity with pearl fisheries and maritime trade. Then, after being part of various Hindu kingdoms (the Pandyan Kingdom, in particular) it was taken over by the Portuguese during the sixteenth century, then by the Dutch during the seventeenth century and, finally, the British from the beginning of the nineteenth century before it was acceded to Independence with the rest of India. Nowadays, it is one of the most important deep water ports of South India and a big town. It retains, amongst diverse public buildings and monuments, a great number of churches and an influential Christian community, composed of a vast majority of Catholics and including a small Lutheran minority and an increasing Evangelical community. Many Christians in Tuticorin belong to the Paravar community and have traditionally been involved with sea related activities, whether as fishermen, marine carpenters, sea traders or prosperous ship owners.

Most significantly from our point of view, fishermen's communities in Tuticorin have been involved—not unlike as in Cuddalore—in the barge business, which developed progressively during colonial times, and picked up in particular during the first world war. However, when it began to decline after this period, the most enterprising owners of barges started to extend their business by increasing the size of their ships and by developing trade with Sri Lanka and then along the western coast, in exactly the same way as they would do this in Cuddalore a few decades later. While such trade existed before that, the barge owners of Tuticorin managed to compete successfully with the traditional traders and ship owners who had practised it for centuries, either on the trade road to Sri Lanka or on the western coast. There also, as in the case of kotias, their main asset for succeeding in this new venture resulted mainly from the very nature of the ships they used. By simply increasing the size of the sort of lighters they had previously been using for transporting goods and people from the cargo ships to the quay, they built a new type of ship which, though certainly not ideal for navigating in deep seas or rough seas, nevertheless had two or three decisive advantages: they were much more solid than the other ships that plied the same sort of trade and could carry a bigger load. And they were also, because of their flat hulls, able to dock in ports to which most other ships didn't have access.

The decline at Tuticorin

If we have not mentioned the thoni industry in Tuticorin before in this book, this is because the building of Thonis began to decline at the end of the 1990's and—with the exception of a small revival when three new ships were built in 2007—none were any longer being built when we began our study in 2011. Given the lifespan of these wooden cargo ships (up to 60 years for the older of them) this however does not mean that they have completely disappeared; there are still many in circulation nowadays. Consequently, while Tuticorin ceased to be a shipbuilding centre quite a long time ago, it remains, nevertheless, an important locus for repairing and refitting thonis and parking them during the winter season.

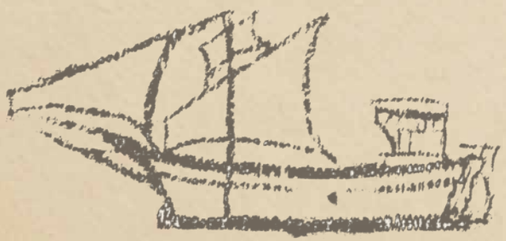
The Villavarayar Family

Eminent members of the Christian fishing community in Tuticorin, the Villavarayar family is a dynasty of ship owners and maritime agents whose commercial activities go back at least four generations to the creation of their familial enterprise, Vilson Shipping Private Limited, in the nineteen twenties, nearly a century ago.

The founder of the dynasty, J Ponnusamy Villavarayar, was known as 'the sea king' at the beginning of the twentieth century when he was said to own one hundred barges or more at Tuticorin. A bit like Ayyadurai at Cuddalore, he was the one of his family to play a decisive role in the progressive development of the coastal thoni industry in this port.

The family knew how to evolve with the times: from the creation of a deep-sea port in Tuticorin in mid 1970s where they nowadays possess their own terminal, they became one of the most important maritime agents of the town and of Tamil Nadu.

The paradox, however, is that while they unreservedly embraced the new technological and economic development in maritime transport, they retained some economic and sentimental investment in the thoni. Jesiah Ponnusamy Joe Villavarayar, the head of the company, offered a thoni to each of his three sons. Although he insisted that his main reason for doing this was linked to his attachment to their familial tradition, he did not hide the fact that he would not have done it if he had not thought it likely to be a profitable venture. He was no longer so sure, however, about this last point when we met him in 2014. As he explained to us, it was then too late for him to end the tradition, and he would deal with it no matter what.

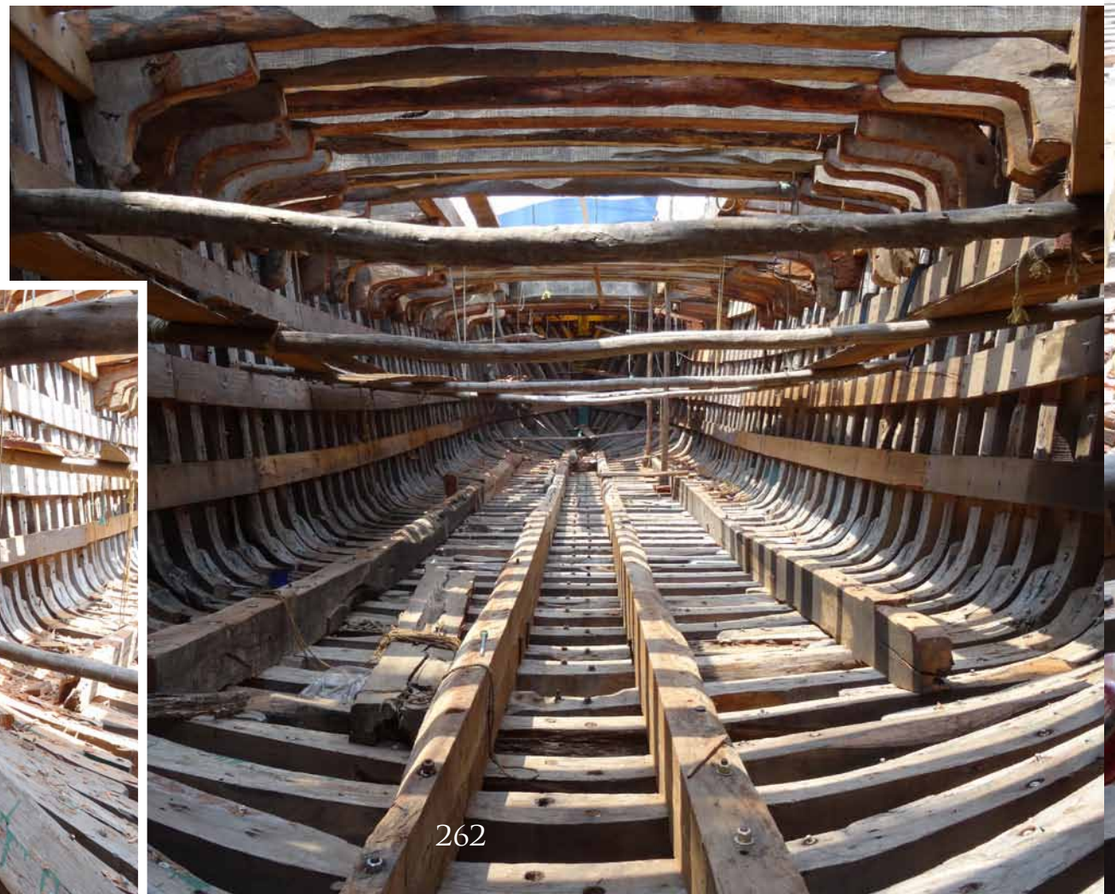


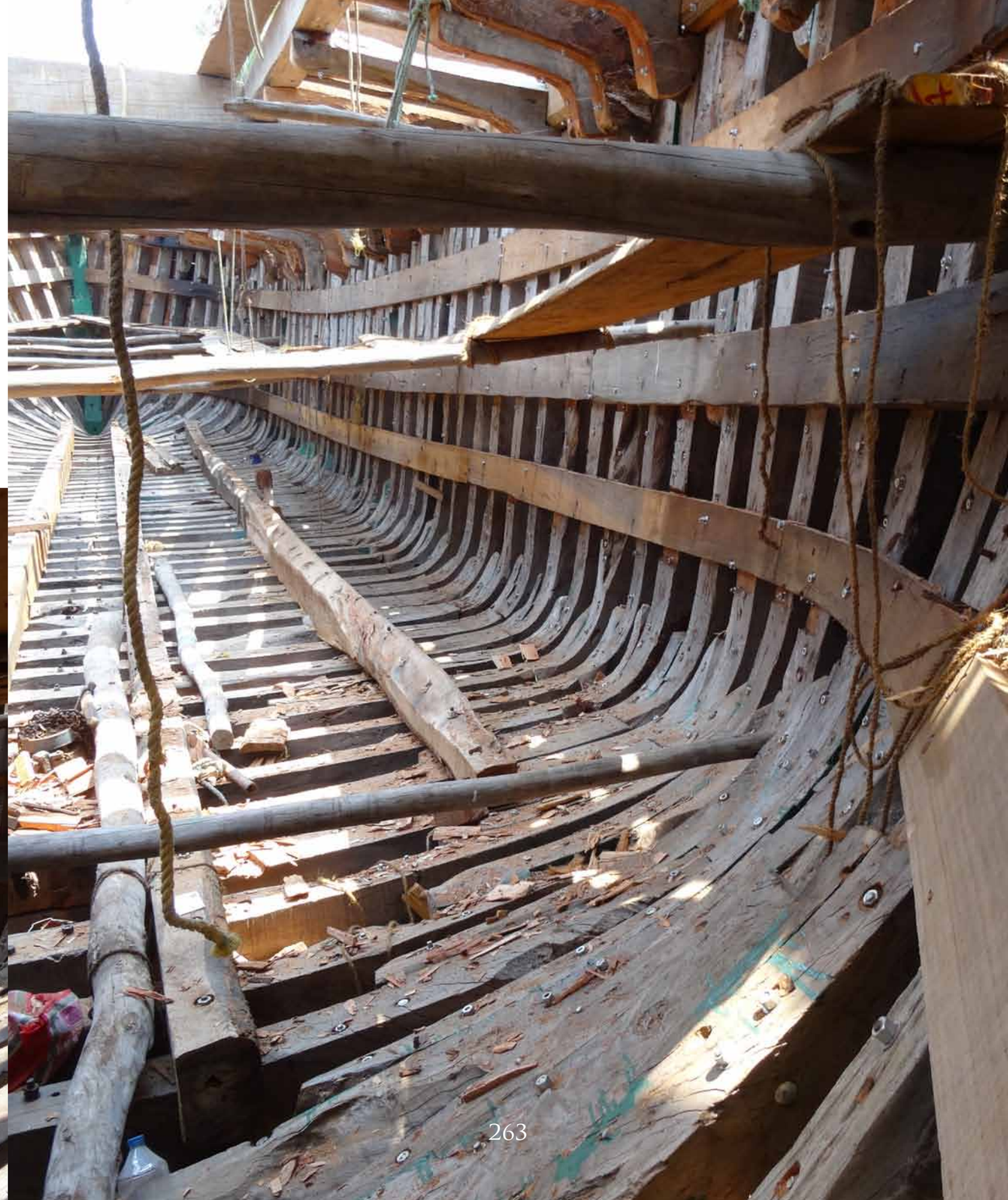
5

Visual intermezzo

Hidden Masterpieces

It was only when Notre Dame de Paris burnt that most people realised that an extraordinary masterpiece had been irremediably lost. What people had failed to recognize up to the event was the existence of a magnificent wooden framework which had been covering the main nave, dating back to the thirteenth century and fundamentally unchanged from then. A curious parallel can be drawn with today's kotias, which, having lost their magnificent sails, may look at first sight relatively mundane. Yet, as in Notre Dame de Paris, they hide behind their wooden planking incredibly spectacular pieces of work, which are their wooden framework. We hope that the following images will do them some justice and that, in contrast to the wooden framework of Notre Dame de Paris, these few photographs will not be destined to speedily become only a historical archive.

























People






JCB
SAHARA
INDIA







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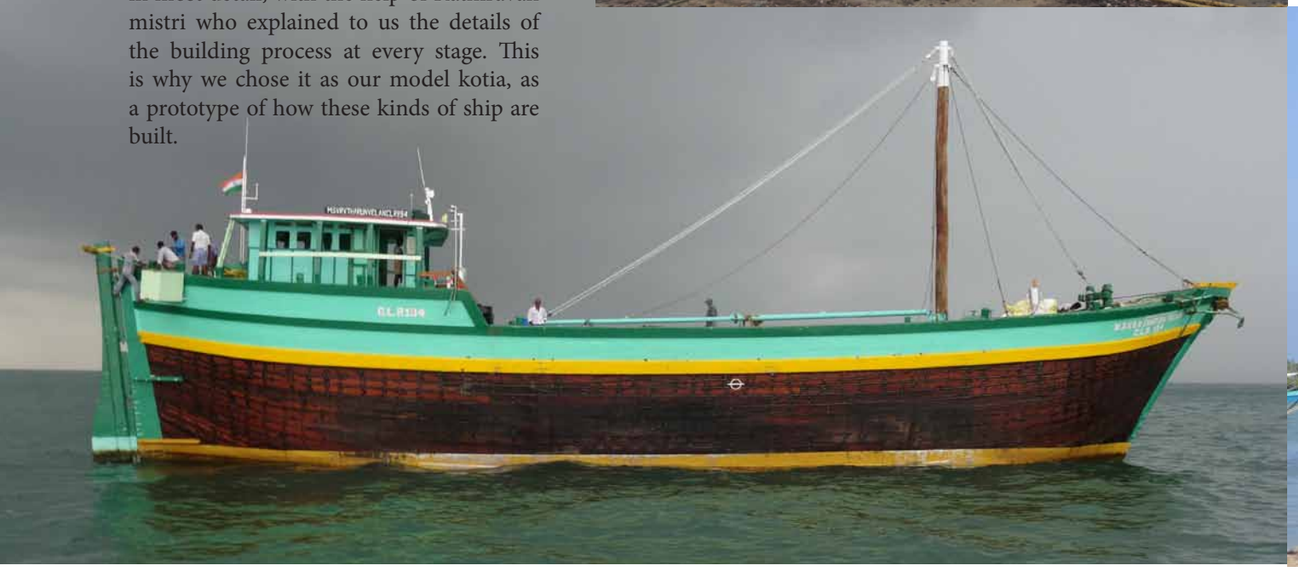
KOTIAS AND THONIS

CLR 194

CLR 194 MSV RV Tharun Velan owned by Mr. A.R.Velavan of Devanampattinam, Cuddalore conceived and supervised by Kathiravan mistri in coordination with Mr. Ayyadurai of Thaikkal, father-in-law of the owner. Began in 2013 and launched in September 2014, it is active today.
Originally conceived and its building started in 2008 for Chandrasekar an owner of another kotia, its completion had to wait for a few years because of lack of space on the riverbank at a time when the kotia business was flourishing. The first owner sold it in 2011 to Velavan, another ship owner, who dismantled it and decided to build a completely new one out of it. It is the building of this ship that we followed in most detail, with the help of Kathiravan mistri who explained to us the details of the building process at every stage. This is why we chose it as our model kotia, as a prototype of how these kinds of ship are built.



CLR 193

CLR 193 MSV JPV Star owned by Mr. Celestine Villavarayar of Tuticorin supervised by Subramaniam mistri and later by Sokkalingam mistri in coordination with Mr. Stanley and Mr. Antony Ignaci. Begun in 2007 and launched in April 2014, it is active today.

It was through meeting Antony Ignaci and Stanley, who supervised the building of this ship for its owner in Tuticorin, that we were introduced to the subtleties and complexities of building a kotia.

CLR 191

CLR 191 MSV Sri Parasakthi owned by Kathiravan of Singarathoppu, supervised by Kamaraj mistri. Begun in 2008 and launched in 2014, it is active today.

The owner and the mistri of this kotia also helped us greatly in understanding their trade and techniques. It was by observing its launching with the winch that we first understood how crucial the process is.

CLR 183

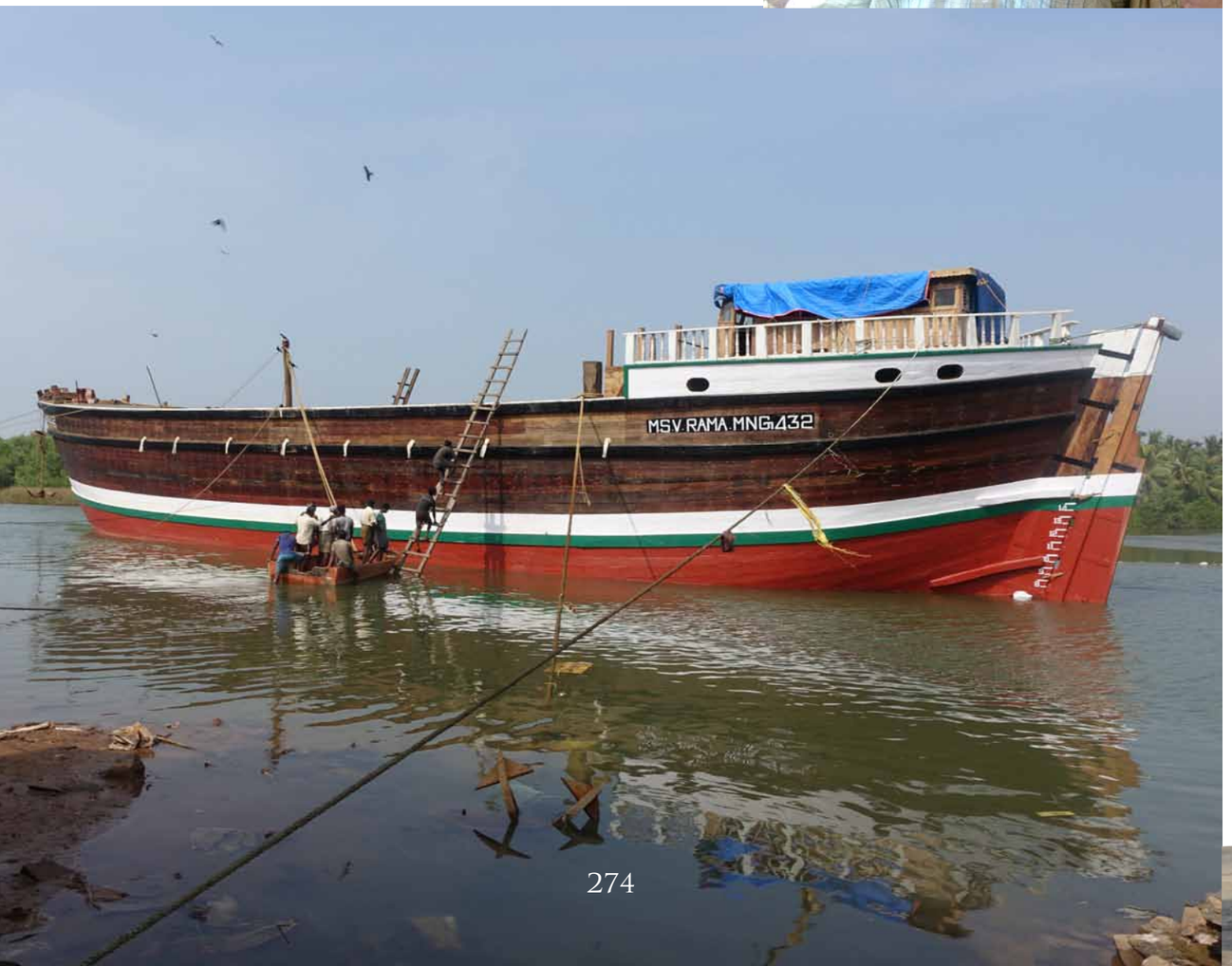
CLR 183 MSV Sarojini owned by Mr. Chandrasekar of Thaikkal supervised by Munusamy mistri and Ramalingam mistri. Begun in 2006 and launched in 2009, it sank in Dec 2015, off the coast of Bombay.

We met its owner before it sank; luckily for him he successfully claimed insurance. The photograph that we took for our study was of modest help in this process.

MNG 432

MNG 432 MSV Rama owned by Mr. Shivaji Mendon of Mangalore supervised by Balu mistri.

This is a fascinating case of how an existing kotia can be readapted to a new use. Originally a 400 ton kotia, its capacity was more than doubled to 1000 tons and reinforced with steel frames in order to be used in the Gulf.



CLR 195

CLR 195 MSV S.R.P. Rajamani owned by Mr. Perumal of Sonankuppam, Cuddalore supervised by a Thaikkal mistri. Begun in 2012 and launched in 2015.

It was caught in a storm and wrecked in November 2021 near Beypore.

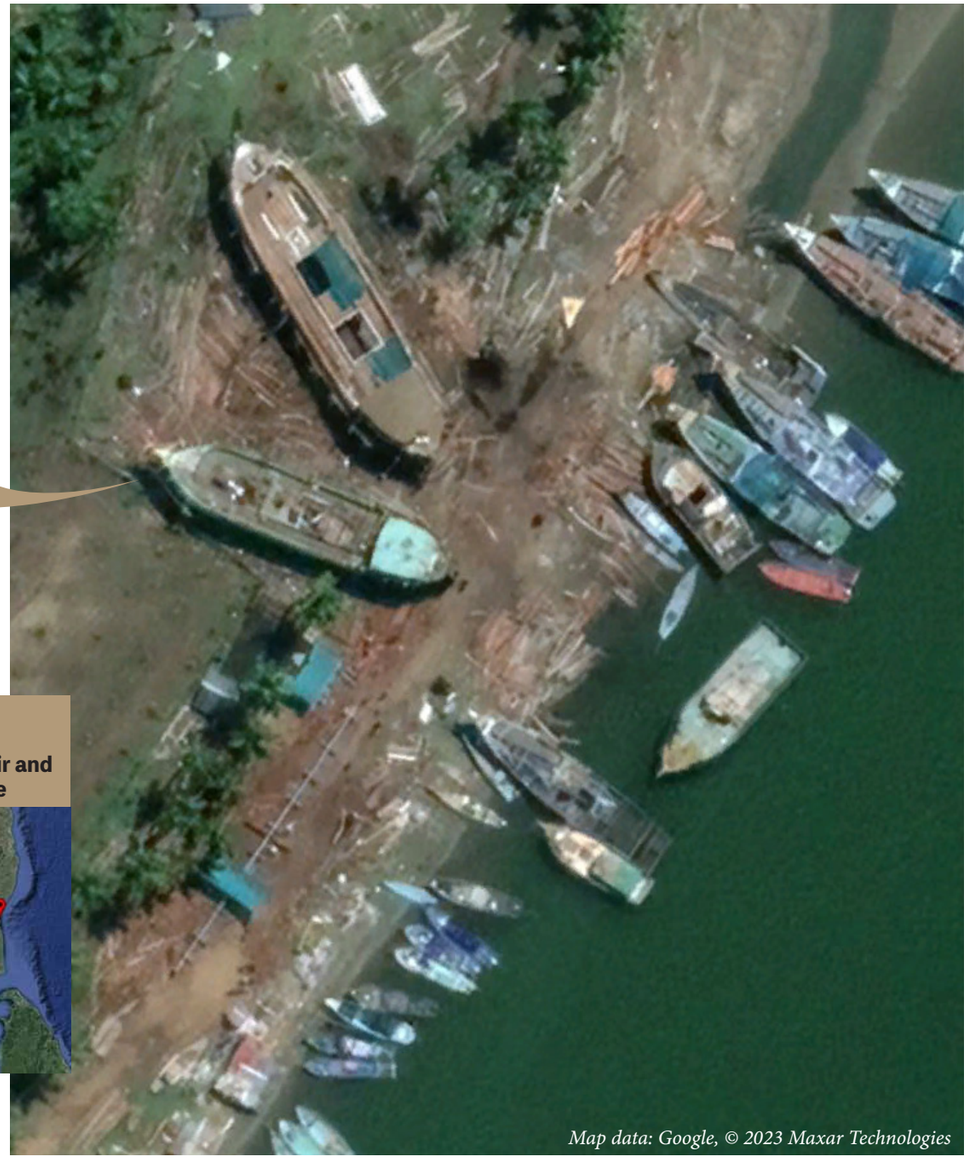
CLR 159

CLR 159 MSV Thilagavathy owned by Arumugam of Gory, Cuddalore. Built in 1997, it was bought by the agent Aslam of Mangalore in 2017. It was refitted in Cuddalore and gained a second life as is what usually happens to kotias after 20 years. This goes to show that some people are still optimistic about the trade.

Satellite images of kotia destinations

Typical shape of a kotia from air.

To identify a kotia, look for the hatches and the cabin.



CUDDALORE
Thaikkal 2022
Kotias under repair and a keel of a new one

Map data: Google, © 2023 Maxar Technologies

CUDDALORE - Old Town 2011

Map data: Google, © 2023 Maxar Technologies

CUDDALORE - Thaikkal 2018
Three Kotias in the jetty

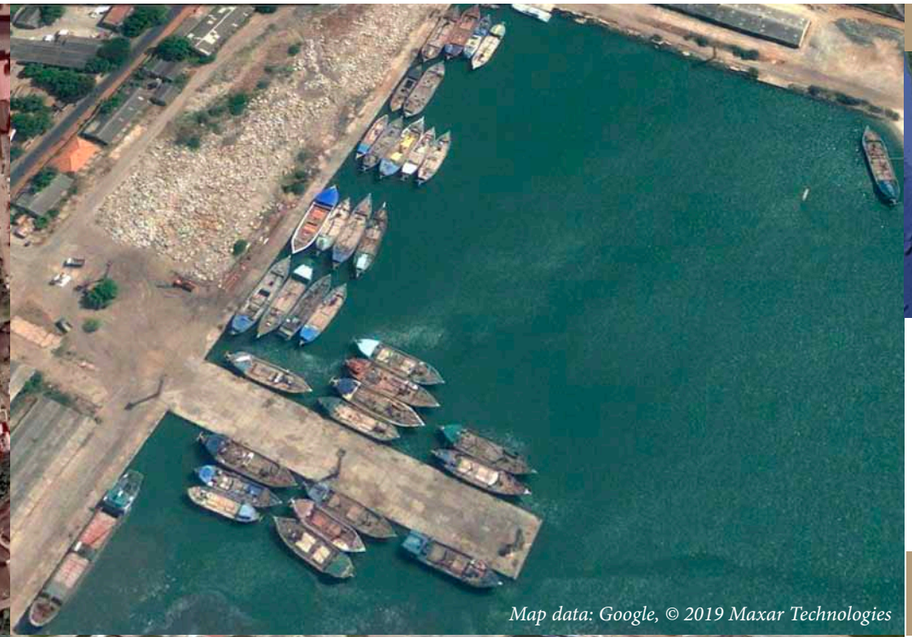
Map data: Google, © 2019 Maxar Technologies

MANGALORE

MANGALORE:
The old port 2016

MANGALORE:
Refitting site 2016

TUTICORIN

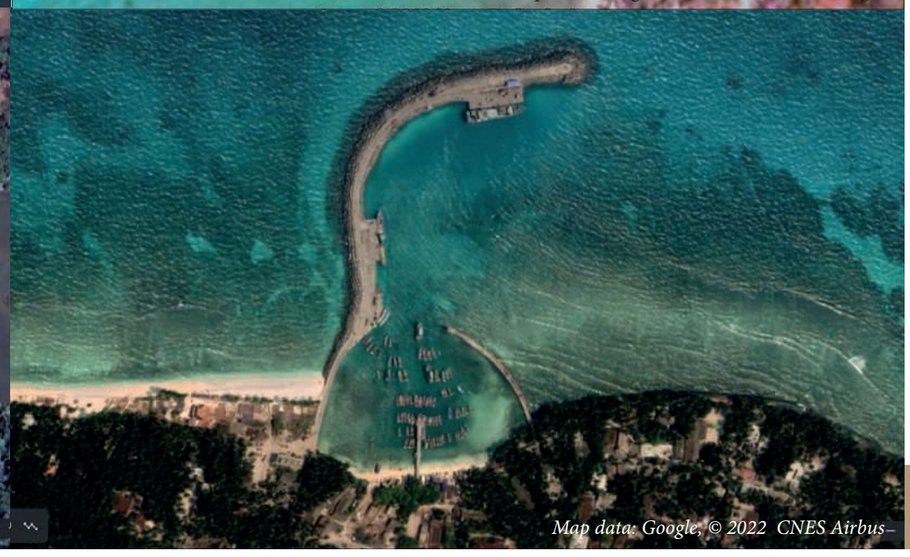


TUTICORIN:
The old port in 2009

TUTICORIN:
Fewer Thonis at the old port in 2011

BEYPORE:
The old port 2022

BEYPORE:
Refitting site 2022

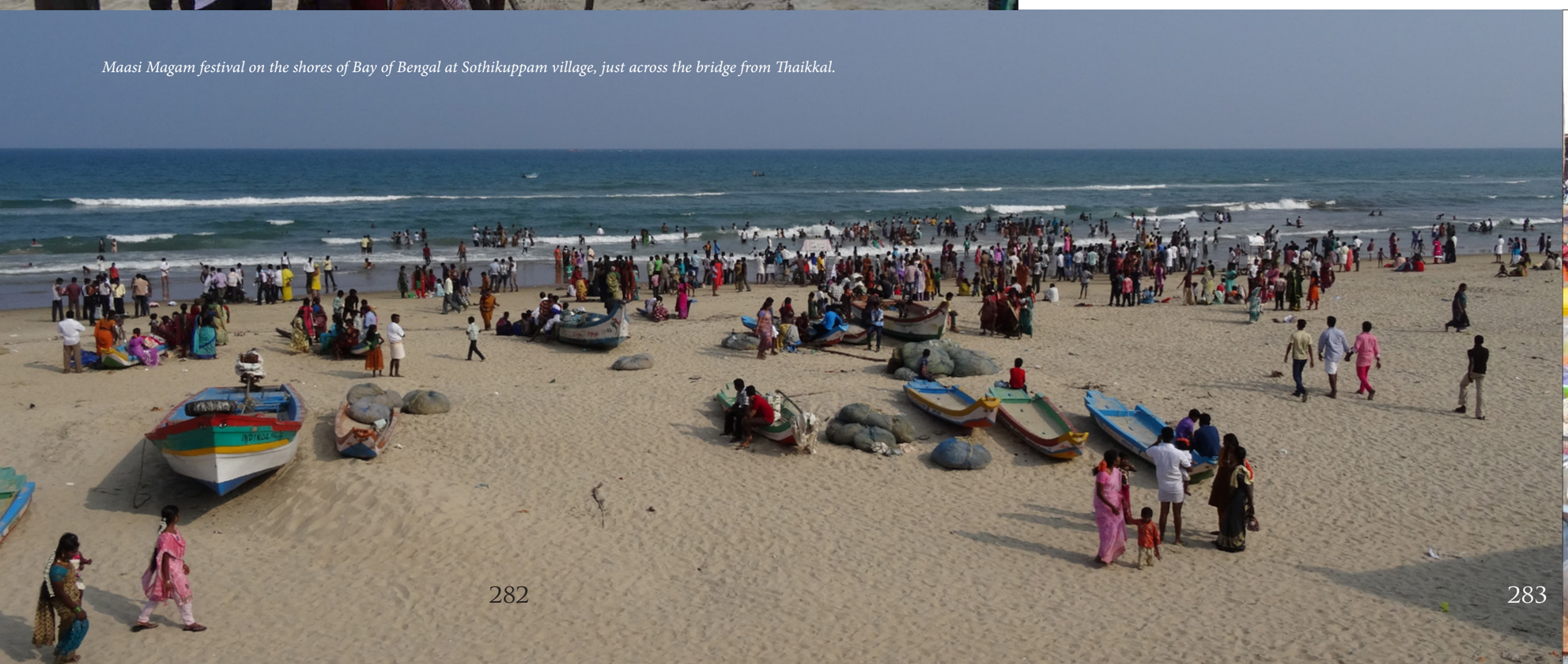


KAVARATTI 2015
LAKSHADWEEP

ANDROTTU 2020
LAKSHADWEEP

MELAS

Maasi Magam festival on the shores of Bay of Bengal at Sothikuppam village, just across the bridge from Thaikkal.

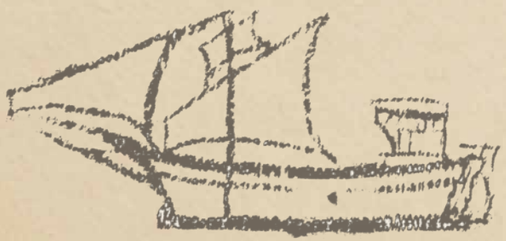


Festival at the Karuppamuthu Mariamman temple on the riverbank in Thaikkal.
A kotia decorated as a palanquin with image of the gods during the evening festivities.

Feast at the Sindhayatirai Madha church, Tuticorin, Tamil Nadu.

Bolesha Waliyulla Dargah at Thaikkal. This sufi saint is considered the younger brother of the one in the famous Nagore Dargah down the same coast and so the Urs festival (post`er) here is celebrated a day after the one in Nagore.

Tombs of Bolesha Waliyullah and his female disciple, Pappathi Ammal.



6

The life of a kotia

The Economics of the Kotia

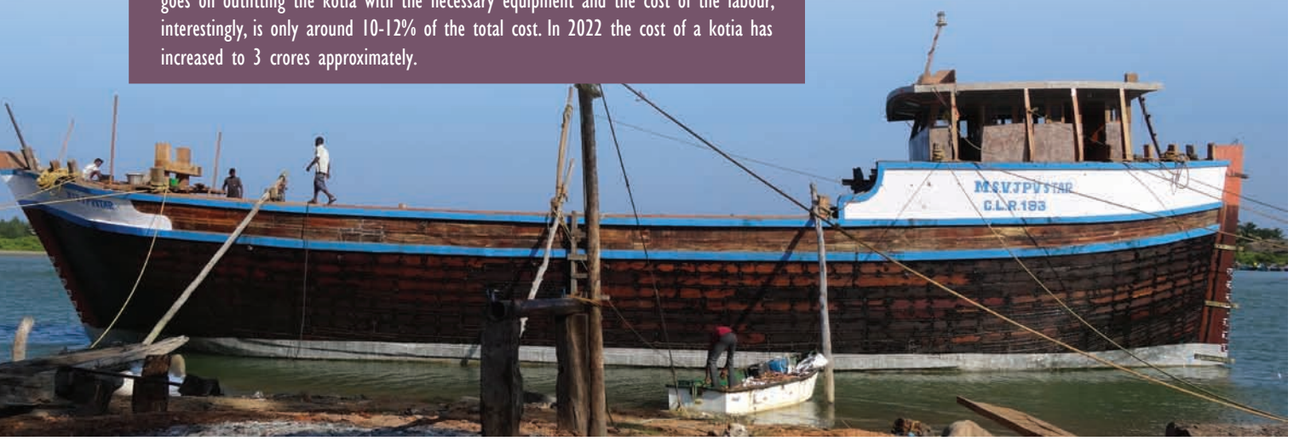
The cost of a kotia

The cost of building a kotia is enormous by local standards, considering the fact that the owners generally belong to the fishing community; some of them might be affluent but rarely millionaires. The estimates quoted by people in the know come to around 2 crores Indian rupees (20 million INR or 250,000 Euros) for a kotia of 300 to 350 tons in 2014. This can vary depending upon the owner who might spend considerably more than this, not hesitating to source better quality wood and expensive engines. But what really matters is not the cost as such, but if and when the investment can be recovered.

Average breakup of costs of a kotia as of 2015

Wood	80 lakhs to 1 crore
Labour	20 to 25 lakhs
Caulking materials and labour	5 lakhs
Iron - 2 tons	2.5 lakhs
Engines and accessories	10-15 lakhs
Propeller, Rudder, deck engine, winch and other mechanical equipment	2 lakhs
Electronic equipment	3 lakhs

(a lakh equals one hundred thousand rupees; ten lakhs equal a million)
As may be seen, the most important factor is the price of wood, which amounts to half of the total cost; this has increased a great deal in recent years. Almost 30% goes on outfitting the kotia with the necessary equipment and the cost of the labour, interestingly, is only around 10-12% of the total cost. In 2022 the cost of a kotia has increased to 3 crores approximately.



What benefit for the owner?

There is a consensus amongst all those we met, that up to recently, basically up to 2012, not only was it considered a sound financial prospect to own a kotia but, with a bit of luck, one could actually make seriously good money with it. Unsurprisingly however, we were never able to assess precisely the profit that could be made, season after season. According to our information, it might earn revenue of about 40 lakhs in a good year, of which 65% would generally go to the owner. Most owners agreed that it would normally take about seven to eight years, ten at most, to recover their capital investment. This means that after this period, if the ship is properly maintained, the owner should be able to reap maximum profits for at least another ten years. A major reinvestment would then be required for renovating the kotia and completely refitting it. This is why many owners decided to sell their ships second-hand at this later stage.

And what for the crew?

Another important aspect of the economic management of a kotia is the fact that its crew is not given any fixed sum or salary for its work. They will receive only a share of the profit made during each season at sea. This share system has been common practice with fishermen all over the world, even though it has greatly declined in Europe. While it rarely pertained to cargo ships it is, nevertheless, an important element in the financial ability of the Kotias. We now give a concrete example of how it works.

In Cuddalore, for example, the share system functions in the following manner. At the end of the annual trading season on the West Coast, which is from the middle of August to the middle of May, a balance sheet based on the total number of trips and related income and expenditures is drawn up. From this statement, the common expenditures such as fuel, groceries, small repairs and equipment are deduced.

Example of expenditures for single trip (as on 2015)

Income (INR 1000 x 330 tons)	330000
EXPENSES:	
Tindal commission - 330 x 25	8250
Crew unloading fees - 330 x 30	9900
Clearance expenses (agent, port fees etc)	25000 (max for Beypore Port)
Diesel - 1400-1600 litres	140000
Belt, Oil, bulb etc	1000
Potable water 3000 litres	500
Total expenses	184650
Balance	330000 - 184650 = 145350
Owner's share @ 64%	= 145350 * 64% = 93024
Crew's share @ 36%	= 145350 * 36% = 52326

Then the balance amount is divided into two shares: one is the share of the owner, which in Cuddalore amounts to 64% while in other places it could be 2 or 3% less. This is the sum that the owner receives towards recovering his investment and making a profit. The crew receives the other 36% (which in Tuticorin is 37%). This 36% share for the crew is divided unequally within the crew based on their functions on board. Each member of the crew (the lascars) will obtain one share, the driver one and a half shares, the tindal will get two shares but the cook only ¾ of a share, the same as a junior lascar. A young apprentice these days is entitled to half a share.

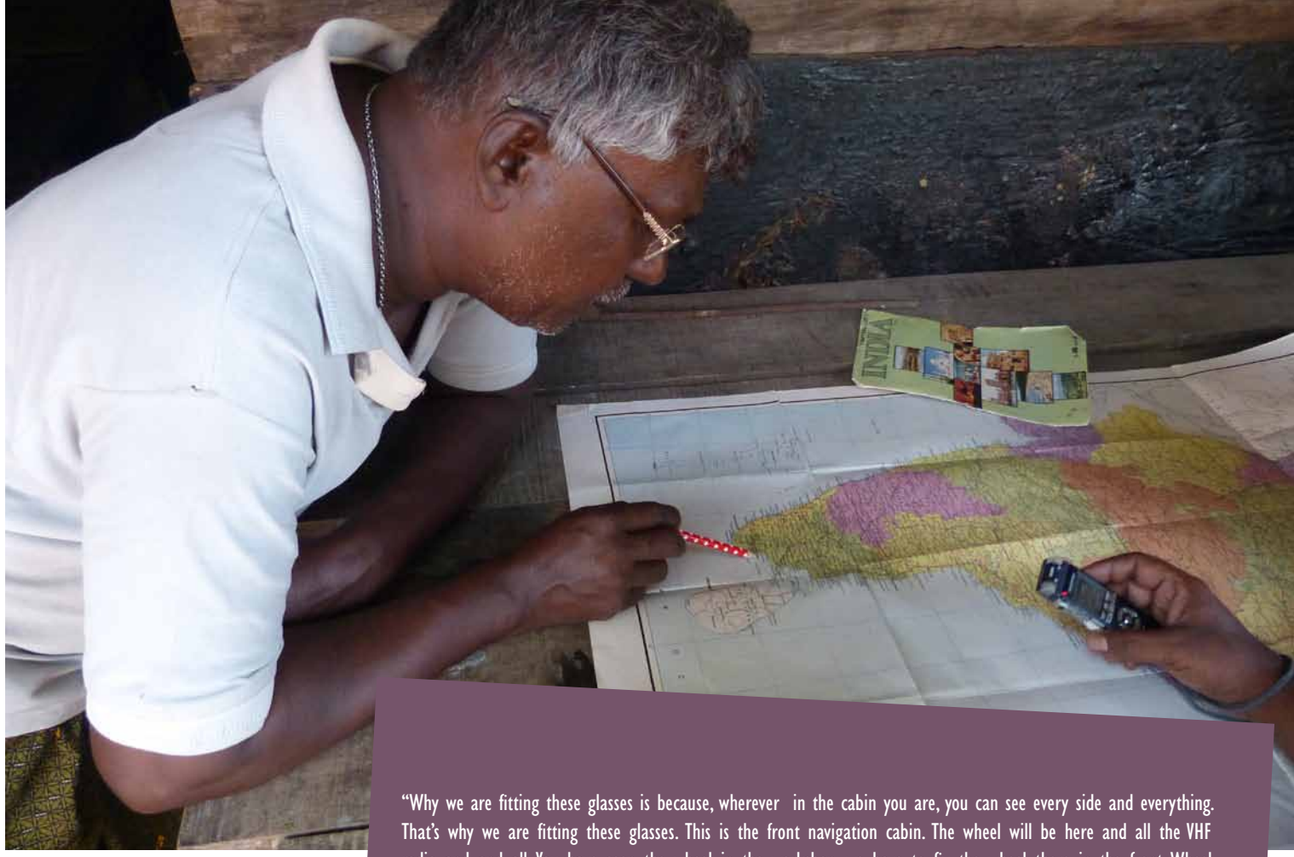
Remunerating the crew through a profit sharing system obviously has many advantages for the owner of the ship. It allows him to pay his employees through the generated revenue itself rather than employing them on the basis of regular wages. In 2014-2018, for example, the lascars were supposed to earn about one and half lakhs on average for a season. Importantly, since the crew's income is linked proportionally to the profit of the ship, there is no financial burden on the owner if the ship's business decreases during the season. It also means the crew will be more motivated to work knowing that their income is dependent on the ship's business. It will, however, be difficult for the tindal to recruit and retain a crew under his command if his ship does not find enough business for any reason. This was the case with one of the ships that we followed, the size of which turned out to be smaller than needed to make a good profit and the crew was threatening to leave the ship. In order to better understand how the crew works, let us give a few more details on the roles shared between crew members.

The crew of a kotia

The Tindal (Captain)

The crew of a kotia these days is usually composed of eight to ten men. The main role, as may easily be guessed, is played by the tindal (captain) who assumes full responsibility for the ship while at sea and also assumes a more important responsibility for its economic management.

Most of the tindals we met impressed us by their competence and their human qualities. This was certainly the case with Antony Ignaci, whom we came to know quite well during our study, and was generally true of most of the tindals that we encountered in Cuddalore, Tuticorin, Beypore and Mangalore ports. The work of a tindal is often transmitted from father to son, but the position remains quite open to enterprising and hard working men as well. Practically none of these will have gone through any kind of formal education or training in sailing; they had all learnt it through apprenticeship and practice.



"Why we are fitting these glasses is because, wherever in the cabin you are, you can see every side and everything. That's why we are fitting these glasses. This is the front navigation cabin. The wheel will be here and all the VHF radio and and all. You have seen the wheel in the workshop, we have to fix the wheel there in the front. Wheel and navigator things will come there. Minimum three lakhs worth of equipment will be there. Light and all the switches will be there.

In this room, fridge will be here and we put the table and put on the TV here but wireless everything will be in the front navigation cabin. Here there will be a table for the navigation charts. There is one bed there and another here. There will be another seat to sit as well. This line of the sight should be clear. This will be the roof of the cabin. It will go till end of the boat on both sides. If it rains there will be a handle here and the whole crew will come and stand here. These are all waterproof. We fix 4 pillars here so the rolling (of the ship in seas) will not affect. On the top we apply fiber coating. We put plywood and we stuff thermocol inside there and fix mica as well. It will be like a AC room….we fix sliding doors because if you fix the normal door it will swing here and there. So the pulling door is better and we lock it as well. We fix the navigation lights in that corner... only then people can see who is approaching from outside. We put a railing pipe on the edges of the roof so you can go and sit on the top as well… you can go sit on the top and lookout from there."

Tindal Antony on cabin design during the construction process:

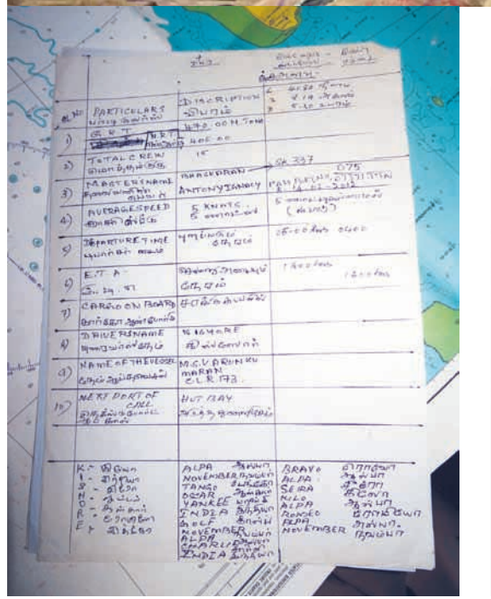
Our friend, tindal Antony Ignaci is in a way an exception to this, having attended—years after he had become a tindal—a certificate course and passed the examination in Calcutta to become a barge master. Though he was justifiably proud of the certificate, he did not attach much importance to it. The way he recounted many stories for us of his childhood days in Tuticorin and of his voyages as tindal must also be noted. For him, as a tindal, the art of sailing a flat bottomed cargo ship that might roll heavily on high seas had hardly any direct relation to theoretical knowledge. The same could be said of his escaping coast guards somewhere between Sri Lanka and India who suspected him of smuggling and started shooting at his sails; or of the way he managed to deal with the situation when he found himself adrift in a flat season in the Bay of Bengal, bound for the Andamans with no fuel left and no possibility of using the sail. He was rescued after a container ship passing by could not help with fuel but managed at least to send a radio message with their powerful radio transmitter to Port Blair, to indicate his ship's location.

The Tindal as an economic manager

Apart from the command of the ship on the seas, the responsibilities of a sea captain are many, especially as they are both administrative and commercial. He is largely responsible for all sorts of procedures that must be complied with when the vessel calls at ports and as well, for all trade and financial transactions that take place from port to port. Usually, the tindals, in accordance with, or through, the owners, find successive commercial assignments to keep the ship busy during the whole season. The main reason for this is that the trips depend not only on pre-established trade contracts and purely formal procedures, such as rotation of trips amongst vessels for transporting goods, but also on personal relationships and on sudden opportunities. The tindal is often the one to grab these because he is the one who is always present (and not the owner) and who is in direct touch with all the intermediaries who play a role in the economics of the kotia.

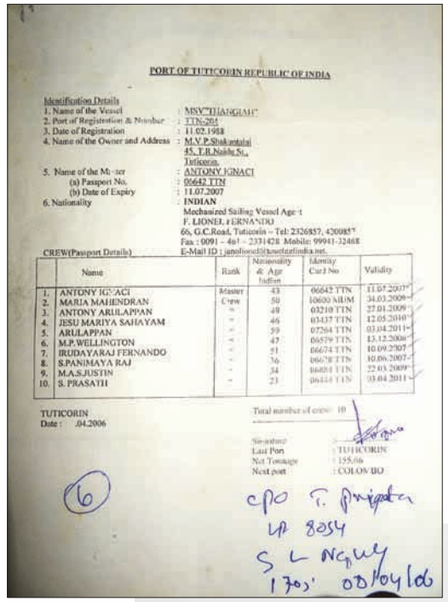
Considering the importance of his responsibilities, it is clear that a deep relation of trust has to exist between the tindal of a kotia and its owner. Not all owners are sailors and not all of them are in productive contact with the trade network along the West Coast so they have to rely on the tindal's account of trade. For example, if the tindal accounts for either less tonnage for a trip or a lesser rate per ton, or loads unaccounted miscellaneous light cargo such as a small number of cattle or a few motorcycles, the owner may well be completely oblivious. Hence the owners allow the tindals to have, beyond their conventional two shares, a commission pegged to the tonnage carried on each trip. Given all this, one is not surprised to learn that successful tindals may end up as owners of a cargo ship themselves. As a matter of fact, many of the ship owners that we met, had been tindals before they had their own kotias or were sons or close relatives of tindals.

Facing page: Cargo loaded on to Kotias and a vessel particulars maintained by Tindal.



The driver

After the tindal, the second most important person aboard a kotia nowadays is the driver. He is the one fully responsible for the functioning of the engine, which is no small role. Alphonse, the driver of the MSV JPV Star, while talking to us, likened the engine to the heart of the human body. The driver may also be consulted during the building process on the choice of engine which he recommends on the basis of the size of the ship, the required speed, fuel efficiency, maintenance, and availability of spares. During voyages he doubles as a mechanic carrying out minor repairs such as replacing the belts and he maintains fuel efficiency. He also explained to us how a good driver has to be alert to watch the flow of sea water which is used for cooling the engines and, in case of a rise in temperature, must investigate immediately or else the engine could stall on full load leading to crank issues and therefore to a reduced life for the engine. In the odd instance of a fishing net getting entangled in a kotia's propeller, the crew may not realise what has happened but will keep throttling in vain, so it is for the driver to correctly diagnose the cause for reduction in speed and order someone to clear the propeller. A good driver, claims Alphonse, should be able to troubleshoot much of the common problems within half an hour. Because of this crucial role, he is ranked, next only to the tindal, earning one and a half shares.



PORT OF TUTICORIN REPUBLIC OF INDIA

Identification Details
1. Name of the Vessel : MSV"THANGAM"
2. Port of Registration & Number : TTN-204
3. Date of Registration : 11.02.1988
4. Name of the Owner and Address : M.V.P.Shakrtatai
45, T.B.Noble St.,
Tuticorin.
5. Name of the Master : ANTONY IGNACI
(a) Passport No. : 06642 TTN
(b) Date of Expiry : 11.07.2007
6. Nationality : INDIAN
Mechanized Sailing Vessel Agent
F. LIONEL FERNANDO
66, G.C.Road, Tuticorin – Tel: 2326857, 4200857
Fax : 0091 - 461 – 2331428 Mobile: 99941-32468
E-Mail ID : jansfood@sancharnet.in.

CREW(Passport Details)

	Name	Rank	Nationality & Age before	Identity Card No	Validity
1.	ANTONY IGNACI	Master	43	06642 TTN	11.07.2007
2.	MARIA MAHENDRAN	Crew	50	10600 AIUM	31.03.2009
3.	ANTONY ARULAPPAN	"	49	03210 TTN	27.01.2009
4.	JESU MARIYA SAHAYAM	"	46	03437 TTN	12.05.2010
5.	ARULAPPAN	"	59	07264 TTN	03.04.2011
6.	M.P.WELLINGTON	"	47	06579 TTN	13.12.2006
7.	IRUDAYARAJ FERNANDO	"	51	06674 TTN	10.09.2007
8.	S.PANIMAYA RAJ	"	36	06678 TTN	10.06.2007
9.	M.A.S.JUSTIN	"	34	06881 TTN	22.03.2009
10.	S. PRASATH	"	23	06444 TTN	03.04.2011

TUTICORIN
Date : .04.2006

Total number of crew: 10

Signature
Last Port : TUTICORIN
Net Tonnage : 155.06
Next port : COLOMBO

6

cpo T. Principal
LP 8054
S L Navy
1705 08/04/06

The crew

The crew is generally chosen from the same village or sometimes, when there is lack of availability, from neighbouring villages. It will deliberately include people of different age groups and usually the tindal assembles his own crew. During the age of sail, the crew would number around 20, and obviously had a proactive role in the sailing but with engines there are not more than eight mostly relegated to manning the wheel (sukkani—literally, one who controls the 'sukkan' - rudder in tamil) and to look out work organised in shifts. Their main duty these days is to help load and unload cargo at ports for which they are paid separately, apart from their one part share.

Life aboard

Life on board the kotias has changed a great deal since the 20th century. This is due in the first place to the addition of a poop deck and a cabin with wheelhouse, which was a result of the introduction of the engine. Compared to the old days of toiling in hard weather, sun or rain, under open sky or at most under a thatched roof at the aft, life has become comfortable. In fact, one of the tindals complained that the crews these days have become used to luxurious sailing compared to the old days, spending much of their time in front of the television in the cabin. But it would be unfair to describe the contemporary lascars as lazy. Apart from loading and unloading cargo, which by itself is painstaking labour, they keep a tally of all materials loaded and unloaded. They load all the materials required for the voyage, such as diesel, water, and food provisions, maintain an inventory and do a final overall check of the vessel before sailing. Above all, they are the ones charged with the physical upkeep of the vessel ranging from pumping water from the bottom deck to cleaning and washing the kotia once the goods are unloaded. They have to ensure that no damage is done by the cargo (handling and also engaging in minor carpentry repairs, painting and sundries that become necessary during the busy season. The whole crew is expected to be on their feet when they are called to, for instance, dive into the sea to check the propeller.

6 people are taking a rest. Other five are on watch, checking if there is any other boat coming or if there is any net there on the sea, things like that. At Night they have to be in the wheelhouse. One person has to be there all the time at night. One man replaces another man. So, two people are engaged in the wheelhouse at night. Then during running there are lots of small works as well. We load the barrel on the top and we load cattle as well. So, we have to recheck and tie them tight. We can't do more work or walk freely on the deck. We will get lots of cargo like mat, cattle, vaththal (dry chilly), eggs, plastic mats; everything will come in this as cargo. So, we have to load everything safely. Cars will come, jeeps and we even load lorry as well on the deck.
(Lascars of Tuticorin)

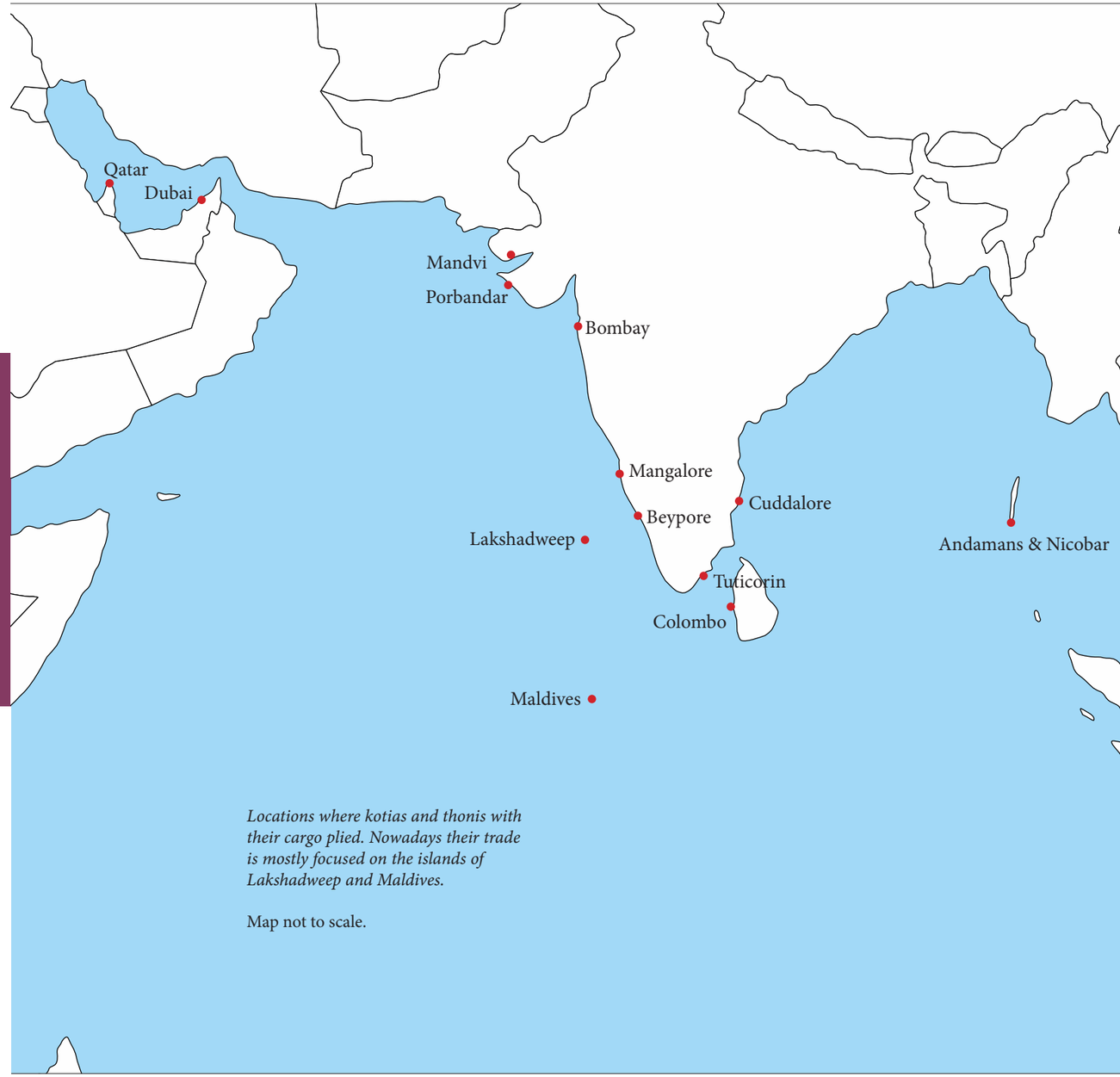
The cargo ships and their trade

In order to better understand the history of cargo shipbuilding in Tamil Nadu, the economic logic on which its profitability depends must be taken into account.

The economic niche that has made possible the development of maritime trade in Tamil Nadu over the last few decades is essentially based on two factors: first, the geography and second, the nature and volume of goods. Up to the first decades of the twentieth century, wooden cargo ships monopolised the trade with Sri Lanka, the Maldives, the Lakshadweep, the Andamans and ports along the Indian West Coast, not to mention the ancient dhow trade routes in the Indian Ocean. But with the development of iron and motorised cargo ships and new port infrastructures to accommodate them, (newly built deep sea ports, in particular) the dominance of wooden cargo ships came to an abrupt end. The paradox however is that such developments, which marked the end of wooden sailing cargo ships around the world, also contributed, in some cases, to the creation of new economic niches—even if small—that opened up a new future for them at the regional level. Such was precisely the case in Tamil Nadu, where they managed to find a new economic role, in parallel with the development in the region of maritime trade with its bigger cargo ships and container ships. The great advantage of the thonis and kotias resided in their ability to enter the shallow ports of the Indian coast and of the Islands where bigger cargo ships could not venture. With the growth of container trade and the logistics of new port infrastructures (as in Colombo in the 1980s, Tuticorin in the 1970s, the Maldives in 2000s) it became less and less viable for the container ships to carry over short distances small quantities of goods, such as vegetables, cattle or groceries for example. But with an average tonnage of about 300 tons, kotias effectively filled that niche. On the other hand, their ability to access several of the region's small ports continued to make them the preferred vehicles for transporting other categories of goods (cement, sand, chemicals, grain, etc.) that would have been too costly to transport and transship otherwise. Thus, new economic opportunities opened up successively during different periods for the wooden cargo ships of Tamil Nadu, and they were able to take advantage of these. They managed in this way for almost a century to ensure not only their simple survival but also real, even if relatively small, economic growth at the local level.

Though Sri Lanka and Maldives accommodate big ships, they will not accept cargo such as plantain (raw banana), onions and dry chilly like the thonis carry...to the Maldives there was a lot of dung fertiliser exported from Tuticorin, about 200 tons/trip...traders will buy 20 kilos for 20 rupees but will sell it there at 200 rupees...for return trip we used to bring back scrap metal from there to Tuticorin.
(Alphonse, Driver, Tuticorin)

"dried fish, onion, chilly and turmeric exported to Sri Lanka are carried by the coasting Thonis. Small machines, bicycles, tobacco, potato, sanitary ware and cement are also carried by Thonis to Colombo".
- www.globalparavar.org[1]



Locations where kotias and thonis with their cargo plied. Nowadays their trade is mostly focused on the islands of Lakshadweep and Maldives.

Map not to scale.

Trade with Srilanka

The trade route between Tuticorin and Colombo was historically important for thonis (the wooden cargo ships of Tuticorin), their economic success being initially based on the exploitation of this trade route. They supplied essential items to the island all through the year, but the trade declined after the 1980s, partly due to the development of modern port infrastructure at Colombo. The port authorities began to insist that only motorised vessels could enter the harbour because larger vessels were now regularly coming in; the thonis would suddenly appear and, with only sails, they could not be stopped or manoeuvred easily to avoid collisions. However, when thonis were motorised as well, the trade with Sri Lanka suffered another blow because of the civil war from the middle of 1980s. The thonis were suspected of helping the Tamil rebels by smuggling arms, fuel and other goods; there were restrictions and mid-sea checks, the intention being to discourage the traffic of these small cargo ships during the civil war period. Still, new opportunities surfaced, such as when the thonis were relied upon to maintain supply lines to the Indian Peace Keeping Force (through the ports of Kankesanthurai, Talaimannar and Trincomalee). But during the last phase of the war in 2007, they were finally completely forbidden from entering Sri Lankan waters, and the ban lasted till 2011. After much lobbying effort, the route was opened again in 2011. Some kotia owners managed to secure a few good contracts associated with post-war reconstruction in the north east of Sri Lanka. But, all in all, trade never completely recovered after this period.

Trade along the west coast

The trade on the West Coast was as significant as that of the Sri Lankan route but of a different nature: most obviously because of the longer distances to be covered but, more fundamentally, the cargo consisted predominantly of bulk trade goods. When the thonis left for the West Coast from Tuticorin they took salt to Beypore, near Calicut. Along the West Coast itself, there were three or four important varieties of cargo to be taken from one port to another. Roof tiles and timber from Beypore and Mangalore were two main commodities that were taken to Bombay along with sand from Malapai for manufacturing porcelain in Bombay but there wasn't much of anything to be found in Bombay itself to be taken elsewhere. Nevertheless, it was worth going empty up to Gujarat where one could find different kinds of bulk goods to bring south. From Porbandar and Veraval there was regular freight, which might be industrial, for example, chemicals, soda ash, fertilisers as well as marble and stones for construction. Wooden cargo ships also transported wheat and rice. Sailors referred to some trade in cattle bones between Bombay and Kerala but we could not figure out for what purpose such bones would have been conveyed.

The trade along the coasts of western India has long been important because of the mountainous terrain of the Western Ghats in the coastal hinterland. Because of its geography, the development of road and rail transport infrastructure in these areas was slow and largely deficient. But with the completion of the Konkan railways in 1999 and improved road infrastructure the competition became tougher. Maritime transport was less profitable, not only because of the cost of transportation but also because of the risk factor associated with transporting goods in a kotia or a thoni whose cargo might be completely lost at sea.

Trade with small islands

Besides the trade with Sri Lanka and along the West Coast, the most important trade in recent years has been with the small islands that dot the Indian Ocean, such as Maldives, Andamans and Nicobar and Lakshadweep islands. The trade with the Maldives, in particular, had a long and distinguished tradition; but in early 2010s, it began to decline because of the introduction of new administrative formalities such as demands for passports and identity cards for the crew and trade licences.

Trade with the Andamans went on for a long time, too, but without having the same importance. The situation changed, however, for a few years after the Indian Ocean tsunami of 2004, when the islands needed to be supplied with emergency relief and later materials for reconstruction efforts. While the bigger ships could dock only at Port Blair in the Andamans, the advantage of the kotias was, once again, that they could circulate between all the smaller islands aiding with the much needed relief and reconstruction work. However, after some time, the island traders successfully lobbied for a monopoly of inter-island trade with wooden cargo ships. The irony of the story is that they could secure this monopoly only by relying on second hand kotias and thonis bought from the mainland and, even today, they remain dependent on the expertise of Cuddalore craftsmen to maintain their vessels.

Fortunately for the kotias and thonis, while most of the other trade routes were seemingly closing to them at the end of the twentieth century, the development of the Lakshadweep islands created new opportunities. There had been regular traffic with these islands before, but the Federal Government's decision to develop them both as strategic outposts and for tourism over the last twenty years was equally decisive. While they continue to carry essential commodities such as food, vegetables and cattle, the ships' main cargo has become construction materials such as concrete hollow blocks, gravel, cement, steel and sand. Even if, as in the past, they return to the mainland with the islands' only products of coconut and tuna or their by-products.

While there is competition from steel barges that ply from Cochin on this trade route, there are not many suitable wharfs where they may dock and their operating costs with a certified crew are higher. In 2018, a wooden cargo ship may still expect anywhere between twelve to twenty trips each year between the mainland (Beypore and Mangalore ports) and different destinations in the island group such as Kavaratti, Andrott, Amini, Agatti and other smaller islands. But the kotia owners worry that this trend may not last forever and so hesitate today to invest in new wooden cargo ships. Meanwhile, some of the traders from the West Coast who operated mostly in this trade are nowadays finding new scope and hope for trade in the Persian Gulf.

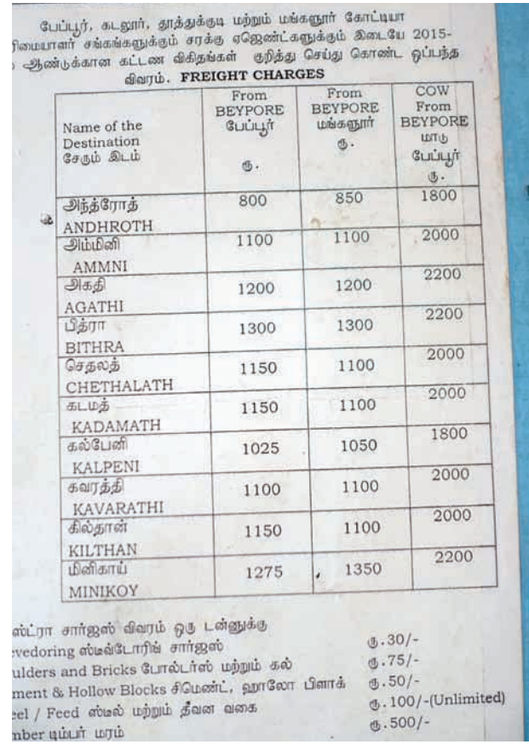
Trade beyond the Indian waters

Kotias and thonis from the East Coast have traded outside Indian waters, but not in a consistent fashion as the Gujarati dhows have. Many of the sailors aboard the kotias and thonis spoke to us about their occasional trips to Muscat, Dubai and even Malacca. This stretch was of course a well established ancient trade route between the West Coast and the Persian Gulf extending to East Africa. But it is only because of the development of kotia and thonis, that some of the ships originating from Tamil Nadu, seem to have participated in this trade in modern times. They left India for the Gulf with Mangalore roof tiles or timber and returned with dates. Nowadays, however, the trade has changed its nature. Mangalore based traders whom we met were acquiring kotias for trading between different ports within the Persian Gulf itself. A recent example of this kind of trade is the surge of traffic between Qatar and Iran, related to the tension between the former and Saudi Arabia. The mechanised sailing vessels (MSVs) of India, either owned by Indians or sold to the owners in the Gulf, have been able to capitalise on this new market.

Whether or not new trade opportunities for wooden cargo ships will emerge in the near future is anyone's guess. But the survival of this little known tradition of artisanal cargo ships in Tamil Nadu has always depended on often unanticipated opportunities and on the ability of their owners to know how to grasp these. This happens quite often on the quay.

On the quay

The economic life of kotias and thonis is played out, not only on the sea but also on the quay, especially on the quays of old ports like Beypore and Mangalore, where all kinds of intermediaries are engaged in negotiations involving cargo to be shipped. These intermediaries play a significant role in the kotia cargo business because there are, in fact, two quite different ways of fixing the freight charges, which will determine a kotia's profitability during the season. On the one hand, there is a well-institutionalised process of fixing them and distributing the cargo across ships. This formal procedure is decided every year between the representatives of the Mechanised Sailing Vessels Owners Association and the agents and is supposed to effectively prevail, as in the case of public works contracts destined for Lakshadweep islands. But, on the other hand, it was clearly explained to us that the securing of cargo and trips depended as well, if not even more, on the resourcefulness of the tindals (the sea captains) or the owners, and of the brinkmanship of the agents with whom they will be dealing.



பேப்பூர், கடலூர், தூத்துக்குடி மற்றும் மங்களூர் கோட்டியா
மையாளர் சங்கங்களுக்கும் சரக்கு ஏஜெண்ட்களுக்கும் இடையே 2015-
ஆண்டுக்கான கட்டண விதிதங்கள் குறித்து செய்து கொண்ட ஒப்பந்த

விவரம். **FREIGHT CHARGES**

Name of the Destination சேரும் இடம்	From BEYPORE பேப்பூர் ரூ.	From BEYPORE மங்களூர் ரூ.	COW From BEYPORE மாடு பேப்பூர் ரூ.
அந்த்ரோத் ANDHROTH	800	850	1800
அம்மினி AMMNI	1100	1100	2000
அகதி AGATHI	1200	1200	2200
பித்ரா BITHRA	1300	1300	2200
செதலத் CHETHALATH	1150	1100	2000
கடமத் KADAMATH	1150	1100	2000
கல்பேனி KALPENI	1025	1050	1800
கவரத்தி KAVARATHI	1100	1100	2000
கில்தான் KILTHAN	1150	1100	2000
மினிகாய் MINIKOY	1275	1350	2200

ஸ்ட்ரா சார்ஜஸ் விவரம் ஒரு டன்னுக்கு

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Aslam, a cheerful and enthusiastic character, who sadly succumbed to Covid-19 recently, is one of the agents whom we have been lucky enough to encounter, who described some of the nuances of the trade, if not all the aspects of it that really need to be elaborated here. Having started as a simple supplier of materials to agents in the port, he had become a reputed agent and owner of two kotias himself. We met him first at Tuticorin in 2014 refitting an old thoni, then in Mangalore in 2015. Subsequently he bought an old Cuddalore kotia in 2017, CLR 159 MSV Thilagavathy that was originally constructed in 1997, refitted in Cuddalore itself and sent to the West Coast in 2019.

Apart from being a centre of gossip and a place where deals are made and opportunities occur, the quay is more fundamentally where goods are handled physically for loading and unloading. As a matter of fact, the financial profitability and economic viability of the industry are dependent, among other things, on the organisation of this cargo loading in terms of time taken, means of loading onto the ships and storage facilities in the port. All the ship owners that we met complained bitterly about the paucity of existing infrastructure in those sections of the ports where they were allowed to berth. Apart from the constant difficulty of finding enough space for berthing or having enough cranes and related facilities for rapid loading, they also cited the fact that the channels in the port were not dredged regularly. This is an important problem because the famous southwest monsoon that lashes the West Coast regularly silts up river mouths. So, the owners are forced to find their own solutions, either using the winches and derricks on board or renting cranes on their own. One of the main objectives of the owners' association has from the beginning been to lobby various administrations and political authorities to ameliorate infrastructure in various ports where they trade with their ships, but apparently so far without much success.

THE MULTIPLE LIVES OF A WOODEN CARGO SHIP

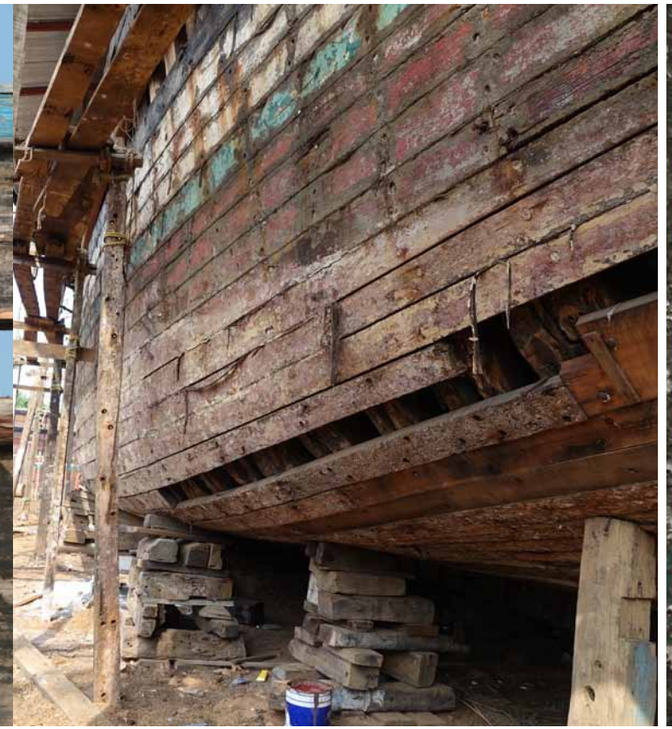
The ship wherein Theseus and the youth of Athens returned from Crete had thirty oars, and was preserved by the Athenians down even to the time of Demetrius Phalereus, for they took away the old planks as they decayed, putting in new and stronger timber in their places, insomuch that this ship became a standing example among the philosophers, for the logical question of things that grow; one side holding that the ship remained the same, and the other contending that it was not the same.
— Plutarch, Theseus

The life of a wooden ship such as a kotia is more akin to the famous ship of Theseus than to the majority of cargo ships today. As long as it can find someone eager to restore it and exploit it again, it will always be possible to replace each of its failing parts or adapt it to new uses. By the same token, it could well claim eternal youth, even if, in real life, the majority of wooden cargo ships seem to go through two successive periods of 'life' that we will describe briefly here.

The first of these goes from the moment of its construction up to its eight or tenth year in trade. During this period, it does not undergo any major repairs. Yet for it to remain in good shape during these first years, it has to be taken extremely good care of. Periodic maintenance is carried out, such as painting, some caulking, and reinforcing and perhaps the replacing of damaged wood. This generally occurs at the beginning of each season and when some parts are damaged during loading, unloading, berthing and sailing at shallow depths. Anywhere between its eighth and tenth year, the master carpenters will recommend a full check up, replacing about 25 percent of the wood according to its quality. With this refitting the kotia starts its second period and will be able to sail for another five or even ten years with diligent care. After this twenty-year window, the kotia may get a new life with a major refit or a complete renovation; as a result of such refitting, some of the old kotias built thirty-five or forty years ago—even fifty or sixty years ago in some rare cases—may still be seen sailing today.

Wear and tear

As the kotias and thonis ply the seas for eight months a year on the West Coast, they require assiduous care. As noted earlier, regular maintenance involves cleaning the kotias after unloading, replacing any worn aluminium sheets on the hull, painting the bulwarks and planks below and caulking. The importance of maintaining the kotia over the years of wear and tear cannot be sufficiently emphasised and the captain of the vessel (the tindal) is considered responsible for its proper maintenance. As was often explained to us, he must have a tight command over the crew to ensure that the ship has adequate care during operations such as loading and unloading. He is also expected to undertake regular cleaning operations, such as scrubbing off barnacles which might eventually eat into the wood. So it is also typical of kotia owners to blame tindals if the vessel incurs any unexpected maintenance expenditure such as replacing parts of wood, which can be expensive.

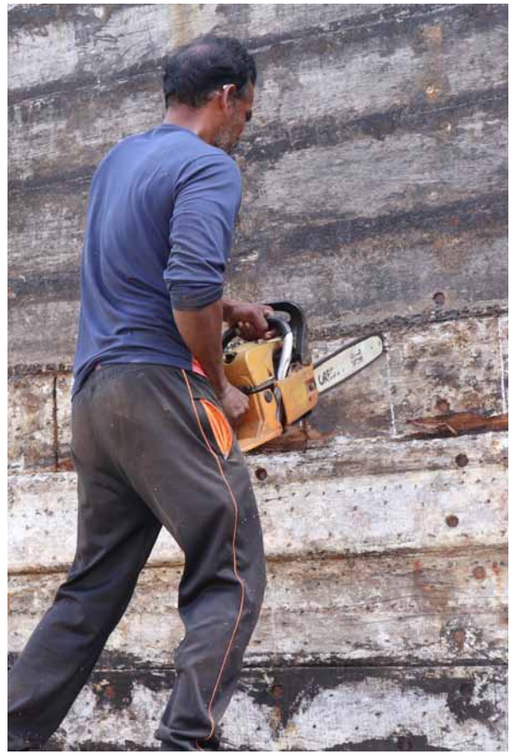


Because the vessel is made entirely of wood, it requires constant attention. So much so that even when it is not sailing during the monsoon season and is left berthed in Mangalore or Beypore, it should remain completely covered with plastic sheets because fresh rain water is not good for the wood; a watchman is appointed to take care of it. During the beginning of the season, or in season, the initiative to fix any minor to major issues has to come from the tindal, who prevails upon the owner to send a mistri (a master carpenter) across to the West Coast. Minor repairs can be carried out by some of the crew members but if they are related to reinforcing internal structure, replacing certain rotten planks or beams, then the mistri is called for. The mistri travels to the West Coast, even if just for a day or two, in order to supervise the repair work. Such repairs may cost around two to five hundred thousand rupees, depending upon who is reporting, the tindal or the owner. The mistri also keeps a regular watch on the vessel and advises the owner and tindal to replace any part of the wood that looks weak. His prior knowledge on where and what kind of wood was used in that specific part during the construction process helps him to identify problem areas effectively. Owners and mistris concur that if the tindal takes good care and if problem areas in the vessel are dealt with in a timely and targeted fashion, huge expenditure will be avoided during the first major refit, which would be due in eight to ten years.

Mangalore has become a hub for repair of Gujarati dhows, Tuticorin thonis and Cuddalore kotias on the West coast.

First refit

After a wooden vessel has been sailing continuously for eight to ten years, it is necessary to take a detailed look at its whole structure. The causes that necessitate this check-up are many: they may include, for example, sailing the vessel into places close to shore on islands where there is not enough draft even for the kotias so that the bottom scrapes the seafloor; or there is damage to deck planks and internal structures while heavy materials such as concrete blocks, cement and steel are loaded. It is crucial to take into account the inevitable gradual ageing of the whole structure, which tends to expand with the prolonged carrying of heavy cargo in its hold. If these different problems are related to the use that has been made of the boat, others may go back to the stage of its construction. As we have seen before, it takes a few years to build a ship and, meanwhile, the procured wood, for the frames, for example, lies exposed to weather before the ship is completely built and sets sail. Such frames may age very quickly. It happens, too, that, in a hurry to finish the construction or because of a cash crunch, the owner may have decided to use any readily available wood which might not have been the best suited and those parts soon become vulnerable and will show their flaws in a few years of sailing.



Repair and refitting work in Cuddalore.

So, the first refit involves a full checkup, a process in which about twenty five percent of the wood in the kotia is replaced (it costs anywhere between 1.5 to 2.5 million rupees). With this first refit, the ship can sail for another five years smoothly and even for the next ten years with proper maintenance. The owners prefer to get the refit done under their supervision in their respective home ports. Tuticorin, though no longer active in building new thonis, is still considered a good place for refit because of the easy availability of imported wood. With the thinning of local Tuticorin craftsmen and their relatively higher wages, Cuddalore carpenters are invited to Tuticorin to work on refit and repairs. Cuddalore carpenters are preferred, not only because of their craftsmanship, but also because they charge less and tend to work for longer hours, being based away from their homes.

Second refit

The end of the twenty-year period constitutes a decisive moment for the ship and for its owner as he has to make a crucial decision at this point in the ship's life, that is, to decide whether to sell or completely renovate it. When business was good, that is up to a few years ago, the owners would do the repairs and invest the income into building a second kotia, thus increasing their income base. But if they are in a financial crunch or pessimistic about the future scope of trade, they will sell it second-hand and let another owner give it a new life. He will renovate it completely, giving it a new home port and possibly a new registration number as well. Since the buyers of second hand kotias are mostly from the islands and the West Coast, Beypore and Mangalore have become the main centres for the repair and refitting of kotias and thonis though the workforce of carpenters and mistris is still drawn largely from Cuddalore. Teams of craftsmen coming from Cuddalore to the West Coast will stay there for many months during the winter season, working on repairs and the transformation of old kotias. Sometimes, in addition to handling the job themselves, they will supervise the work of local workers and carpenters. Such is the case with workers from the Casbah near the old Mangalore port.

To come back now to the economic aspect: after twenty years of use, kotias and thonis will have lost much of their prime value and will be sold at a third to a quarter of their original value. This is considered worth it if the kotia's structure is in good condition, taking into account the fact that the price of wood will usually have increased enormously in the interim. This is why many shipowners prefer to buy an old vessel rather than building a new one from scratch. In some cases, this refit would mean dismantling the entire structure and rebuilding a new one using the good frames and logs of wood found in other parts of the old structure. In other cases, they are refurbished, even if this means a complete replacement of almost all the planks and the repairing of frames.

There are also cases where an old kotia is transformed, capitalising on the refitting to give it an entirely new look, better adapted to the tasks that await it in a new environment. We witnessed, in Beypore, such a metamorphosis of an old kotia, which had been sold to a new owner, who wanted to deploy it in the Persian Gulf. To suit its new environment, and to give it financial viability, the owner decided to increase its capacity by more than double, from 400 to a thousand tons. New frames had to be added at the centre of the wooden hull, a bit like a caterpillar, supposing rings could be added in the middle. Then its hull was reinforced with steel beams, the ship equipped with a new engine and a fresh crew came from Gujarat to take over; they remained in Mangalore during the final stages of the refit. We also saw in Cuddalore a kotia, an important part of whose hull was replaced while the deck of another one was raised because it was taking in too much water when the sea was rough.

Initially, it was difficult for us to understand why it would be more convenient to refit an old kotia than to build a new one, given the complexity of the task, the amount of new wood necessarily involved and the labour that goes into the whole exercise. But according to various ship owners, it is still worth refitting for financial reasons. In one case in particular, even when some Cuddalore ship owners didn't think it was worth refitting a particular old kotia, the owner was convinced that it was. He went ahead and slowly refurbished it over many years, saving—if we are to believe him—nearly half the cost of building a completely new one. We saw, too, in 2021 a new kotia owner, convinced that he would be able to recover the capital of nearly one crore rupees that he was investing in buying a second hand kotia and refitting it in no more than two years.

A 400 ton kotia is modified into a 1000 ton vessel destined for Gulf trade, by adding more frames elongating its length.

Where east and west meet

Another aspect of this kind of radical refitting is particularly significant from the point of view of the history and anthropology of shipbuilding. The site was Mangalore and the vessels in question were not kotias and thonis of the East Coast, but rather ships originally built in Gujarat. The reason why this kindled our interest was because it was one of these cases where the refitting was not only made by locals from Mangalore but also by Cuddalore craftsmen who supervised the refit. As we mentioned earlier, this prominence of Cuddalore craftsmen is the case nowadays, not only at Mangalore, Beypore or Tuticorin, but even in the Gulf.

Because the vessel was a Gujarat-built dhow, the shape of its hull, resembling a 'V', was characteristic of the ships that have traditionally been made on that part of the West Coast. Such a design makes it easier to navigate in the open seas and reduces worry about waves hitting the side. But while this shape helps in terms of navigation and speed, it also means a lower cargo carrying capacity for these ships. So, under the supervision of a Cuddalore mistri, what the carpenters were doing was to carefully flatten the bottom hull and reinforce it. In effect, what was fundamentally happening was the transformation of a classical Gujarati dhow into a kind of reborn kotia. This kind of example shows why maritime historians should not be too hasty in associating the structure or appearance of a ship with a defined geographical or temporal origin; and, as well, why the intriguing shape of some of the wrecks they study may well be emblematic of more complicated stories than the ones that spontaneously emerge.

Wasted

Finally, we must mention the case of kotias that are used by their owners till no one is interested either in buying or refitting them, or even in acquiring them for their wood. In all the sites where kotias and thonis are repaired and refitted, one may see the rather sad spectacle of such old kotias and thonis rotting slowly on the shores or nearby in the sea.

The world at large

The story of kotias and thonis and the people associated with them is not, however, bounded by the Indian subcontinent and the Indian coasts. While there had been more than a millennium- long tradition of seafaring, maritime trade and certainly of shipbuilding in Tamil Nadu, this tradition seemed almost to have disappeared during the late colonial period. The reinvention of wooden cargo ships in Cuddalore or Tuticorin was reintroduced on their own terms by the coastal communities of this part of India into the whole maritime economy of the Indian Ocean. Not only did local fishermen find a new place in it by building, sailing and trading on kotias, but their reinvented ships were not used only by Indian owners or even by islanders; they were also built or renovated for owners of the Persian Gulf. To give an early example of this, a Correra (a thoni builder) was awarded a citation in 1983 by the then President of India, Giani Zail Singh 'for exporting the first mechanised sailing vessel from India' to the Gulf.

This further extended the range of action for all the craftsmen of the Indian East Coast, particularly those from Cuddalore. Because of the reputation they acquired with their work on kotias, they found new opportunities wherever they went, to work, not only on vessels they built themselves but also on other sorts of vessel. This was the case with our friend Kathiravan mistri, who was initially called to repair kotias but eventually to work on the royal yachts of Qatar. By undertaking such work, the carpenters and caulkers have been extending the range of their expertise in such a way that there are those who are nowadays expert in some of the most recent trends in building wooden ships (in Pondicherry shipyard, for example). Someone roaming in Thaikkal today might then meet not only sailors but also fishermen-carpenters who have travelled far and wide on the high seas.

Fortunes and misfortunes of the trade

All through our inquiry, we were struck by the fact that everyone we spoke to, underlined the fine balance that exists between fortune and misfortune, success and failure, profit and loss in such a trade. We saw, for example, that the flat bottom of the kotias was one of their main assets because it allowed them to carry more cargo. But, as we have also seen, it meant that they could easily capsize, risking the lives of the crew and ruining the owner. In 2021, one of the kotias that we saw being built in 2015, crashed on a sandbank near Beypore in a storm and broke up completely in the following hours. Fortunately, in this case there were no casualties. A frequent, if not favourite, topic of the 'Thaikkal net mending club' is the fortunes or misfortunes of so and so, who either became wealthy through favourable circumstances or, on the contrary, lost his entire fortune and his hopes of social mobility that had been pinned on kotias, as if the whole thing had happened in a casino.

The conditions upon which the profitability of kotias depends are so many and so diverse that it is difficult to enumerate them. It may be a matter of unforthcoming bank loans or of difficulty in assessing the quality of wood on the basis of small samples and the disappointment that follows if it does not live up to expectations. It may happen, too, as we have seen, that the design of the ship does not turn out to match the expected capacity. There are, as well, all sorts of perils that lie in

Story of the man who was cheated by his associate

TThe long reach of Thaikkal's skills and trade network into the West Coast and the Persian Gulf has its share of perils. Kedar Shankar of Thaikkal, built one of the first kotias of a size reaching 300 tons at a cost of 1.2 million Rupees in 1980; it was registered as MNG 289 MSV Thirumalai, and traded successfully on the West Coast with occasional trips to Muscat and Dubai in the Gulf. Through his well-established trade contacts on the West Coast, Kedarshankar was introduced to a Dubai citizen of Indian Origin who was interested in entering into partnership with him to engage in the Gulf trade. The deal was that the Dubai sponsor would find regular trade for the kotia in the Gulf for which he would take 20% of the profits and the remaining 80% would go to the kotia owner. The vessel, which was originally fitted with an old used Ashok Leyland engine, reached Dubai, where it was fitted with a new and powerful Yanmar engine and modified with modern facilities with a new cabin to suit the Gulf trade. Kedarshankar received an advance of half a million rupees in 1987 for entering into a contract for 14 years. But after that, the Dubai sponsor refused for many years to divulge any details of the trade made with the vessel. After much wrangling with no positive outcome for him, Kedarshankar decided to pursue legal action against the Dubai sponsor. He suspects that the contract extensions were forged and that the sponsor had influential connections with local authorities that protected him from being successfully sued. With the legal battle extending well over 20 years, Kedarshankar found it difficult to retain a lawyer in a foreign land and to keep track of all developments in the court procedures. Hailing from a well-to-do family, he turned his business attention towards civil construction and managing his brother's hospital. He still hopes that the courts will favour him and justice be delivered. The only kotia that he built, which made him wealthy initially and was a source of proud moments—such as the one he brought into Muscat, sails in place, after running out of fuel and with all the locals coming to watch in awe—became a source of despair and bitterness later on and led to his vowing that he will never build another one.

Story of many captains who suddenly became rich enough to own a kotia themselves

Although we did not meet the personalities concerned, it is a topic of conversation in the Thaikkal social club that some of the people involved in the kotia business became rich in a short time; it is mostly the tindals that such a story is attributed to. The possibility of such short pathways to riches is due to the transport of special cargo to the islands undetected by the authorities. Locally known as sugar powder, the traffic of such hidden items in the cargo hold may yield fortunes of such magnitude that the tindals of the vessels become vessel owners themselves within a season or two. Such traffic is not without its risks and, if caught, though this is rare, the owner may as well forget the very existence of the vessel. It is said that such traffic was quite prevalent while trade with the Maldives and the Gulf was busy. It is also one reason why the owners prefer to engage mostly in the West Coast trade rather than that of the Gulf or Maldives as they cannot maintain a complete oversight of the trade activities of their vessels.

Story of the man whose kotia capsized and with it all his hopes of social advancement

Fortunes can swing either way in the world of kotias. Panneer from Thaikkal is a self-made man from a modest fishing family who still owns a 10ft vattal (small wooden fishing craft), on which he goes fishing occasionally in the Paravanar River. He built his first kotia of 180 tons in the late 1990s and sold it to a Mangalore owner in 2003, as he could not manage to repay his loans. He built another one of 350 tons, which was caught in the 2004 tsunami during construction, was finally repaired and left for the West Coast in 2005. He sold this one to a Tuticorin owner in 2011. He started building a third one in 2011 but it was caught in the Thane cyclone of December 2011. He managed to complete the work in 2012 and traded for three years on the West Coast before the ship sank off Mangalore in December 2015. No one was able to give a reason for the accident. The whole crew reached home unharmed and claimed that they heard a loud noise and the next moment they were all in the water with the vessel sinking fast before their eyes. The common assumption is that they probably hit a bigger vessel and were rescued by fishermen. Panneer fortunately had an insurance cover, though the case dragged on for years; after he had struggled to establish evidence that his kotia had actually sunk in the seas, he was compensated. His son Senthil, who is a carpenter and works with Kathiravan mistri, had to migrate to the Gulf for the upkeep of the family. Panneer was distressed for many years but would always discuss details of the trade with us, sporting a smile and saying that his three kotias had given him more wisdom than wealth.

wait during the operation at sea: whether it is extreme weather events such as cyclones, difficulty in finding enough cargo and trips in a season, piracy at sea and related Government decisions to assign no-safe zones, or the constant suspicion of coast guards directed towards them. All these different elements will enter into the equation and influence the choice of the more affluent members of the fishing community as to whether they prefer to invest in a kotia or in a fishing boat, for example. While the kotias have been considered more profitable for a long time now, because of the uncertainties linked to the ownership of a fishing boat, the situation surrounding the future of this type of maritime transport is rapidly changing. If the future of the kotias of Cuddalore does not look too promising these days, most of the people involved tend to agree that it is still too early to make any definitive judgement about it.

A logic of its own

Looking at the history of kotias and thonis in Tamil Nadu in retrospective, one may be tempted to approach it from a quasi Darwinian perspective, as is often done in the history of shipbuilding. But as we have seen previously, there are decisive methodological reasons why this temptation must be resisted or at least dealt with using extreme caution.

There is no doubt, indeed, that one may attribute the origin of this family of ships to their close or more distant ancestors (the barges or fishing boats) of Cuddalore and Tuticorin; and one may also track with relative precision the small adaptive changes that progressively altered their size, structure and appearance. But it must also be made very clear that one cannot limit the analysis of their evolution to that of purely formal characteristics. And one can't rely either on strictly functional criteria linked to their seaworthiness for a better understanding of the history of the traditional forms of shipbuilding in this part of the world.

If the kotias and thonis retained their wooden hulls and sails, this was not necessarily only because they fulfilled a functional requirement or that they survived as useless relics of the past. It is rather because wooden hulls and sails correlate closely with legal requirements and administrative regulations on which their profitability depends. Similarly, the flat bottom of their hulls may well be a non-starter from the functional aspects of faring on the high seas, increasing the risk of capsizing in rough seas. But it makes perfect economic sense as the hull allows more goods to be carried and islands with shallow drafts approached and it thus opens up new trade opportunities for the kotias and thonis. The paradoxical consequence is that one will not hesitate to change the shape of an existing ship even if it means diminishing its seaworthiness in order to make it more economically profitable. This also explains more generally how the kotia have gradually come to replace the locally made cargo ships on the west coast of India. Finally, the survival of this category of ships will be dependent not only on their technological evolution but, more fundamentally, on a series of political factors which go beyond the local economy and over which local actors have little control.

KOTIA TIMELINE

1914
beginning of the lighters' building tradition in Tuticorin, according to Hawkins (they were initially of 70 tons)

1920-1925
the size of thonis increases from 70 to 120 tons (Hawkins)

1945-1961
two to three vessels a year built in Tuticorin

1957
in Cuddalore first paai vathal of 75 tons (Ayyaddurai: born in the1920s)

1958/1961
30 new thonis are built (Hawkins) with still more increase in size and number of masts (one of them with four masts, at the beginning of the 70's)

1960
125 thonis registered at Tuticorin (Hawkins)

1960
10 thonis at Kulasekarapattinam

1974-1979
development of Tuticorin as a Major deep-sea port terminal

1980
first kotia of 300 tons (Kedar Shankar)

1980s
44 lighter thonis built in Tuticorin

1980s
40 coasting Thonis in Thoothukudi.

1980s
nearly 4000 people who were employed on Thonis at Tuticorin– lighterage and coasting together

1980s
end of the tradition of Uru at Beypore: "But the business did not last long in Mangalore either. As a result, it was shifted to Kannur in Kerala but was eventually closed down".

1982
first mechanised coasting thoni in 1982: MSV Abood by Suresh Corera of Suresh construction (never operated in India, sold in Dubai). Suresh Corera was awarded a citation in 1983 by the then President of India, Giani Zailsingh "for exporting the first mechanised sailing vessel from India".

second mechanised thoni in Tuticorin (ZK 232) sold to an owner on the West Coast

from 1990 up to 2014
the best time for business

1994
sail-only thonis are still in use at Tuticorin

2003-2013
about twenty Kotias constructed in Cuddalore (Murugan)

2004
the tsunami strikes the Indian coast (Coromandel Coast in particular)
- The kotias and thonis are used for emergency service and reconstruction work in the Andamans

2007
small revival in Tuticorin: 3 thonis under construction

2008
the road to Colombo is closed. Thoni services from Tuticorin to Colombo were suspended in 2008 partly due to limited berthing facilities in Colombo but more importantly because of the security concerns of the Sri Lankan Government.

2010
300 sailors and around 1000 families are still directly dependent on the Thoni industry.

2011
the road to Colombo is reopened, but kotias and thonis can't manage to recover the part of the market they have lost in this trade

2011
still 43 coasting Thonis.
The last one to be built in Tuticorin

2011
manufacture of uru resumes in Beypore, but they are now built as luxury yacht for the wealthy in the Gulf countires. 16 have been built until 2022.

2013
about 100 kotias and thonis in trade (Kedar Shankar and Arumugam from Thaikkal)

2013
beginning of this study and fieldwork in Cuddalore

2014
difficulty of trade with the Andamans; priority (or monopoly) is given to the islanders

New threats in 2014
• competetion from cargo barges in Kerala, which could kill the trade to the islands; however, not all the islands would be accessible by barge, and the new jetty built in the Lakshadweep is not fully operational.
• the competition intensifies with trucks and railways along the west coast.
• new regulations and enforcement: demanding passport for an Indian seamen in the Maldives.
• ever increasing cost of maintenance.
• upgradation of emergency materials, AIS (Automatic Information System) becoming mandatory.

2014
the only remaining trade for a number of years: the commerce with the islands (Lakshadweep, Maldives)

2014
kotias and thoni berthing in various ports along the south Indian coast.
(satellite image)
- Mangalore: 39 in 2014
- Beypore: 17 in 2015
- Tuticorin: 33 in 2017

2015
no new Kotias to be built in Cuddalore until 2022

2017
30 thoni still in operation

2018
number of kotia and thoni registered in India, according to the official count:
- 29 kotias (Cuddalore)
- 28 Thonis (Tuticorin)
- 448 Mechanised Sailing Vessels still in operation all over India

2021
three kotias were being refitted in Cuddalore during the last months of the year. While no new one has been built for the last seven years, a kotia owner is seriously considering the possibility of building a new one.

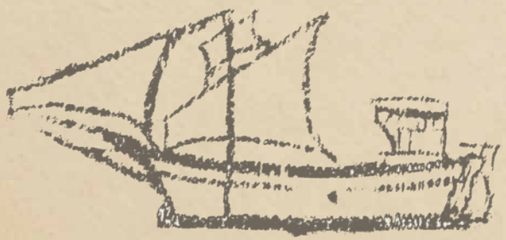
2022
one new kotia being built and three refitted in Cuddalore.
Seven refitted in Tuticorin, that had not witnessed such a flurry of activity in the last few years.
An estimated 60 kotias and thonis are still in circulation.

2022
as per our count around 500 Kotias and Thonis were built since their emergence during the first half od the twentieth century in the South Indian coast.

If we look at the twists and turns of such an idiosyncratic history, we realise that it does not only tell us how and why kotias and thonis have developed and prospered on this East Coast of India over a century but may, as well, show us why their very existence challenges some of the principles on which our understanding of the history of shipbuilding has been based. Moreover, by reconsidering local initiatives like this one, it is possible to understand the central role they play in the fabric of Indian economy, a role which has been neglected too often by most economists and historians of economics.

7

What next ?



Tracing the existence of *niches*

When we first encountered the wooden cargo shipbuilding traditions of Tamil Nadu in 2011, there were eight of these ships being built in Cuddalore and one in Tuticorin. But in 2019, with the exception of a few being refitted in both places, there has been no construction of kotias in Cuddalore since 2014 and no new thonis in Tuticorin since 2011. Must we then conclude, even if with some nostalgia, that we had the sad luck of being the last witnesses to such a magnificent craft?

As a matter of fact, we are not the first and may be not the last to share such a premise. Most of the authors who have studied artisanal forms of shipbuilding in Tamil Nadu, from the beginning of the twentieth century onwards, have more or less shared the same feeling of the ships being at the end of their tradition. Yet it is precisely during this time from the 1920s till today that thonis and kotias were not only reinvented but evolved and prospered.

However, the question lingered on: weren't they really going to disappear forever? Such was the pessimism of many of the main actors in recent years because of the slump in trade. So it was surprising to discover at the end of 2021 in Cuddalore, there were three kotias being refitted but also that two of the former kotia owners were seriously considering the possibility of building new ones in coming years. They weren't just empty plans. In summer 2022, a new kotia was being built in Thaikkal, Cuddalore. Even more encouraging, a dozen wooden cargo ships were being refitted in various ports of southern India that we visited (Mangalore, Tuticorin, Cuddalore), attesting to the renewed optimism of the owners.

While the trade had focused more or less exclusively on the Lakshadweep for some years, promising opportunities were seen to revive trade with Sri Lanka which had long been one of the favoured trade routes for the wooden cargo ships of Tamil Nadu. The constant uncertainty that reigns over the future of a craft activity like this or the fact that it appears on the margins of the Indian macroeconomics should not then lead us to underestimate its importance, past or future.

Employment for the thousands

Like any other statistics of the sort, the total number of people who gained some sort of revenue out of shipbuilding in Tuticorin, Cuddalore and a few other places is difficult to assess. Still, when these two shipyards and the number of people navigating from them were at the peak of their activity, it may reasonably be assumed that between 3000 and 5000 made some substantive part of their income directly or indirectly from this cottage industry during the recent decades. If the average size of a family during the same years has been five, this means that there may have been anything between 15000 and 25000 people who derived a part of their income from shipbuilding in these two localities. This may sound insignificant when compared to the whole Indian population but it becomes all the more significant when it is understood that a large proportion of employment in India is derived precisely from this kind of niche activity.

While the possible benefits of the spectacular developments which have taken place in a few high tech sectors in India cannot be disregarded, the fact must also be acknowledged that such technological developments have so far had only a marginal impact on the job market as a whole. Despite some remarkable economic growth during the last two to three decades, the job market in India remains cursed by underemployment and critically insufficient incomes for a huge number of the working population. As a matter of fact, employment is, as in the past, mostly provided by the informal sector which is estimated as supplying anywhere between eighty and ninety-four percent of existing jobs. To give just an example of the younger section of the workforce (15 to 29 years old);

"*..according to the OECD Economic Survey India, 2017 over 30% of youth aged 15-29 in India are not in employment, education or training. This is more than double the OECD average and almost three times that of China... and according also to 2011 Census 84.5 million young people in India live below the poverty line, which is the highest rate worldwide, (44.2 percent of the total youth population) at the same time there are 44 million Indian youths who are undernourished, which constitutes 23 percent of the youth population in India*" (Kumar 2020).

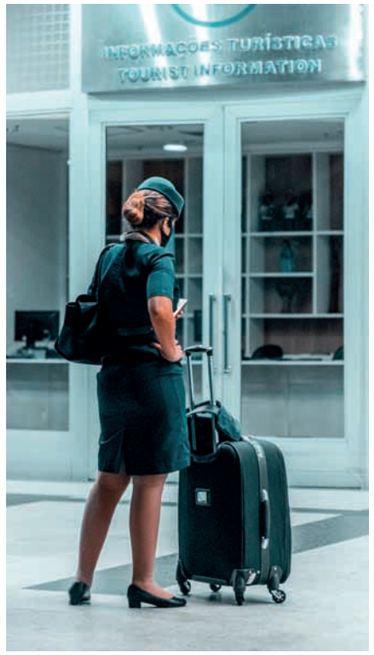
It is in such a macroeconomic context that the real importance of small, localised cottage industries like the one described in this book are to be appreciated.

Moreover, the reinvention of wooden cargo ships in a coastal part of India, where shipbuilding resurfaced during the twentieth century, is in stark contrast to the standard evolution of technological progress. Once aware of this kind of an example, it becomes possible to realise that this type of reinvention is not an exception or an anomaly, and that it is not only its economic significance, but also our usual conception of technological progress that it invites us to revise. As David Edgerton has rightly insisted, one should consider not only how and when technology appeared for the first time, but also how it is used, by whom and what the various implications may be, whether economic, technological or environmental. In order to underline this point, we would like to briefly describe two examples and their implications.

Suitcases on wheels

The first well-documented evidence of the invention of the wheel seems to date back, at the very least, 5 or 6 millennia according to the first convincing testimonies found in the Middle East; it is around the same time that we know that humans were using bags (backpacks to be more precise), as shown by the recent discovery of a hunter born at that time, whose mummy was recently preserved in a glacier between Austria and Italy. On the other hand, apart from a few prototypes that remained more or less without follow-up in the first half of the 20th century, the first somewhat systematic use of relatively light luggage combined with wheels seems to date from the first decades of the twentieth century and it is only in the 1970s that their use was really to spread. The kind of two-wheeled suitcase in common use today—taller than it is wide, with a telescopic handle - dates from 1987, and the four-wheeled ones from 2004, less than fifteen years ago. It is remarkable that it took at least 5000 years to come up with the idea of making a piece of luggage with wheels, even though these two kinds of artefact were known and used separately.

The circumstances of the invention of the wheeled suitcase are, moreover, fairly well known; its beginnings are closely linked to a very specific environment, that of airports and air transport. It was in this context in 1970, that an employee of a luggage company, Bernard Sadow, saw (according to his own account) luggage being transported on a trolley, which gave him the idea of making a suitcase on wheels and marketing his invention. It met with some success, which was greatly amplified when his idea was taken up and improved by large companies, Delsey in France and Samsonite in the United States, and then diffused throughout the world. A stewardess had already had more or less the same idea in 1949 but, although she had tried to market it then, it had not been a success. While the use of wheeled suitcases dates back to 1970, it was a steward, Robert Plath, who actually came up with the idea of the wheeled suitcase as we know it with built-in wheels and a retractable handle in 1987, again for use when travelling by plane. He was a handyman and made these suitcases for the first time in his garage and sold them to a few colleagues, before the idea was taken up, like Bernard Sadow's, by many companies who now make this kind of luggage mainly in China and India. Now it is clear that the image of Robert Plath tinkering with the first wheeled suitcase in his garage in 1987 is less well known than that of Steve Wozniack and Steve Jobs making their first Mac in another garage a few years earlier, but it is no less significant in methodological terms and has also had considerable impact on the way we live and



move around. The wheeled suitcase was born thanks to the existence of airports; but it has played a recognised role in the development of air transport and mass tourism; and its spread has in turn influenced the very way airports are designed today. Moreover, by proliferating across the world, the use of wheeled suitcases has had a range of significant social effects.

Let us consider, from this point of view, the fate of the porters of the Indian railways. As the kotias, they have been around for a century, more or less. Their red-clad figures that followed the titanic development of the railways in India is familiar to every traveller. After Amitabh Bachan, the most famous Indian actor of the period, played one of them in 'Coolie', a very popular film of the 1980s, they became one of the most stereotypical incarnations of the Indian working class. But this is no longer the case. While passenger traffic has never stopped increasing (up to 23 million in 2018) during recent decades, the number of railway porters has drastically diminished during the same period. This is due, of course, to the progressive adoption by rail passengers of suitcases with wheels. Moreover, what this fundamentally means is that, while the discovery of a new use for wheels made Indian Railways one of the biggest employers in India and in the world, the very recent invention of another new use for them resulted in the loss of jobs for hundreds of thousands of workers in the same sector.

This clearly shows, from a methodological point of view, that it is not enough to study, for example, the technological advance of the use of computers or the Internet to understand the 'impact of new' technologies in India or elsewhere. The simple act of adding small wheels onto a suitcase may appear rather unspectacular. But its socio-economic impact may be as drastic as that of the introduction of high technology in the workplace, especially when one looks at their consequences for the less privileged sections of the population. And it's not just because an invention dating back 5000 years can still be the source of significant technological and socio-economic changes for society in the long term. It is also because such technological innovation can emerge not only in technologically advanced environments such as airports, but can also take place in completely different socio-economic environments. Our second example will demonstrate it clearly.

Water pot trolleys

The representation of rural women carrying water jars on their heads has long been one of the best known clichés of developing countries, whether in India or in Africa. But beyond the photographic cliché, we must also note that such a practice is surely as old as the invention of the wheel and that it is well attested in ancient Greece, more than two thousand years ago. More fundamentally, if we are to believe NGO reports on the subject, there are still today, in Africa for example, more than 13 million women who daily travel more than half an hour from their homes to fetch water, which they carry on their heads. And in India, it is still, most certainly, a very common practice, even if coloured plastic pots are now tending to replace those made of copper or earthenware.

We were really surprised one day on a road to Tuticorin in Ramanathapuram district, for the first time in our common experience, a group of women carrying their water pots, not on their heads but on trolleys obviously made for this specific purpose. There is evidence that the first wheelbarrows were used in China, at least two millennia ago, from where they seem to have spread to Europe around the 13th century and the Middle East in the 18th and 19th centuries, where they had hardly been used until then. In India wheelbarrows and trolleys are now regularly used for all sorts of purposes, whether in railway stations or in markets. But the idea of women using them to move between their homes and the place where they fetch water seems to be novel even today.

We were lucky enough to find the local forge where these carts were made. The blacksmith explained to us that the marketing of these carts had not been very successful at first because their wheels had iron rims so the cart would sink in the soil as soon as the villagers left the paved roads onto their village paths. So he came up with the idea of using scooter tyres for the wheels of these carts, and it worked much better, even if it was a bit more expensive. He also told us how he had the idea to manufacture and market them in his village after working

in the blacksmiths' quarter located in the old bazaar of Tuticorin where they seemed to have been invented. As we later discovered, several blacksmiths indeed made these carts in this bazaar, an activity that they developed only a few years ago.

It is clear that these trolleys make life much easier for the women who use them, as they themselves explained to us; but the problem is that they are still too expensive for the majority of village women. It may also be difficult to justify their purchase when it costs nothing to carry jars of water on your head. It is also what differentiates their purchase from that of a suitcase on wheels. The additional cost of wheeled suitcases compared to the suitcases or the simple bags previously used can be more easily justified—even in households with very little means—first because it is an object that enjoys a certain social prestige; and secondly because it obviates the necessity to pay a porter.

As the case of the boats that we have studied in Tamil Nadu showed, such innovations may have potentially important and often unexpected social consequences. They may contribute in a decisive manner to economic life at the most local level and they may lead to the existence, or disappearance, of thousands, if not hundreds of thousands of jobs. And they may also potentially change the daily lives of thousands of rural women. But whether it is the invention of wooden cargo ships, of new uses for wheels on suitcases or of water trolleys, their real importance will not depend on the degree of "modernity" or "sophistication" that they may be superficially associated with.

While the role of big corporations in marketing and disseminating recent innovations on a global scale cannot be underestimated, it is then remarkable to note the diversity of environments from which these can emerge. It is not only in the garages of Bangalore and Silicon Valley or in the technology departments of prestigious universities that the most significant innovations necessarily arise, even today. It is just as much on the banks of a temple or in the stalls of a bazaar that socially decisive inventions take place. And you can find an amateur handyman, a local blacksmith, a barge owner, a small contractor or a wise intermediary at their origin. This is an important point to bear in mind when assessing the future of the wooden cargo shipbuilding industry in Tamil Nadu or other parts of the Indian coast.

RECOMBINING KNOW-HOWS, AIMS AND TECHNOLOGIES

Luxury yachts of Beypore

The shipbuilding tradition in Beypore near Calicut in Kerala has a very different history from that of Cuddalore or Tuticorin in Tamil Nadu on the East Coast. Unlike as has happened at these two ports, the wooden cargo shipbuilding tradition seems to have continued there, almost without interruption, for more than a millennium. There are several reasons for this. Beypore has been, since the 9th century AD, an important trading place with the Arab world and the East African Coast. A large colony of local Muslim traders has been instrumental in keeping that connection alive to this day. Beypore also owes its importance and renown as a shipbuilding centre to its geographical location. Situated on an estuary, it is located at the mouth of the Kallayi/Chaliyar River, which brought down perhaps the best wood in the world for shipbuilding: teak. The different kinds of teak and other species of wood that grow on the Western Ghats within a hundred kilometres (for example in the Nilambur forests), were traditionally brought to Beypore along the river. There, they were used not only locally for shipbuilding but were exported all over the world, especially to countries in the Persian Gulf. Although such economic activity predates Western colonisation by far, it increased along with it. Beypore served as a shipbuilding yard not only for the local traders or the ruling powers in India and the Gulf countries but for the Portuguese and the British as well. It was equally known for the expertise of its workforce: whether it was the ability to transport and manipulate big logs of wood or the craftsmanship of its marine carpenters, the Odayis and Mappila Khalasis in particular, along with various trades associated with shipbuilding.

In spite of such an ancient and prestigious past, the tradition of shipbuilding in Beypore has gradually declined, with the risk of totally disappearing during the 1980s. The most important reason for such a decline was linked, it appears, to the extreme rise in the price of wood and in particular that of teak from the Western Ghats, once these species became 'protected' by the Indian state from over harvesting. There have been other reasons that played a role, such as the local strength of the Unions, which, whatever their legitimacy otherwise, threatened the profitability of this economic activity and viability in Beypore. As a result of different factors, the shipbuilding activity first shifted for a few years to Mangalore during the 1980s; it didn't last long there either, shifted to Kannur in Kerala and was eventually shut down. The paradox is that this happened simultaneously with the shipping tradition which, in contrast, was developing swiftly in Cuddalore on the East Coast of India. Consequently, not only did thonis and kotias supplant the Urus on the West Coast, but the traders and agents of Kerala, Karnataka and Lakshadweep became the main buyers of these cargo ships of Tamil Nadu.

Because of the decline, some carpenters of this erstwhile Uru tradition were relegated to building miniature models of Urus for tourists and international markets. A few others have been working since the shut down under the supervision of Cuddalore craftsmen, on refitting dhows and kotias in Mangalore. Although it appeared that all forms of its original shipbuilding tradition had vanished from Beypore for nearly thirty to forty years, a sort of 'miracle' happened and contrary to all notions of 'loss of tradition', a new breath of life has blown in, in a most unexpected fashion.

Kathiravan mistri of Cuddalore, who accompanied us to Beypore in 2015, could hardly believe his eyes when we stumbled upon, by pure chance, in the backwaters of Chaliyar, a covered shipyard. His complete amazement came from the unusual appearance of two large wooden ships that were being built, but even more, from the kind of wood they were built with.

Apart from the steel frameworks that were used to reinforce the internal structure of the vessel, the entire structure was built with teak, that teak that has become so expensive, and hence its use so restricted, that it is rarely used even to build wooden ship models for tourists. So, the very idea that a whole ship could be entirely made of teak was completely unfathomable, unless it was ordered by one of the wealthiest people in the world, which was not far from the truth in this case.

Like many success stories, it all seems to have begun with one man. While he was working in Qatar in 2011, Satyan Edathodi, a master carpenter from Beypore, was clever enough to convince members of the royal family of the excellence of the shipbuilding tradition of his native place. He obtained a first order for a wooden yacht that would be built in Qatar by Beypore's craftsmen. The Qataris were pleased with the result. Then he managed to convince them that it would be cheaper to build them in Beypore except for the luxurious interior finishing and a new engine that would be fitted in Qatar or Dubai. Gulf oligarchies may love to display their wealth with everything modern, but they are just as eager as anyone else to reassert their cultural identity. Even if they are fascinated by the environmental incongruity of building the highest possible skyscrapers in the middle of a desert and fiercely compete for it, the presence of a luxurious but vaguely 'traditional' wooden yacht in front of one's riviera is none the less appreciated in order to add a little flavour of cultural 'authenticity' to the urban

Facing page: Satyan Edathodiin his Uru building yard in Beypore.

landscape. If everyone has big cars and many have luxurious yachts, it is not given to everyone to possess an 'authentic' dhow (the name used for urus in the Gulf). An International Dhow Festival has been annually organised since 2011 becoming a tourist attraction. Whatever the actual motivations of the Gulf elites, the descendants of the Beypore Uru builders are directly benefiting from it for reviving their own traditions.

There are nowadays at least two shipbuilding enterprises in Beypore that make wooden luxury yachts, mostly for various members of the Qatar elite. When we visited Beypore in 2015, one of the biggest 'Uru cum luxury' yachts ever made was nearly completed. It is supposed to include six bedrooms, a main hall (majari), a dining hall, kitchen and the captain's cabin. It weighed approximately 1500 tons and cost around 70 million Indian Rupees. When we visited one of these enterprises in 2022, two of these new sambouk Uru cum luxury yachts were in the making but more orders were expected to come. Altogether, sixteen of these luxury urus were built from 2013 to 2022.

Shipbuilding in Beypore is thus experiencing a real revival and there is no reason to believe that it will not grow stronger and continue to develop. What is most fascinating in this case is the fact that it happened after a gap of thirty years between the last traditional Uru and the first of the new luxury urus. It is then sheer luck that some of the senior master craftsmen were alive, who could teach, supervise and perpetuate this centuries' old tradition to a generation of younger craftsmen, even if that meant reshaping the appearance, use and function of the ships that they built. Yet, it was fundamentally the same type of know-how, skills and competence, which were deployed for building the new ships as for the old ones. Thus, for example, a small-scale model of a luxury uru was made prior to its construction in order to convince some wealthy Qataris to commission it . But as we were watching that model with interest, the master carpenter came immediately to explain to us that it was of no practical use for constructing the ship. Similarly, we could see the old remains of a slipway to launch ships rusty with disuse as the dashing new urus are still launched into water with the tried and tested wooden winches and the roller mechanisms of the Mappilas, complete with their songs.

Urus, dhows and other similar boats have been at the heart of social, economic and cultural exchanges in this part of the Indian Ocean for over a millennium. Although their importance has gradually diminished since the middle of the twentieth century, they remained very present in the Gulf up to the 1970s. It is only in recent decades that their numbers have been drastically reduced. It happened not only because of the increasing competition with more advanced cargo ships but also, more recently, because of maritime piracy in this part of the world. Wooden cargo ships of Indian origin were not only frequent victims of it but sometimes also, it was said, were used for the same purpose once they had been captured. Despite this and regardless of the new luxury yachts made in Beypore, cargo ships made in India never completely disappeared from the region and they are still commissioned or bought second-hand by local traders for working in the Gulf. Moreover Tamilian and other Indian carpenters and caulkers still find regular employment for their maintenance in the different principalities of the region.

Experimenting with fishing boats

Karaikal is a fishing harbour on the East Coast of Tamil Nadu with bustling boat building yards. When we visited it In December 2019, more than a dozen boats were in different stages of fabrication (Indira Fabricators) in one of the big yards. In contrast to Cuddalore, after the Indian Ocean tsunami of 2004, this yard specialised in building fishing boats made of steel, as in adjacent Nagapattinam, a major fishing harbour on this part of the coast. But to our fascination, while the place is no farther than a hundred kilometres from Cuddalore, the builder supervising the fabrication and those around him simply refused to believe us when we told them that fully wooden cargo and fishing boats were being built in Cuddalore up to a few years ago. He was so convinced that all use of wood for building boats had stopped after 2004 that he was ready to bet with us on it. As a matter of fact, while these ship builders are close neighbours of Cuddalore and share most of the same fishing traditions, their appreciation of technological advancement in this domain was very different.

The evolution of technological change in fishing boats at Cuddalore has been quite different from the one which has taken place in Karaikal, even if with almost the same types of actors; but it has been no less experimental and is no less significant. Basically, during the last fifteen

years, three modes of building big fishing boats (STBs) have coexisted. We were still witnessing the building of big fishing boats entirely made of wood up to 2015, at which point they quickly went into a decline. But rather than being replaced immediately by steel fishing boats, the trend has been to combine a wooden hull structure with a cover of fibreglass. Still, as in Karaikal and Nagapattinam, some owners decided to invest in steel boats. But in contrast to what happened in these two places, only a few steel boats (perhaps thirty) were built in Cuddalore between 2015 and 2018, after which construction completely stopped up to today. The reasons attributed to this are heavy initial investment (about 5 million rupees for building a boat and almost another 4 million rupees for equipping it fully), frequent maintenance of the steel hull and uncertainty of fish catch to ensure returns on such a huge investment. Today, as regards these big fishing boats, the choice has shifted back to the ones made of a fibreglass cover, reinforced with wooden frames and plywood sheets for the hull, resulting in huge savings in initial investment, better speed and less maintenance of the hull. They are also said to be more convenient to use because they may be deployed with various types of net. But, perhaps the most interesting aspect of them is how they are built.

Small fibreglass boats with outboard engines are made in one piece by using a mould that is at everyone's disposal in Cuddalore. But for a big fishing boat, a completely different technique is used. First the frames are drawn and fitted in a manner similar to that of a wooden cargo ship but simple plywood sheets are used instead of wooden planks for the hull. The function of this light and wooden structure is to serve as a mould to give the desired shape to the boat; thick layers of fibreglass are applied on top of it. It's only in the following stage, after the fibreglass hull is made, that it will be reinforced with a wooden frame structure inside the boat, which is covered with a second layer of fibreglass. Although the building process of these boats and the material is completely different from what has been done in practice even in the recent past, it manages to incorporate the knowledge and expertise accumulated over generations of local marine carpenters, and also to give it a new currency by renewing its use.

Such a process is fascinating because, as in the case of the sambouk urus and the new luxury yachts at Beypore, it represents a novel way of recycling local knowledge and expertise. We have already seen that historians of shipbuilding have emphasised the distinction between two distinct techniques of shipbuilding. On the one hand, there were those ships whose hulls were built first and later reinforced with frames

inside, the plank-first technique; this technique is apparently the first to have existed and it was suggested that it was chosen because the construction did not require the whole ship to be preconceived cognitively in the minds of the craftsmen. On the other hand, there were those whose frame was built before the planks were fixed to it, the frame-first technique. It is assumed that such a process came later, as marine archeology seems to confirm, because it is cognitively more sophisticated to use such a process of fabrication which requires that the shape of the ship to be preconceived in the minds of the craftsmen before it is concretely made. However, the interest in the manner in which the large fiberglass fishing boats are built at Cuddalore is that their construction inseparably combines these two techniques. However, the interest in the manner in which the large fiberglass fishing boats are built at Cuddalore is that their construction inseparably combines these two techniques. This is most certainly one of the many innovative skills that experienced marine carpenters truly possess locally.

Why not a fiberglass kotia?

For more than two years now, our friend Kathiravan, perhaps the most renowned master carpenter in Cuddalore, has been thinking about an idea that could, in his opinion, guarantee a new future for the kotias. Why not apply new building methods that we have just described for building fibreglass fishing boats to kotias? The first step would be to build the main frame of the hull, exactly as it was always done before. The main difference at this stage, however, would be that there would be no need to use such massive beams as before. It would be sufficient in his eyes if they were half the thickness of the usual ones. The reason is simple: once the frame was completed, it would no longer be necessary to use wooden planks to build the sides of the ship. Instead, they would be covered with layers of fibreglass. This would cut down, too, on the strenuous process of caulking the planks of the ship. Similarly, the interior of the ship, i.e. its floors and inner sides, would no longer be covered with wooden floors and walls, but with a fresh layer of fibreglass. The final step at this stage would be to protect the outer fibreglass hull of the vessel with a set of wooden protection elements to ensure its solidity, especially when the vessel inevitably bumped into the quay or other vessels when stationary in port, or if it slightly scraped a sandbank when sailing in shallow waters. Once this building stage is over, the other steps in the construction of the kotia would not differ in any way from those that had always been carried out up till then. Thus, for example, the deck, the mast and the cabin would be made of wood as they had always been. And apart from the hull, which would be partly made of a different material while being fundamentally similar in structure, there would be nothing to distinguish these new kotias from those that had preceded them. Despite this, this new way of making kotias would have several decisive advantages.

One of the main reasons why kotias are expensive to maintain is the rapid wear and tear on the wooden planks that line the hull. No matter how much care is taken to preserve them with multiple layers of protection and an aluminium sheeting, they are inevitably under attack from sea water and, above all, from barnacles and parasites. Moreover, especially in the Lakshadweep, it is difficult to avoid progressive damage from scraping against the coral reefs that dot the shoreline. Therefore, from all these points of view, fibreglass walls would have a decisive advantage because they are much less susceptible to these multiple causes of corrosion and structural damage. However, this is not their only advantage; the possibility of drastically reducing the cost of building kotias would be just as crucial. This would be made possible by saving on two expensive items, which today play a central role in the overall cost.

The first of these costs is related to the ever-increasing price of wood for the manufacture of kotias and the difficulty of obtaining sufficient quantities of a quality that effectively guarantees the longevity of the ship. Replacing the planking of the hull with fibreglass walls would in itself radically reduce this cost. In addition, it would no longer be necessary to go through the process of caulking and fitting an aluminium layer, which also represents a significant amount of the labour costs in the construction of a kotia. We may naturally regret the decline of such an activity that has long represented an important source of income and a valued form of skill

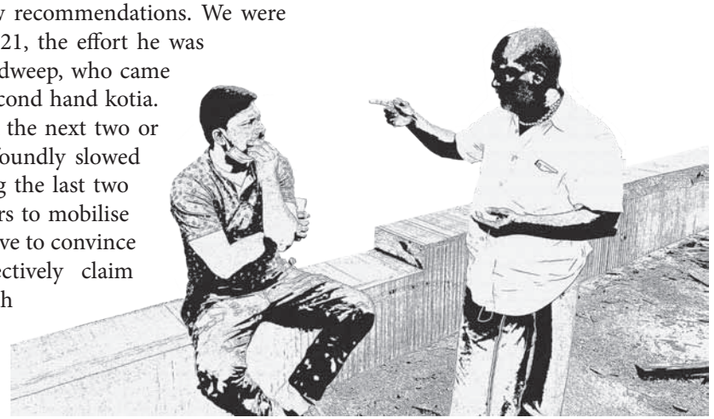
for the local workforce. The fact is, however, that the only alternative in the long run will be not to build kotias at all, which is hardly preferable.

Kathiravan believes that the solution he proposes would not only reduce the cost of a kotia by 50-60% but also drastically reduce the cost of its maintenance afterwards. If this is really the case, it would make them much more profitable and, in his opinion, would allow the production of kotia to be relaunched locally on these new bases. However, two other conditions must also be met.

-The first of these would obviously be that the kotias made with fibreglass walls are no less solid than those made entirely of wood and that they have a longevity at least equal to the latter. Not only is Kathivaran convinced of this, but even thinks that they may be stronger, being both more watertight and more resistant to damage from the coral reefs that abound around the Lakshadweep.

- The second condition, just as decisive, is that the modifications made to the kotia in this way do not lead the maritime administration to cease to consider them as vessels of a traditional nature (MSV) and to withdraw from them the set of legal and financial advantages they benefit from and which are just as indispensable, if not more so, to their profitability. Here again Kathiravan is fully convinced that the proposed modifications would not change the fundamental nature of the vessels, if only because they would continue to appear as cargo ships made mainly of wood and would also still have a mast and sails.

So, the only difficulty he has actually faced for two years now is—despite all the esteem in which he is held in his profession—to convince a potential kotia owner to actually listen to his arguments and to commission the construction of a first fibreglass kotia according to his new recommendations. We were fortunate enough to witness, in November 2021, the effort he was making to convince a shipowner from Lakshadweep, who came to Cuddalore to conclude the purchase of a second hand kotia. He seemed interested in taking such a step in the next two or three years. As the Covid pandemic has profoundly slowed down business in this area as in others during the last two years, he believed that it would take a few years to mobilise capital funds. But, even in this case, he will have to convince the port authorities that such a kotia can effectively claim the status of MSV despite its fibreglass hull, with all the regulatory advantages associated with this category of ships. Only time will show whether his optimism was justified or not.



IMAGINED FUTURES

We have seen that whether in Tamil Nadu or on the other coasts of India, the making of wooden cargo ships is either largely ignored today in India or simply dismissed as an obsolete craft or cottage industry reminiscent of a bygone era, destined to disappear in the imminent future. One of the main purposes of this book is however to contribute to overturning this judgement. We would like to argue here that such an industry, far from being an outdated legacy of the past, should be and can be considered, on the contrary, as a promising solution for the future.

We have seen throughout this book the significant role it has played locally from the first decades of the twentieth century up to recent years. Nothing should prevent us from thinking that it might play such a role again in the future, even if in a new guise. This may sound slightly far-fetched when we consider that no new thonis have been built in Tuticorin since 2011 and only one new kotia in Cuddalore since 2014. But as we have just seen in examining the innovations proposed by Kathiravan for their future construction, this does not mean that the shipbuilding tradition in the region is necessarily lost. After all, as we have just noted in the case of Beypore, the building of urus had completely stopped for at least thirty years before it was revived in an utterly unexpected way and form. Recent history thus shows, both in Tuticorin and Cuddalore, and in Beypore more recently, that as long as there is a collective will and the indispensable know-how to practise and perpetuate or reinvent such a glorious tradition as the shipbuilding described here, nothing need ever be lost forever.

We certainly don't wish to entertain vain illusions about possible futures for the wooden cargo shipbuilding industry and tradition, be it in Cuddalore, Tuticorin or in any other part of the Indian coast. We would, nevertheless, like to end this book by summarising a set of reasons that have already been referred to in various instances, which argue in favour of the continued existence of this tradition. And we would also like to point out a number of possible initiatives that might promote this tradition of shipbuilding.

A priceless cottage industry

It is common knowledge that various actors from policy establishments, NGOs, international organisations and activists in India are looking for grassroots initiatives, which may have convincing societal as well as ecological impact and are worth promoting. We have shown in this book that wooden cargo shipbuilding in Cuddalore and a few other ports in India invariably checks all these boxes. It is thanks to the fishermen community, one of the marginalised sections of

Indian society that such an industry was created and exists till today. It has also contributed significantly to the employment and the professional qualifications of this same population. Moreover, it has the rare advantage of having a positive ecological impact while having convincingly proven that it could be economically and financially viable.

The use of wood for shipbuilding may certainly appear to be a mixed blessing from an ecological perspective as the benefits resulting from its use may be counterbalanced by a rather negative impact if it leads to the depletion of scarce forest resources in a country such as India. But with care, good planning sense and a bit of political will, it can have the exact opposite effect as well. Such would be the case, for example if it becomes possible to protect and ameliorate the management of the forests in the region with the simultaneous promotion of an equally ecological and reasoned use of their exploitation. This could be done by favouring and subsidising their use for activities that are ecologically sound, such as, precisely, the construction of wooden boats and ships.

The hope that local governments may be seriously interested in such a project may seem a little utopian but this is not necessarily the case. In Kerala, for example, government initiatives were taken in this direction in the 1990s, even though they don't appear to have been pursued in a sufficiently consistent manner in the long term. The ambition there was, in rather the same spirit in which it is proposed here, to promote through subsidies the access of fishing communities to wood in order to preserve the artisanal manufacture of fishing boats.

> "S. Natarajan, Deputy Chairman, V.O. Chidambaranar Port Trust, Tuticorin, the chief guest, flagged off the vessel in the presence of P. Ramnath, Chief Executive Officer, Sterlite Copper. Mr. Natarajan said that efforts would be made to provide more facilities at the old port to give a fillip to the traditional sail vessel industry. Small jetties were being established in many harbours along the west coast to strengthen shipment activities through sail vessels, operational along the coastline of 6,000 km in 40 districts across India, he added."
>
> *- The Hindu*[8]

A complementary approach would be to explore the possibility of substituting expensive wood by new sorts of bio-composites, equally sound from an ecological point of view but cheaper and easier to grow, in order to make some parts of the frame. Some experiments are made in this sense with bamboo based bio-composites in Bangladesh, France and other countries (Dehaye 2018). Similarly, it would make sense to eventually replace the use of fibreglass in shipbuilding with other components which could be more ecologically friendly. Much research is currently being done in the world in this direction. And they should be considered as priority research in India too. The advantage of such innovative approaches would be to remedy one of the main drawbacks faced by traditional shipbuilding i.e the extreme rise in the price of the required wood in the last few decades.

More generally, there is a whole range of legal, economic and logistic measures that the Indian State and various local governments and bureaucracies would be able to take if there were genuine political ambition to save and promote this industry. Several of these have been formulated and called for over several years by associations of wooden cargo ship owners, in particular the Federation of All India Sailing Vessel Industry Association and the Coastal Sailing Vessel Owners' Association, Tuticorin.

Repeated requests have been regularly made to improve the port infrastructure for the kind of cargo handled by the kotias and thonis. In particular, lack of sufficient space reserved for wooden cargo ships in these old ports is a major concern. There is also lack of sufficient facilities such as cranes for loading and unloading goods from these vessels, a difficulty with detrimental impact on their financial viability. The absence of dry docks for periodic maintenance is another concern as such docks are sorely missed.

There are also, on another note, repeated calls for easier access to bank loans for the construction of these vessels along with the improvement and simplification of the legislative and administrative procedures applied to them with reference to navigation. Beyond the decisive necessity of keeping a favourable legal and administrative environment for the maintenance and development of such a valuable local industry, the most radical measure called for to secure this mode of transportation would be to ensure that a certain type and proportion of goods transported by sea under the aegis of the State should be exclusively reserved for wooden cargo ships; this is a measure that could be followed by the private sector too. Such demands are not completely unrealistic either; the best proof of this is that an initiative was made in this direction in 2012.

In this case, unfortunately, not only would it appear that good intentions have prevailed over actual achievements, but the real irony is that Sterlite Copper, the Tuticorin based industry which was initially involved in this scheme is not exactly a model in terms of environmental policy, being better known locally as one of the most dangerously polluting industries in the whole region.

There is another powerful reason why Indian authorities should take a close interest in their small shipbuilding industries, such as the one described here. One can better see nowadays in Europe the long term negative consequences of two complementary developments: namely, on the one hand, an extreme concentration of maritime traffic in just a handful of large ports that possess the necessary heavy infrastructure to accommodate the disproportionate size of cargo ships today; and, on the other hand, the drastic reduction in activity of a vast number of secondary ports unable to host and rapidly unload them. As a consequence of this, the number of small cargo ships has nowadays decreased dramatically on European coasts.

Such a concentration of maritime transport is disastrous from an ecological point of view, not only because of the considerable pollution caused by these megaships and the megaports they require. Since the mechanical consequence of such centralising mega infrastructures is the extension of road distance to get the goods to their final destinations, it further adds to the ecological problem with disastrous increase in air pollution and CO2 production. In contrast, coastal navigation offers several decisive advantages on the environmental level, compared to road transport. The cost in CO2 decreases up to 8 times if small cargo ships maintain a maximum speed of 8 knots. They represent more decisive gains if their manufacture involves bio-composites (wood, etc.) and if they are propelled partly or completely by wind. Moreover, the maintenance or development of economic activity in traditional small ports is a decisive asset in maintaining a more ecologically sound and balanced economic development by fostering employment opportunities in the coastal regions. And one may finally add that abandoning a maritime activity in small port towns that have specialised in this domain for centuries if not for millennia, represents a considerable loss in terms of know-how and intangible cultural heritage.

Many well-intentioned initiatives have been taken during recent decades in Europe to encourage a return to coastal navigation, which favours the survival of secondary ports. But the difficulty is that - regardless of the well-known downsides associated with the concentration of maritime transport—plenty of economic reasons contribute to favouring this concentration but only in the short term. This is particularly true of the decisive immediate financial advantage of road transport over short sea shipping, which largely explains why institutional attempts (by the European Community, in particular) to favour maritime transport at regional level have mostly failed up to now. However, there are currently encouraging signs that the situation could change rapidly. One reason for this is the expected tightening of the environmental legislation and taxation systems, the aim of which is precisely to hasten the energy transition by favouring less polluting and less carbon-intensive modes of transport. Another one is the fact that the cost of fuel has been rising very rapidly for several years and is unlikely to fall. These major factors, along with others, not only favour maritime transport and the renaissance of secondary ports, but also call for a profound transformation of the very nature of the ships that transport goods around the world.

Compared to Europe today, the situation on Indian coasts is characterised by profound similarities and by real differences. In both cases there has been a radical reduction in coastal shipping activities for more than a century and a huge concentration of maritime freight on a small number of deep-water ports while a large number of secondary ports relegated to only fishing. The case of Cuddalore that we have studied here is a good example of this. Also, as in Europe, the practice of sailing and the use of traditional materials to build even the smallest

categories of boat is progressively abandoned and could be vanishing completely and very quickly.

This is a figure that is hard to believe but according to specialised historians, no less than 40,000 small coasters (dhows) specialised in coastal trade docked in Bombay every year during the first three decades of the last century. And while such numbers radically declined over the next decades, there were apparently still more than 12000 of them docking at the same port in the late 1970s (Martin 1982). Today, however, only a few hundred of them continue to engage in coastal transport or to circulate between the islands near the Indian coast. Such a historical decline in coastal shipping in recent times however makes it profoundly different compared to what happened in Europe.

As this book demonstrates, a major aspect to consider, contrary to Europe, is that an impressive amount of skill and know-how is still available to build and sail the kind of ships that closely match the kind of ecological ideal that many desperately try to revive and reinvent in Europe. But more fundamentally, one does not necessarily find in India, the irreducible financial gap that one faces in Europe today between the cost of road freight transport and other means of transport that may be more environmentally and socially friendly but less economical. Indeed, we have been able to show that traditional shipbuilding and coastal navigation was able to develop nearly up to the present day on the southern and western coasts of India precisely because it offered its potential investors the prospect of equal or greater and regular profits than they could hope to find with other kinds of investment. Even of late, we have witnessed that a few entrepreneurs who had otherwise been specialised in road transport (in Cuddalore) or in large-scale maritime transport (in Tuticorin) still chose to invest in the type of wooden freighters we have studied.

What made this possible locally in the first place was the ingenuity and sense of opportunity of a handful of entrepreneurs, combined with the collective know-how and adaptability of a community of fishermen and craftsmen. And precisely for this reason, such an example may seem quite exceptional. But, as we have argued, one may find a wide range of more or less equivalent examples of this same capacity for initiative in the whole informal economy and the craft industry in India today. And often, too, as in the case of the shipbuilding industry we have studied here, these should be seen as the premise of a possible future rather than as one of the belated remnants of a doomed past.

As we noticed previously, one main difficulty that the return of sailing and the use of traditional materials has long encountered was not economic or technological but related to psychosocial and psycho-cultural reasons. It simply seemed too

ingrained in Western minds that timber and sail were a thing of the past even if this did not prevent their use for regattas and for yachting. But as all those involved in promoting the return of wind propulsion for shipping will attest, such a prejudice has long held back their initiatives and prevented them from being taken seriously by the industry. However, the technological advances that are taking place today in alternative ways of navigating are leading nowadays to a rapid change not only in practices but also in perceptions. Whether it is the use of biocomposites for shipbuilding or reinvented ways of exploiting the wind for navigating, none of these practices need to be synonymous anymore with the expensive and often devalued human labour that was inevitably required in the past. They are associated instead with the most advanced technologies and fashionable trends in Europe today.

The same reasons that led to the disqualification of the use of sail or the use of traditional materials in Europe, are equally present in a country like India. Here, too, the communities of craftsmen, sailors and fishermen who had always used these traditional techniques are increasingly reluctant to do so and to see their children do the same. Moreover such a prejudice is widely shared, by the entrepreneurs, administrators, officials and legislators on whom the use of these vessels is depending directly. But still, one should not consider, any more than in the European case, that such a detrimental state of mind can't be effectively reversed.

Indeed, the political and administrative concern to balance local development are equally acute in India as in Europe, especially in the coastal regions. And the political concern not to let secondary ports wither away is equally strong. Moreover, India's capacities in the field of high technology cannot be doubted; nor the ability of India to promote the kind of technological development that is taking place today elsewhere in the development of new sorts of wind propulsion systems or biocomposites for the maritime industry. And there is equally a growing sensitivity to environmental issues in India which should play an increasingly important role in promoting legal and fiscal measures which favour the energy transition. Thus, in this context the very existence of a still living tradition of coastal navigation which remains based on wooden and sailing cargo ships, far from being just a symbol of the past, should constitute, on the contrary, both a starting point and an important asset for redeveloping and decarbonising maritime traffic in the Indian coastal regions. This would be the case provided that such a tradition is not allowed to wither but finds a new lease of life at a time when there is growing awareness of its exceptional value and potential. Finally, in addition to the socioeconomic and ecological reasons that alone would justify the preservation and promotion of a cottage shipbuilding industry in Tamil Nadu, there are equally powerful motivations which should generate, as well, enough interest for local authorities and private players to move in this direction.

We have seen how the survival of a shipbuilding tradition in Beypore has been ensured by the awareness of its tourism and heritage potential in another part of the world: Qatar in this case. More generally, we are now witnessing a powerful revival of heritage interest in traditional shipbuilding in almost every country in the world with a long maritime tradition. It would be more than a pity if India were an exception in this respect. India has managed to remain for so long one of the few regions in the world (along with Indonesia perhaps) which has not only excelled in this practice of shipbuilding for thousands of years, but is also the locus where the skills to build a wide variety of locally made ships remained very much alive until very recently. The question is: for how many years can this last? The truth is that, so far, with the exception of a few scattered government initiatives and those taken by people directly involved in this craft industry, one can't easily find the kind of interest in preserving such a fascinating tradition. On the contrary, we unfortunately find that new legal and administrative rules are now making survival even more difficult. It would then be deeply sad if India missed the golden opportunity it has today to preserve and reinvent such a tradition while there is still time to do so. Whether for societal, ecological, tourism or heritage reasons, there are so many compelling factors that combine to motivate stakeholders to move in this direction.

If this book may contribute, even in a very modest way, to help preserve the memory of the extraordinary shipbuilding tradition which developed in Tamil Nadu during the twentieth century, not only by providing an archive of it but also in inciting anyone to act who wants to take part in preserving and reinventing it in their own way, its authors and all the local communities who took it upon themselves to help them so wholeheartedly, would be deeply satisfied.

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Siegfried breaks the smith's anvil - Imaginer Savoir Croire, Public domain, via Wikimedia Commons
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p49: Arsenal de Toulon - culture.fr, Public domain, via Wikimedia Commons *https://upload.wikimedia.org/wikipedia/commons/e/e2/Arsenal_de_Toulon_en_1670_avec_vaisseau_en_construction.jpg*
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p62: IFP facade - Photo Archives, French Institute of Pondicherry & EFEO

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p71: Thoni - Hawkins, Clifford William

p74: Lighters - Shilpin Patel

p130-133: Technical drawings - Ranjit Kumar & Ganesh Gopal

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p202: Yuko Watanabe

p204: Yuko Watanabe

p236: An artillery park - Courtesy of LeonardoDaVinci.net
Uru launch - *https://amazingindiablog.in/beypore-ship-building-industry-for-handmade-cargo-uru-ships/*

p251: Inset - Kotia crossing Pamban bridge, Vilsons Shipping Pvt. Ltd.

p252: Crew - Alan Villiers, No restrictions, via Wikimedia Commons *https://upload.wikimedia.org/wikipedia/commons/c/c1/Dhow_-_crew_at_the_repair_of_sails_on_the_foredeck.jpg*

p252: Thoni - Hawkins, Clifford William

p254: Pearl fisheries - *http://www.columbia.edu/itc/mealac/pritchett/00routesdata/1700_1799/coromandel/tuticorin/tuticorin.html*
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p255: Thonis - Brodrick, J., 1952. Saint Francis Xavier. London: Burns Oates.

pp276-281: Google maps

p303: Base map by Tom Patterson at *https://equal-earth.com/*

p338: Air hostess - Maick Maciel on Unsplash

p343: Uru - Chitra Ajith *https://www.villagesquare.in/will-uru-tourism-revive-prospects-of-keralas-wooden-dhows/*