



A Historical Study: Types and Evolution of Indigenous Sea Vessels in Coastal Gujarat

Shashi Kant Sah¹, Adhya B. Saxena¹

¹Department of History, Faculty of Arts, The Maharaja Sayajirao University of Baroda,
Vadodara, Gujarat, India- 390002

Abstract

This paper explores the typological diversity and evolutionary patterns of indigenous sea vessels developed along the coast of Gujarat. Drawing from historical texts, ethnographic records, oral traditions, and maritime archaeological findings, the study reconstructs the forms and functions of vessels such as the *kotia*, *baghela*, *dhanghi*, *nauri*, *batela* and *machwa*. These vessel types emerged in response to the ecological characteristics of Gujarat's coastline, the dynamics of regional trade across the Arabian Sea, and the embedded knowledge systems of local sea vessels building communities. The paper highlights the manufacturing techniques, material choices, and symbolic design elements that contributed to the longevity and resilience of Gujarat's maritime craft. By situating these vessels within the broader cultural and economic framework of Gujarat's coastal life, this research reaffirms the region's role as a centre of maritime innovation and indigenous technical tradition.

1. Introduction

Sea vessels building has long been a vital part of navigational knowledge more than just a craft, it was central to the success and survival of maritime trade.¹ For traders and seafarers navigating expansive and risky waters, the structural integrity and suitability of a vessel often determined the outcomes of their voyages whether prosperous or disastrous, safe or fatal. A well-designed vessel, built for strength and suited to specific sea conditions, was essential for safe and valuable voyages.

A complete understanding of the construction of vessels, including the materials used, methods in which designs were modified to fit local geographies, and the hazards that were anticipated, offers invaluable insight into the maritime trade. The challenges of each sea shaped the types

¹ Arunachalam, B. (2008). Technology of Indian Sea Navigation (c. 1200-c. 1800). *Medieval History Journal*, 11(2), 187-227.



of vessels that sailed them: smaller, swift vessels were preferred in the Red Sea's reef-strewn passages, while junks frequently avoided the shallows of the Arabian Sea entirely. Even a ship's design may reflect the cultural or religious values of the society that built and sailed it.²

We may never know when or how humans first considered taking to the water, but the sight of a floating wood could have encouraged early experiments. Over time, humans learnt to shape wood for more stability and control, resulting in basic boats similar to the canoes or small vessels used by fishing tribes around the Indian Ocean today.³ These early innovations laid the foundation for a rich maritime tradition where every vessel tells a story not just of trade, but of creativity, adaptation, and human novelty.

Gujarat is located in the western part of India 22.6708° N, 71.5724° E⁴, occupying the region where the Indian peninsula connects with the broader Asian mainland. To its northwest, beyond the expansive marshlands of the Rann of Kachchh, lies the Indus River delta. The state shares its northern and northeastern boundaries with Rajasthan and has a relatively short border on the east with Madhya Pradesh.

The coastline of Gujarat has historically served as a crucial edge between the Indian subcontinent and the wider Indian Ocean world. Ports such as Kachchh; Mandvi,⁵ Mundra, Anjar, Lakhpur, Bhadrashwar. Kathiawar; Veraval, Salaya, Talaja, Mahuva, Dongar, Nagsari, Porbandar, Jhanjmer, Salaya, Dwarka, Gogha, central Gujarat coast; Cambay, Kavi, Bhangad, south Gujarat coast; Surat, Bilimora, Gandevi, Daman, Bharuch, Gandhar, Navsari,⁶

have historically served as hubs for marine activity, promoting the movement of products, people, and ideas. Twelve villages in the Kachchh and Saurashtra regions were particularly allocated for the purpose of vessel building, beginning with Koteshwar in Kachchh and extending through Mandvi, Beyt, Porbandar, and Veraval, among others. Nonetheless, sea vessels building is not limited to these designated places; it is actively practiced in a number

² Pearson, M. N. (2006). Littoral society: The concept and the problems. *Journal of World History*, 353-373.

³ Sharma, P. (2018). Shipbuilding in Indian Ocean c.1000-c.1500 CE. *Suraj Punj Journal for Multidisciplinary Research*, 8(12) 100-112

⁴ Singh, R. L. (1971). *India: A Regional Geography*. p 879

⁵ Saxena, A. B. (2007). MANDVI: DYNAMIC PORT TOWN OF KACHCHH-GUJARAT. In *Proceedings of the Indian History Congress* (Vol. 68, 427-435). Indian History Congress.

⁶ Varadarajan, L. (1980). Traditions of indigenous navigation in Gujarat. *South Asia: Journal of South Asian Studies*, 3(1), 28-35.



of smaller coastal villages around the coastline.⁷ While significant scholarly emphasis has been paid to Gujarat's participation in regional and transoceanic trade, the vessels that enabled and sustained this maritime activity have received insufficient attention. Gujarat's ships were more than just commercial vessels; they symbolised the region's material culture, indigenous engineering, and ecological adaptation.

This study investigates the typology and evolution of indigenous sea vessels on the coast of Gujarat region, tracing how forms such as the *kotia*, *baghela*, *dhangli*, *nauri*, and *batela* emerged and evolved within local contexts. These craft varied in size, structure, ornamentation, and navigational use, often blending Arab, Persian, and later European influences with longstanding regional traditions. The vessels building practices of Gujarat's coastal communities shaped by religious rituals, artisanal guilds, and climatic demands represent a unique knowledge system that continues to persist in parts of the region today.

This research attempts to create a typology of Gujarat's sea vessels based on historical and ethnographic information by categorising vessel types and analysing their construction, symbolism, and regional circulation. Examine how the evolution of vessels was impacted by location, trading demands, and cultural interchange. Showcase Gujarat's indigenous sea vessels building traditions greater recognition in order to contribute to a debate within maritime history.

2. Typology and Design of Indigenous Sea Vessels in Coastal Gujarat

Overview of Classification Principles

The indigenous sea vessels of Gujarat display remarkable typological diversity shaped by geography, trade demands, and cultural heritage. To meaningfully understand and document this variety, vessels can be classified using multiple criteria: hull shape and stern design, mast configuration, sail type, construction method (e.g., stitched, nailed, *vadhera* jointing), function (cargo transport, fishing, pilgrimage), and geographic region.⁸ This typology is learned by a combination of archival sources, ethnographic fieldwork, oral traditions, and marine

⁷ Ray, H. P. (1900). Early historic Gujarat and the trading world of the Western Indian Ocean. *Transregional trade and traders: Situating Gujarat in the Indian Ocean from early times to*, 100-122.

⁸ Shaikh, Zeeshan A., Sila Tripathi, and Vasant Shinde. "A study of traditional boats of Goa." (2011). Vol 36. 79-87



archaeological evidence. Scholars such as James Hornell, John Edye, Lotika Varadarajan, and B. Arunachalam have contributed foundational insights into this classification.

Major Vessel Types and Their Characteristics

Kotia

The *kotia* is among the most iconic and prestigious deep-sea vessels of Gujarat, especially prevalent in Mandvi and Veraval.⁹ Characterized by a high poop deck, flat stern, and broad beam, the *kotia* is a two-masted vessel that employs large lateen sails. A distinguishing visual feature is the elaborately carved parrot-head prow, believed to bring luck and ward off danger. Built using teak wood and carvel construction, some *kotia*'s were copper-bottomed to protect against marine organisms. These vessels were primarily used for long-distance trade with Arabia, East Africa, and Southeast Asia.

Baghela (or Baggala)

The *baghela* is a larger and more robust cargo vessel, similar in form to the Arab *baghla*. It often featured two or three masts, a high freeboard, and a steep raked stern. With a focus on stability and cargo capacity, *baghelas* were equipped for extended voyages. European and Mughal-era records frequently reference these vessels. Their elaborate sterns often included window-like openings and deck ornamentation. *Baghela*'s were commonly used for bulk cargo and sometimes for transporting pilgrims.¹⁰

Dhanghi

The *dhanghi* is a versatile, fast-sailing vessel blending indigenous Gujarati and Arab design traits. It has a double-ended hull with sharp bow and stern and typically supports two masts with lateen rigging.¹¹ Its construction style varies from stitched to nailed planking. The *dhanghi* was particularly favoured for coastal trade, ferrying goods between Gujarat's ports and those along the Konkan and Malabar coasts. Lightweight and manoeuvrable, these ships were an essential component of Gujarat's short-range maritime economy.

⁹ Arunachalam, B. (2008). Technology of Indian Sea Navigation (c. 1200-c. 1800). *Medieval History Journal*, 11(2), 187-227.

¹⁰ Burningham, N. (2007). Baghla, ghanja and kotia: Distinguishing the Baghla from the suri ghanja and the Indian Kotia. *International Journal of Nautical Archaeology*, 36(1), 91-111

¹¹ Hornell, J. (1918). The Origins and Ethnological Significance of Indian Boat Designs. Vol 7. *memories* 3, Bengal Asiatic Society



Nauri

Nauris are medium-sized vessels that share similarities with the *dhangī* but are generally smaller and simpler in form. They are noted for their parrot-head figureheads, rounded sterns, and decked construction. Some *nauris* incorporated wheel-steering mechanisms, influenced by European techniques.¹² Used mainly for fishing and short-range trade, these vessels were prevalent in coastal Saurashtra and Kathiawar.

Batela (Batelo)

The *batela* is a smaller, shallow-draft vessel used primarily in estuarine and creek environments. It has a raked stem, flat bottom, and is often undecked. The *batela's* design makes it ideal for inland and shallow-water transport, especially where larger vessels could not operate.¹³ Traditionally constructed using *vadhera* jointing a method where grooved planks are keyed together and bound with coir *batelas* reflect an ancient shipbuilding tradition with roots in Parsi heritage.

Machwa

Machwas are agile, single-masted fishing boats still seen along Gujarat's coast, particularly near Mumbai and Saurashtra.¹⁴ Their concave keels, sharp bows, and light wooden frames make them perfect for quick manoeuvres and net-based fishing. The mast and rigging are designed to be easily dismantled. *Machwas* represent a living maritime tradition and are among the few vessel types that have remained in continuous use.

Enhancement and Symbolism in Vessel Design

A significant number of Gujarati maritime vessels feature symbolic elements as an integral part of their design. Notably, the parrot-head prow frequently observed on *kotias* and *nauris* is traditionally regarded as a talismanic form of spiritual protection. Additionally, intricate carvings, rope-pattern motifs, and floral scrollwork are commonly found adorning the stern and railings. These ornamental features serve purposes beyond mere decoration; they embody markers of caste identity, regional affiliation, and, in some cases, religious symbolism linked to coastal deities and seafaring rituals.

¹² Hornell, J. (1946). The sailing craft of western India. *The Mariner's Mirror*, 32(4), 200-202

¹³ *Ibid*, 200-204

¹⁴ Varadarajan, L. (1980). Traditions of indigenous navigation in Gujarat. *South Asia: Journal of South Asian Studies*, 3(1), 28-35



Regional Variations

The maritime heritage of Gujarat shows distinct regional variations shaped by functional, environmental, and cultural imperatives. The ports of Mandvi and Veraval are renowned for constructing *kotias* and vessels intended for export, whereas coastal areas of Saurashtra predominantly employ *nauris* and *machwas*, which are better adapted for fishing and short-distance trade. In the Gulf of Khambhat, the presence of estuarine mudflats and shallow waters has led to the use of flat-bottomed boats such as batelas. In contrast, the sea vessels building traditions of Kachchh display marked Arab-Persian influences, particularly evident in the design and ornamentation of *baghelas*. This typological diversity serves as a crucial analytical framework for tracing the evolution of Gujarat's indigenous maritime technologies in relation to its ecological conditions, economic demands, and cultural interactions.¹⁵

3. Construction Techniques and Materials

The traditional practices of sea vessel construction in Gujarat reflect a sophisticated grasp of environmental adaptability, material properties, and structural design. These indigenous shipbuilding methods were predominantly maintained by hereditary artisan communities such as the *Kharwas*, *Lohanas*, and *Vaghers*, who transmitted their specialized knowledge through oral traditions and hands-on training across generations.

Wood Selection and Usage: *Teak* was the primary timber utilized in traditional sea vessel building, valued for its exceptional durability, structural flexibility, and natural resistance to marine conditions. While it was primarily procured from local sources in the Saurashtra region, imports from the Malabar coast were also occasionally employed. In the construction of smaller vessels or for components not requiring high structural strength, alternative woods such as *babul* and *mango* were selectively used.

Joinery Techniques: Two major joinery traditions co-existed:

- **Carvel construction:** This construction technique, commonly employed in the building of large vessels such as the *kotia* and *baghela*, required the alignment of wooden planks edge-to-edge over a robust internal framework. The joints were sealed using natural

¹⁵ Barnes, R., & Parkin, D. (2015). *Ships and the development of maritime technology on the Indian Ocean*. Routledge.



caulking substances to ensure watertightness, while the planks were secured in place with iron nails or wooden treenails.¹⁶

- **Vadhera Jointing:** This method, primarily applied in the construction of *batelas* and other small-sized boats, utilized interlocking grooved plank edges that were tightly joined and bound with coir rope. The seams were sealed with a traditional waterproofing mixture composed of lime, dammar resin, and fish oil. Notably, this technique reduced reliance on metal fastenings and was particularly well-suited to vessels operating in shallow waters.

Sewn Plank Construction: An older construction technique observed in *dhanghi* vessels and some of the region's earliest fishing boats involved stitching planks together using coir or fiber cords threaded through holes drilled along the plank edges. Although this method was gradually abandoned due to its structural constraints, certain coastal communities continued to employ it well into the early modern era, preserving it as part of their maritime heritage.

Fastenings and Waterproofing: Coir ropes and other natural fibre cordage were commonly utilized for lashing, owing to their resilience in saline environments. The caulking process typically involved packing the seams with cotton or jute, followed by sealing them with a compound comprising fish oil, lime, and resin to ensure water resistance. For vessels planned for long maritime journeys, hulls were occasionally clad in copper sheathing to protect the wooden structure from marine borers and other destructive organisms.

Tools and Infrastructure

Vessels building activities were typically conducted in open-air yards situated near river mouths or within coastal settlements. The construction process relied on a range of traditional tools such as adzes, augers, chisels, and caulking irons.¹⁷ The act of launching a vessel was a significant communal event, frequently accompanied by religious ceremonies intended to invoke the protection and favour of maritime deities.

Importantly, this indigenous tradition of naval engineering was dynamic rather than static it continually evolved in response to shifting trade demands, external cultural influences, and

¹⁶ Jean Deloche, "Techniques anciennes de constructions navales en Inde: le probleme de la liaison des bordages", paper read at Sixth European Conference on Modern South Asian Studies, Paris, 1978, pp. 6-8

¹⁷ Qaisar, A. Jan. "Shipbuilding in the Mughal Empire during the seventeenth century." *The Indian Economic & Social History Review* 5, no. 2 (1968): 149-170.



local environmental conditions. Such adaptability enabled Gujarat's maritime vessels to maintain their functional relevance and durability over successive centuries.

4. Socioeconomic and Cultural Context

In Gujarat, the construction, upkeep, and operation of sea vessels extended beyond mere technical undertakings, forming an integral part of the social, cultural, and economic life of coastal communities. Various groups including the *Kharwas*, *Vaghers*, *Lohanas*, as well as Muslim maritime communities such as the *Memons* and *Bohras* occupied specialized and interrelated roles within the regional shipbuilding economy.¹⁸ These roles were frequently hereditary in nature, with expertise transmitted across generations through apprenticeship systems and tightly knit community-based knowledge networks.

The dynamics of caste, religion, and occupational specialization significantly shaped the distribution of roles within Gujarat's maritime sphere determining who constructed the vessels, who navigated them, and who provided financial backing. Communities such as the *Kharwas* and *Vaghers* were particularly noted for their skills in sea vessels building and navigation, whereas merchant groups like the *Lohanas* and Muslim trading communities played a central role in organizing and funding long-distance maritime trade. In many coastal settlements, these groups evolved into complex interdependent systems, wherein shipwrights, sailors, merchants, and religious authorities collectively sustained the region's seafaring traditions.

Maritime workers were organized through flexible hierarchies. Roles aboard ships *malam* (navigator), *nakhuda* (captain), *khalassi* (sailor), *bhandari* (cook/treasurer), and *panjari* (lookout) were designated through skill and reputation rather than rigid institutional structures. The absence of formal naval academies or shipbuilding schools was offset by tightly knit community learning systems.

Religion occupied a central place in shaping the maritime worldview of Gujarat's coastal communities. Deities such as *Shikotri* and *Hinglaj Mata*, *Ranchodji* or *Dwarkadhish*, *Darya Lall Udayyra* and *Khizr Pir* were worshipped across both Hindu and Muslim populations, reflecting a shared devotional landscape. Ritual practices such as *Narial Purnima* marked the formal onset of the sailing season, during which seafarers offered prayers and symbolic items

¹⁸ Varadarajan, L. (1980). Traditions of indigenous navigation in Gujarat. *South Asia: Journal of South Asian Studies*, 3(1), 30-32.



to the sea, invoking blessings for protection and favourable conditions. Among these, the veneration of *Darya Lall* stands out as a particularly significant tradition. Within the Lohana community, *Darya Lall Udayra* was closely associated with Varuna, the Vedic deity of the waters, and was revered as the spiritual incarnation of the Indus River. This maritime divinity is also known by various other names, including *Sagar Dev*, *Darya Pir*, and *Hindawai Pir Jind*.¹⁹ Votive rituals conducted before the launch of a vessel or the initiation of a voyage were considered indispensable, serving both spiritual and communal functions in safeguarding the journey and ensuring its success.

Gujarat's maritime trade networks extended across the Red Sea, Persian Gulf, East African coast, and Southeast Asia, generating considerable economic prosperity and fostering a cosmopolitan character in port towns. These exchanges were not solely dependent on cargo movement but were deeply embedded in kinship ties and trust-based networks that traversed the Indian Ocean rim. Consequently, Gujarat's maritime society evolved into a distinctive cultural formation one that wove together commerce, religious practice, familial structures, and technological knowledge.

5. Conclusion

This study has explored the typologies, construction methodologies, cultural symbolism, and socioeconomic underpinnings of indigenous maritime vessels in coastal Gujarat. By analyzing specific vessel forms including the *kotia*, *baghela*, *dhangli*, *nauri*, *batela*, and *machwa*, it becomes clear that Gujarat's maritime tradition represents a distinctive synthesis of technological ingenuity, ecological responsiveness, and cultural identity. These sea vessels functioned not merely as engineered artifacts, but as dynamic components of the coastal sociocultural fabric, deeply embedded in ritual practices and everyday communal life. The confluence of varied influences ranging from Arab *dhow* traditions to Portuguese shipbuilding techniques served not to succeed indigenous practices but to enhance them, giving rise to resilient and versatile vessel designs capable of meeting the requirements of both regional and transoceanic commerce. Techniques such as *vadhera* jointing exemplify the enduring sustainability and practicality of these construction methods. Moreover, the community-based transmission of maritime knowledge underscores a model of continuity and adaptability that

¹⁹ V. Narbheramji, *Sri Daryalall Udayra Pragatya* (in Gujarati) (Rajkot), pp. 1 -7.



contrasts sharply with contemporary industrial approaches, which often privilege efficiency and standardization at the expense of durability and cultural preservation.

As global attention increasingly turns toward sustainable practices and heritage conservation, the case of Gujarat's maritime legacy offers vital lessons. The region's traditional practices illustrate how decentralized, culturally rooted systems have supported complex and enduring industries across generations. Preserving this knowledge is not only a tribute to the ingenuity of past communities but a resource for reimagining future pathways in maritime design, community strength, and ecological harmony.

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