[**B:**RESEARCH]

Vernacular Nautical Architecture in transition:

A case study of traditional Sri Lankan fishing craft

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Abstract

This paper concerns the oru, the archetypal Sri Lankan craft, that is commonly but erroneously called "catamaran". Oru are of great antiquity and their age can only be guessed at. This vernacular form evolved from the need to build a watercraft using available bio-resources that could fit the nature of the existing inshore waters. The craft were made only of wood with all fastenings being, by choice, of coconut coir rope – a technology common to Indian Ocean cultures till recent times. They are dual-element craft, comprising dug-out hulls connected by spars, or booms, to outrigger floats. The entire craft was 'flexible', meaning that they were non-rigid and could cope with surf-induced torque. The hull being a monoxylon, its rounded bottom could withstand abrasion due to crossing sand spits and being hauled up the beach. It was essentially a "skimming" craft, with a hull that barely caused any displacement and, hence, technologically different from double-outrigger (common in south-east Asia, Madagascar and the east African coast). It has also been suggested that it, can be linked to outrigger canoes of Oceania, but neither of these forms will be argued in this paper as the subject matter is a study in transition. In Sri Lanka the craft remained unchanged for what must have been millennia. In the latter part of the last century, changes began to manifested themselves: the gradual use of iron nails and nylon cordage in preference to coir rope; the preference for GRP over dugout logs for hulls; the use of outboard motors for propulsion instead of sails and rigging and the consequent changes in hull morphology which led to the craft ceasing to have a double-ended configuration. The reasons for change included deforestation, changing priorities in life, cost of manufacture, loss of skills etc. Significantly, even the use of new materials and techniques did not change the dual-element form of the craft: a form which – technologically speaking – had been made redundant by the process of change. This paper seeks to record the processes of change.

This exercise threw up a fundamental question: when, in the course of transition, does a vernacular form cease to be vernacular? As this question could not be answered without reference to the vernacular structures in general, it was decided to pose it at ISVS-5 Seminar. It was also suggested that the horizons of "the vernacular" be extended beyond the built environment and settlements while remaining within the ambit of Architecture: vernacular Nautical Architecture being proposed as one. These two questions are not argued in this paper as it is hoped, that the case study presented will lead to an appreciation of the two issues.

Keywords: Fishing craft; nautical architecture; processes; Sri Lanka

Introduction

The 'Oru': the "National and dominant design

Ships and other major watercraft are, today, built following an architectural design process: "Naval Architecture", is the formal term for this process, and is recognized both as a discipline and a specialization. Pre-modern craft, however, while being products of an architectural process, were – yet, are – 'built' in accordance with a traditional craft technology. In this paper the term "nautical" is used in preference to "naval" in relation to vernacular craft as, in their building and design, the norms and disciplines of Naval Architecture today were, (and are) not followed. Such craft were purpose-built, by builders who drew upon traditional knowledge, training and experience, and not on drawings, calculations, controlled trials, computer simulation etc. They are, in fact, the products of a design process, but one far removed from that of formal "Naval Architecture***".***

[For convenience all illustrations are grouped together below]

The *Oru* – to use its plural, or stem form in Sinhala (*oruwa* being the singular form) – is an outrigger canoe. It is dual-element craft: a marriage of a dugout log hull and a balance log (or outrigger). They are commonly and incorrectly called "catamarans" in English. This nomenclature is an accident of history and lack of specialist knowledge which has spawned further errors, and cannot now be undone. A recent dictionary of watercraft (Mariners' Museum, 2001: 123) lists thirteen geographical regions in which the word "catamaran" is used to denote a raft, and is very specific in its overall definition:

> "**catamaran**
>
> **1.** Generic term for a shaped raft of bamboo or logs found in numerous parts of the world….
>
> **2-4.** (omitted as not relevant to the discussion)
>
> **5.** Sometimes mistakenly applied to an **outrigger canoe.**"

The word "catamaran" is, in fact, derived from the Tamil word *kattu-maram* which denotes a shaped-log raft. Early English writers mistakenly applied the latter name to denote the *oru*, and it has, since, become standardized. Modern "Catamarans" and "Trimarans" are, really, neither *oru* nor *kattumaram*, but "double-hulled" craft inspired by the Pacific model. For readers of this paper it is essential to know the difference between these and the *oru*.

The *oru* of the fishermen is basically a hollowed out log (*orukañda*) which retains a thin, linear shape and is thus considered a 'canoe'. The basic dugout is later modified in two ways:

(a) by the addition of washstrakes ("planks") sewn to the gunwales (top edges of the log hull) to increase its freeboard (i.e. height above waterline), and

(b) by connecting a single outrigger balance-log (*kollääwa*) to the dugout hull using two flexible wooden booms.

By neither process is the shape of the original dugout altered. The composite structure, comprising dugout hull and outrigger, is the *oru.* On completion, the *oru* is made up comprises the major elements which are permanently joined together, i.e:

The dugout hull retaining the shape of the original log;

Plank washstrakes sewn onto the gunwales of the hull and closed off, fore and aft, to form a box-like superstructure with ends sloping upward ;

A shaped wooden outrigger, or balance-log;

A pair of wooden booms lashed to, and connecting the hull and the outrigger;

and other elements, which are detachable but essential for sailing, namely:

Masts (of Bamboo or wood), Sails (of treated Cotton cloth), Rigging (of coir rope) and Rudders and leeboards (of wood, attached the hull by rope loops, or 'grommets')

All parts firmly attached to the dugout hull are fastened with coir rope, either sewn or lashed.

Oru are made in several configurations: variation being dictated by function. In wave-free inland waters, the washstrakes, masts, sails, rudders and leeboards are not used while, at sea they are essential. Here – the working environment of the dominant form of *oru* – the type of fishing it is engaged in dictates the size, and sometimes such additional features as rowing rails.

This paper will focus on the *oru* but brief references will also be made to two other types of fishing craft in use in Sri Lanka.

(1) The "shaped-log raft", already referred to, exists in two forms – *kattu-maram* and *theppam* – common to both south India and Sri Lanka and bearing Tamil names. *Kattu-maram* ("lashed log rafts"), the larger, have 3-5 logs lashed to each other with coir rope, with a removable, shaped bow-piece attached to the bow. The smaller *theppam* ("pegged-log rafts") have no bow-piece: the logs are more finely fitted, and pierced across, to permit two long, flexible rods to be inserted with ends protruding on either side. These protrusions are the "pegs" which are lashed to each other across the craft, forcing the logs against each other. In both forms, the lashings are frequently replaced and the logs dismantled and dried out.

(2) The other type of fishing craft is the beach-seine boats called *mā-däl-pāru* in Sinhala. It is a large, scow-ended craft with vestigial twin-hulls, rectangular in plan, with high freeboard, used only for laying off-shore seine nets. They are rowed and not sailed.

For the purposes of this paper no further description of these types is necessary.

An overview of studies on the *oru*

There is a paucity of studies into the *oru.* Although 19th century studies by persons with a nautical background – such as Edye (1934) and Pâris (1841-43) – produced very useful technical and descriptive drawings, they do not fulfill the needs of modern scholarship. There have also been descriptive accounts and sketches over the years by perceptive observers such as Lewis (1913), and in the Fisheries Department Bulletins (1956, 1958): these, too – while useful – suffer from the same shortcoming.

The earliest studies of importance to watercraft, the world over, begin with James T. Hornell, commonly regarded as the father of such studies. His enduring work was "Water Transport: Origins and Evolution" (1946), but as he had extensive experience of work in India and Sri Lanka, he has left behind two documents of specific interest: "The origins and ethnological significance of Indian Boat designs" (1920 and 2002) and "Fishing and coastal craft of Ceylon" (1943). It is the latter that first makes specific reference to *oru* and, even though the paper is only a few pages long and is concerned with other watercraft than the *oru,* the information and his observations are most pertinent and reflects a global view.

It was not till 1987 that anyone studied a vernacular Sri Lankan craft. That year, Kentley (with Gunaratne) undertook a serious study of the *mā-däl-pāru* for the International Journal of Nautical Archaeology (1987) which he (Kentley) revised in 2003. While very useful, this work is confined to one specific craft and not the *oru.* A few years later Vitharana (1993) undertook the most comprehensive study of Sri Lankan watercraft, "The *oru* and the *yathra*" which will serve as a baseline study for years to come. The same year appeared Vosmer's "The *yathra dhoni* of Sri Lanka", (1993) which, again, was concerned with one craft, and not the *oru*.

Between 1984 and 2009, there appeared a series of in-depth studies on different classes of *oru* published in several European journals and notably in the International Journal of Nautical Archaeology. These were the work of Kapitän, who had walked the beaches photographing, measuring, drawing and interviewing till he became too feeble to continue the work. The published papers, Classification of types, unpublished photographs and scale drawings were collected and prepared for publication by Grainge and the present writer as a Nautical Archaeology Society Monograph and a British Archaeology Report (Kapitan: 2009). This work will form the other baseline (along with Vitharana's) for future studies. The present writer, himself, has been writing widely on Sri Lankan ships and watercraft since 1987, the latest published being "Ships and ship-building in Sri Lanka, with particular reference to a vernacular nautical architectural idiom" (2011) and "Sailing on a string and a prayer: The '*oru* ' culture in Sri Lanka and

the Indian Ocean" (2010, unpublished). Both these papers are concerned with the structure and building of *oru.* Grainge's paper, "Sailing a Sinhalese Outrigger Logboat", dealing with the other aspect of the *oru* – that of actually sailing it at sea – has been accepted for publication in the Journal of the Nautical Archaeological Association and will appear in the September 2011 issue.

Readers interested in knowing more about the *oru* are referred to the writings of Hornell and those who have written after.

The 'Oru': from Vernacular to post-Vernacular

This subject of this paper is how the traditional fishing boats mentioned above have been transformed in the 20th century. Change manifested itself in the middle years of the century and is possible that wartime (1939-46) austerity was a factor that brought about change. However, the major changes took place nearer the last quarter of the century due, not to any plan but to a plethora of contributory factors, including (but not limited to) the rise of mechanized fishing and the consequent marginalization of traditional fishing craft, shortage of traditional materials and the availability of new and cheaper materials, deforestation and population shifts following on societal changes, greater upward social mobility engendered by the availability of free education up to University level. The list is open-ended at the time of writing as this subject has not been systematically researched.

The paper is structured as follows:

1. Reasons for considering the *oru* a vernacular form.
2. The form and structure of *oru*.
3. The heart of this paper namely, the transformation of the *oru* into something not strictly vernacular in form, and the parallel process in the *theppam* and the *mā-däl-pāru*. Questions that arise from this transformation process.

1. The *oru* as a vernacular form

An objective definition of the term "vernacular" was sought to provide a balance to the writer's own understanding of the term, which had been derived from the sphere of Linguistics. "Vernacular" has been defined in architectural terms. For the purposes of this paper such definitions will not be depended on but, instead, definitions readily available to non-specialists will be used. An Internet search threw up www.answers.com which provided definitions of both the noun and adjectival forms. As it is the latter that of interest to this study it is given below, with emphasis underlined:

> "1. Native to or commonly spoken by the members of a particular country or region.
>
> 2. Using the native language of a region, especially as distinct from the literary language: *a vernacular poet.*
>
> 3. Relating to or expressed in the native language or dialect.

4.Of or being an indigenous building style using local materials and traditional methods of construction and ornament, especially as distinguished from academic or historical architectural styles.

5. Occurring or existing in a particular locality; endemic: *a vernacular disease.*

6. Relating to or designating the common, nonscientific name of a plant or animal."

Another source, the Oxford English Dictionary, adds an interesting extension to this, particularly in the adjectival form and pertaining to the field of architecture:

"6**.** Of arts, or features of these: Native or peculiar to a particular country or locality. spec. in **vernacular architecture**, architecture concerned with ordinary domestic and functional buildings rather than the essentially monumental"

In sum, it would not be consider that "vernacular" refers to a structure that is (a) particular to a region, (b) indigenous in style, (c) uses local materials (d) uses traditional constructional methods (e) is functional rather than monumenal and (e) is bound by traditional methods of ornament. Within these parameters, the *oru* is definitely a vernacular watercraft.

The first requirement is to identify that the *oru* is a craft specific to a region. It has been described as a dugout canoe with a single-outrigger. Apart from that form there are two other related forms: double outrigger and double hulled craft. Both single and double outrigger canoes are to be found, in the global context, (a) in Madagascar and the east coast of Africa, (b) in and around Sri Lanka, (c) in the Indonesian archipelago, and (d) in the countless islands of the Pacific. In each area they are distinctively different, with multiple forms sometimes co-existing. In the Indian Ocean the double outrigger craft are found in the western and eastern rims while the single outrigger, common in the Pacific Ocean, is found only in Sri Lanka, Kerala and the Andaman Islands. (Hornell: 1946: 255 and map). It is not intended to speculate why the two single-outrigger areas are not contiguous, beyond noting that the double-outrigger area occurs between, and separates them. In the northern Indian Ocean Sri Lanka takes centre stage, with Kerala and Lakshadweep (Laccadive Islands) to the north, the Andaman Islands to the east and the Maldive Islands (where this craft is no longer in use) to the west. It is in Sri Lanka and Kerala that the *oru* culture developed to limits not achieved elsewhere and maintains its vibrancy to date.

Within Sri Lanka itself the *oru* culture flourished in the west and south of the island: and elsewhere other, more localized nautical cultures existed. James T. Hornell, who once served as an advisor to our Department of Fisheries, made the oft-quoted perspicacious remark that

"No greater contrast can be found in small craft designing than that between the types used on opposite sides of the Gulf of Mannar, South of latitude 9 degrees N. On the Indian, or Tamil, side the catamaran or boat canoe alone are employed; on the Sinhalese side, the outrigger canoe is the national and dominant design, the catamaran being used only in the northern, or non-Sinhalese part of the island and by migrant Tamil fisherman in Colombo, with the dug-out restricted to its proper sphere of usefulness on rivers and inland waters."
(Hornell: 1943: 40-53) (emphasis mine)

Thus, even though Sri Lanka was the centre of the Indian Ocean single outrigger culture, the heartland of the culture was the area that Hornell delineates: south of the Gulf of Mannar, meaning, the western, southern and eastern coasts. It may be noted in passing that, responding to the change of the monsoons, migrant Sinhalese fishermen in the west and south moved overland with their *oru* from to the east and back again. This migration came to an end in 1983 and hence the presence of *oru* in the east coast has diminished. A Fisheries Department map of 1958 gives the following distribution of *oru*: Western Coast (Kalpitiya to Galle) – 4000; Southern Coast (Galle to Hambantota) – 1900 [*a grand total of 5900*]; and Eastern Coast (Kuchchaveli to Akkaraipattu) – 1500. These figures underline the fact that the west and south were the heartland of the *oru* where it flourished and, in fact, may have been born. Last year a definitive record of the last of the vernacular *oru* of this area was published (Kapitan: 2009). Eric Kentley, who systematically studied the *mā-däl-pāru* of Sri Lankan and the *masula* boats of the Coromandel coast was moved to say:

> "Although the boats of Sri Lanka share with several other boat types of the Indian Ocean a common technique in fastening planks, indeed a special method of sewing, this is a single attribute and not sufficient to place Sri Lanka within a broad 'Indian Ocean boat building culture'. In terms of maritime ethnotechnology, Sri Lanka has a distinctive culture: sewing may be the only imported trait (though it cannot be ruled out that it developed here first)." (Kentley: 2003: 180)

Note that he places our maritime ethnotechnology outside the Indian Ocean boat building culture, thus lending credence to the position that our nautical culture was a vernacular one.

2. Form and Structure

The first requirement necessary for considering the *oru* "vernacular" was to demonstrate that it was a regional, local and native form. This has be done, briefly, by separating the cultures of the north and south of the Indian Ocean, placing Sri Lanka at the centre of the northern culture and by identifying the heartland of the culture within the country. It is now possible to consider whether, as stated in the Abstract, the heartland of the *oru* culture held the potential to give rise to a form of watercraft of that form and structure, given the available bio-resources and inshore marine environment

2.1: *The working environment*

Oru were in use both on the sea and in sheltered inland waters. On river, lake, canal and lagoon where waters were calm, the *oru* was merely a hollowed-out log joined by round timbers or spars, to a balance log (the *pilā oru* form) which was quite stable. At sea, however, a *pilā oru* could ship water and be swamped and, hence, vertical plank extensions were sewn on to increase freeboard and prevent this. This made the hull ride higher in the water than the outrigger, and the outrigger booms had to curve downwards from the top of the washstrakes to the outrigger. These modifications proved satisfactory and made it possible row or sail the craft in a dynamic environment. With both ends (fore and aft) of the dugout hull identically shaped and sails rigged on masts or sprits, the sea-going *oru* could efficiently sail to windward by "changing ends" (sometimes called "shunting"), instead of 'tacking' as a craft with fixed 'bow' and 'stern' would. It is a fast and maneuverable sailing craft capable of sailing close to the wind. Earlier this year, Gerald Grainge, (yachtsman and Series Editor for the International

Journal of Nautical Archaeology Monographs) undertook a study into how an *issan oruwa* actually sails to compare his findings with a previously published paper (Kapitan: 2009:176-181). In a paper, to be published in September (Grainge:2011) he has commented, as follows, on the sailing efficiency of the craft:

> "Using a hand-held GPS and a hand-held anemometer, I was able to record some performance data for the *oru*. The wind was north to north-easterly 6 to 9 knots (Force 3 occasionally dropping to the top end of Force 2). On various points of sailing from hard on the wind to running downwind, boat speeds in the range of 4 to 6 knots were recorded, averaging 4.75 knots. In terms of the apparent wind, windward performance looked respectable at some 45° off the bow. However, converted to true wind, this seems disappointing – *c.* 75° off the bow. Even so, few modern cruising yachts will do better than 40° off the bow in terms of the apparent wind."

He adds the cautionary words:

> Such data, recorded on one occasion over a period of some three hours, must be treated with caution…. In spite of this the overall impression is of a capable sailing craft.

These *oru* operate in comparatively shallow inshore waters, with shelving beaches, off-shore reefs, heavy surf close to land, a negligible tidal range, coping with prevailing currents and counter-currents subject to abrupt change. In such waters, the craft have to be of shallow draught and hardy construction with a sturdy bottom, and also be able breast, or ride the surf while remaining essentially a workboat. What this environment called for was a craft with:

- Tough hulls, of readily available material, that could work both at sea and on river and withstand abrasion encountered while crossing sand spits and being hauled up the beaches in fair weather.
- Fastenings of easily replaced "sewing" and lashing material, which assured a 'flexible' (i.e. non-rigid construction) craft at sea.
- A double-ended, dual element configuration, of shallow draught to facilitate 'skimming' over the surf and beaching in an upright position.

The *oru* with its shallow draught (it had no keel), its dual element form, having no keel but with the ability to flex to meet the surf generated torque (due to its rope fastenings) satisfied all requirements.

2.2: *Materials and resources*

The preceding section would have demonstrated that the inshore maritime environment could have generated the *oru* form as an answer to the difficulties faced. Whether the necessary bio- and human resources were available for building the craft have now to be examined.

Constructional material was easily found in the heartland of the *oru* culture. The south-west of the island was, until the 19th.century, under heavy rain forest cover which afforded builders a wide spectrum of timbers. The oldest boat recovered from a river bed was built of *Artocarpus nobilis* (*sinh.*"val del"): *Artocarpus* species are used for boat-

building in Kerala (locally *anjili*) and Sri Lanka even today. Vitharana (2009:175), speaking of the last surviving fishing *oru* lists thirty-eight different types of wood that could be used for seven major parts of the craft: three for the Hull, five for the washstrakes, five for the Booms, two for the Balance log, eight for the Rudder, four for the Mast, five for the blade and six for the loom (handle) of the oar. A wider range may have been available earlier.

Carpenters, who practised a craft learnt under the *guru-sishya paramparawa* (teacher-pupil continuum), were the boat-builders. (During the last six hundred years or so fishermen began building their own boats.) Iron and steel were being produced locally at least two millennia ago and they would have had axes for logging, adzes for hollowing-out the log boats and, perhaps drill-bits. Importantly, iron nails were not used to fasten parts of the boat together; they were "sewn" or lashed, with rope. This appears to have been a matter of choice as, since the dawn of Sri Lankan History, wood was a material used to build houses or furniture which would have involved the use of either iron nails or treenails. Such structures were certainly not sewn or lashed.

Since the coconut palm propagated itself around the coast, and was widely cultivated inland, there was no shortage of rope. Coconut timber and fibre (coir) were widely used for shipbuilding elsewhere in other Indian Ocean cultures, too. Gunawardana (1990:31), quoting al-Idrisi, says that Arab ships from Oman came here to obtain rope, coconut tree trunks for masts and spars and timber for planking. Orders were also placed for ships constructed here. Well laid-out coconut plantations are referred to in the reign of King Mahadathika Mahanaga (9-21 A.D.). Aelian, (170-235 A.D) says that:

> "…this island in the Great Sea which they call Taprobane has palm trees wonderfully planted in rows, just as in lush parks the park keepers' plant shady trees." (Weerakkody 1997: 235)

The bio-diversity of south-western Sri Lanka thus provided the raw materials to build vernacular craft, namely:

- Large trees for timber.
- Other timbers with specific characteristics.
- Coconut rope in commercial quantities.

The *oru* required very few materials: wood, coir rope and cotton sail-cloth. Since these were always available, the *oru* and *pāru* forms persisted – responding to encountered imperatives – and flourished throughout known History and even earlier. The oldest example found, studied, recorded and dated is (as noted earlier) of *Artocarpus nobilis* (*sinh.*'Val-del') and is C^{14} dated to 2300 ± 100 BP (*circa* 360-460 BCE). This places it very close to the beginnings of traditional History, and its high level of workmanship speaks of advanced boat-building skills that must have *either* existed here from before to that date *or* have been introduced here as a fully developed technology by the Indo-Aryan settlers. Since the *oru* culture lay far south of the Indo-Aryan homeland, where the coconut palm cannot grow, the latter possibility is considered unlikely. The greater likelihood is that the technology emerged in Kerala (South India) and, in the *oru* heartland of Sri Lanka and interaction followed. If one sets sail from Kerala for Sri Lanka, the first landfall is south of Mannar. The oldest log boat found in Sri Lanka and referred to above, was recovered from a river bed in the heratland. All factors appear to support the view that the *oru* is a vernacular watercraft and its suggested birth and development from log to cargo ship is traced, in sequence, in Fig.1, below. Here the two

main boat types, ***ORU*** and ***PARU,*** are identified as two separate forms within the overarching *oru* culture.

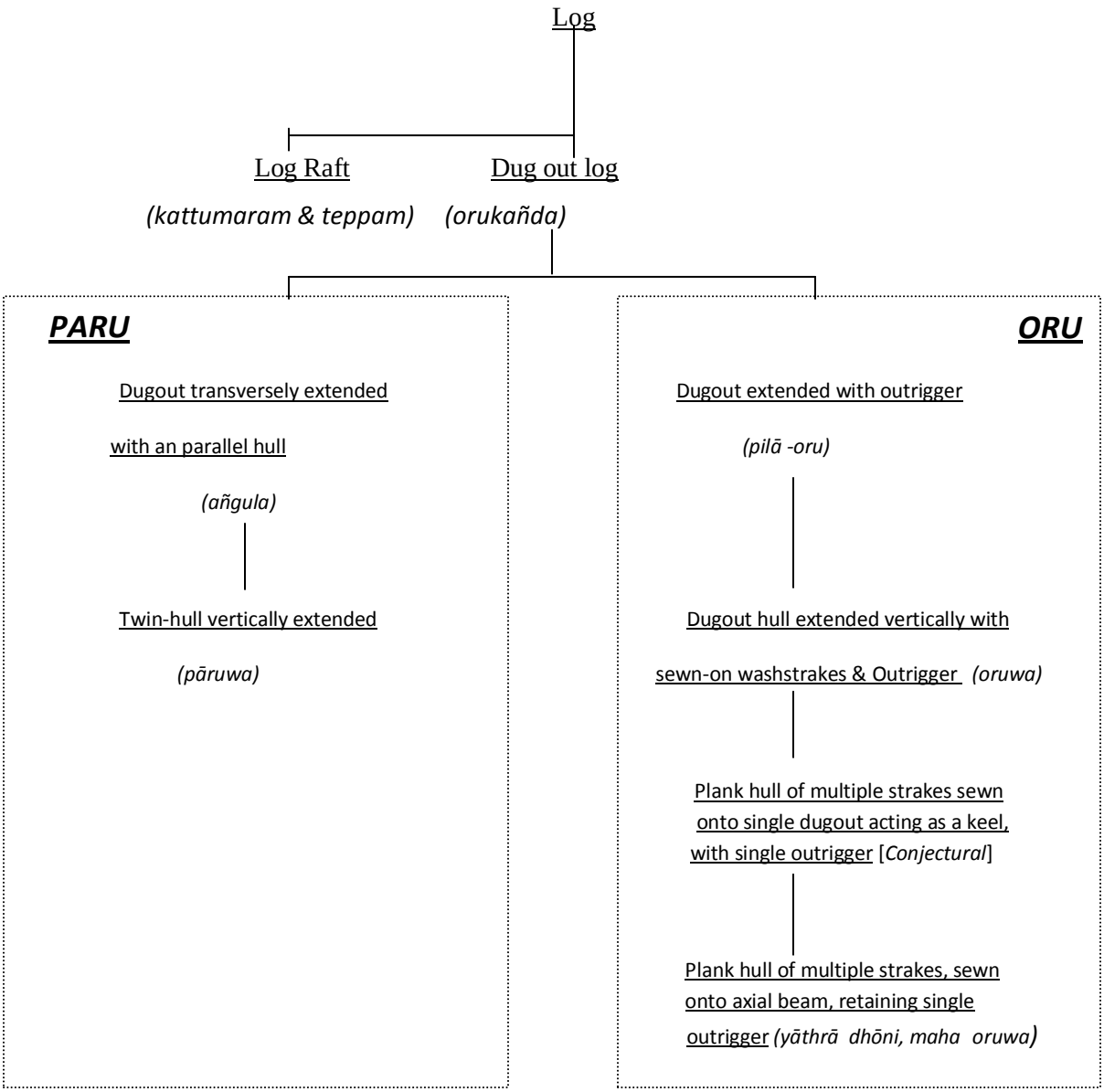

Fig.2. The main boat types ORU, PARU and their development

[NOTE: Of the configurations above, only the Dug out log *(orukañda)* is unstable in the water. It becomes stable when linked to a twin hull (in *PARU* form) or an outrigger (in *ORU* form)

For purposes of clarity, and ease in following the argument, these craft above are illustrated:

Fig.1. A view of an *Oruwa*

Fig. 3. *orukañda:* log being hollowed out

Fig.4. *kattumaram:* lashed-log raft

Fig. 5. *teppam:* pegged-log raft

Fig.6. *añgula:* twin-hulled ferry

Fig. 7. *pāruwa:* twin-hulled cargo craft

Fig. 8. *pilā –oru:* outrigger without washstrakes and sails

Fig. 9. *oruwa:* seagoing outrigger craft

Fig. 10. *[From Kerala. Must have occurred here, too, but evidence is lacking]*

Fig.11. *yāthrā dhōni:* plank-hulled, seagoing cargo ship with outrigger

The last two forms are included to illustrate the final forms in which the *oru* form developed but are not dealt with at length in this paper.]

3. Transformation

The base form of the *oru* now has now been described; particularly its dependence on forest and cultivated produce, and pre-modern craft technology. It is now possible to trace the changes that took place in the course of the last century and try to foresee the future of the craft.

3.1 Imperatives for change

Transformation of this base form was sparked off by one, or more of such factors as:

1. Dwindling of bio-resources
2. Socio-economic shifts
3. Redundancy (of larger craft)

4. Shrinking pool of skilled workmen
5. Emergence of alternative materials
6. Altered life-styles

No doubt there are other factors. But, among those listed, only the third ("redundancy") did not affect the *oru, kattumaram, theppam* and *mā-däl-pāru.* These craft were all fishing craft. There is a steady demand for fresh fish in a country where meat-eating is not widespread, and fishermen and their craft fill a niche in community life. However, all other factors listed above did affect the fishermen.

Major socio-economic developments had begun to influence the south and west, flowing from the arrival of European colonialism in the 16th century. For the purposes of this paper it is sufficient to note its impact on the south-west: that this least "developed" region in ancient and medieval times was transformed into the most commercial and urban region in the country, and that the new economy touched and radically changed the life of all those who lived there.

With the European powers controlling all major sea-borne traffic, through their control of the seaboard, the larger traditional cargo craft (i.e. *yāthrā dhōni*) were, first, confined to coastal and barely viable role and, finally, became economically non-viable. Smaller fishing craft were not so affected, as they had a role, albeit domestic, to perform. But, with the disappearance of the larger ships, the fishermen too were faced with problems of keeping their craft in good order.

These problems made the boat builder and owner resort to various stratagems in building, maintaining and using their craft. Building of new *oru* ceased to be easy with the sacrifice of the forest cover for the new plantation-based economy, based on deforestation and urbanization. Simply put, suitable trees were difficult to find and the laws pertaining to their felling were equally difficult to deal with. Coconut fibre also became a scarce commodity, but for a different reason. Rope has to be woven by hand to reach the standards required for high-risk work: but coir manufacture became mechanized and catered for less discerning consumers. Fishermen were forced to weave their rope themselves and they found themselves marching at a slower pace than the rest of the developing community. New boats were not built regularly and those that were, tended to be smaller and costlier. The fishing fleet became smaller, both in size and numbers and means had to be found to maintain the older ones in operational condition. The last traditional builders found insufficient markets for their skills though, for a while, they were useful for the upkeep of the older boats. But that was a limited field and, as they were basically carpenters, they sought other work. When the Omani builders of the "Jewel of Muscat", (a replica of a 9th century Arab ship) came here in 2008 to find specialists in caulking and sewing planks with coir rope *"galappatti karanawa")*, they could find only one who was sufficiently skilled and they decided to recruit them from Cochin (in Kerala) and Minicoy (in Lakshadweep) where the skill

survives. As large trees, high quality coir rope and skilled builders were not available, and as fishing was both a livelihood and a community need, alternatives had to be found.

3.2 Transformation: the process

Transformation was effected in several ways, namely, by:

- substitution of non-traditional materials for traditional ones;
- adoption of new forms of propulsion; and
- resultant changes to form and structure.

Nails.

The first non-traditional constructional material was iron nails, clenched or riveted. It was first used to fasten wooden patches on to the hull. The earlier practice had been to cut around the damaged section, making a neat rectangular opening, which was filled in and covered over by a rectangular wooden "plug patch" sewn on to the main hull. The practice of using nails, which (perhaps) emerged during the war years, continued into the 1960s, if not later. Patches were nailed, or riveted to the hull, instead of being sewn on (Fig.11). The reason may have been a lack or high cost of skilled labour, or merely simplification. Iron nails/rivets corroded upon interaction with oxygen and these would later have been replaced by copper nails. (The large river *pāru* – cargo carriers on river and canal – which were regularly exposed to salty water and breezes, were all fastened with copper fittings since, perhaps, the 19th. century.) Copper (and later aluminum alloy) coins first served as 'washers' (the technical term being 'rove') between the nail head and the wooden hull to reduce contact with the wood. It is likely that the coins would have been used after iron nails or rivets, by themselves, had proved unsatisfactory. Nails were thus the first non-traditional material to be used but were, in turn, rendered redundant with the adoption of other non-traditional materials.

Fig.12 Use of coins and nails for quick repair

Nylon cordage

The traditional material that made its absence felt, in a major way, was coir rope. By this time the builders had already become maintainers, and they required quantities of quality rope to keep the *oru* seaworthy. All sewing and lashings on board were replaced within 12-18 months, generally soon after the Sinhala New Year. If there was no rope there was no boat, and so alternatives had to be found. Merchant ships and Fisheries Department multi-day trawlers used imported Manila rope. This was expensive, but quite satisfactory and those discarded or replaced during periodic refitting were bought by the fishermen. While this was a satisfactory substitute it was no solution, as the fishermen had no control over the supply, and importation was beyond their financial reach. At this point, nylon cordage became a viable alternative (Fig.12). It was already in use on merchant ships trawlers and harbour craft. It was in demand for a variety of uses, which led to it being manufactured locally. Freely available in a variety of sizes by the early 1970s, it had some disadvantages, but price and availability were strong arguments in its favour. However, for use in sewing, coir rope was largely persisted with.

Fig. 13. Manila rope and nylon cordage

Mechanization

So far, the transformation was entirely a matter of substitution of one constructional material for another. The next stage was the transformation of the *oru* from a sailing craft to a mechanized one. The first outboard motors (OBMs) made their appearance in the 1970s. In the first stage of the transformation process the motor was clamped to the after boom. The OBM provided both motive power and steering capability. In the second stage, once the motor had proved its value, one end of the craft was sawn off, and a flat surface created ('transom stern') to which the motor could be permanently affixed (Fig.13).This change improved the sailing qualities of the craft but made it impossible to sail her.

Fig.14. Outboard motor on the transom stern of a mechanized *vallam oru*

Changes brought about by mechanization

The effect was to change the entire rationale of the *oru* form. The *oru* was a double-ended craft with each end serving as the bow whenever the sail, rudders and leeboards were adjusted as necessary. With the OBM fitted to the stern, the craft acquired a fixed bow and stern. The outrigger, though retained, was no longer required to be to windward. Now that there was a Bow and a Stern, the terms "Port" and "Starboard" had a meaning in the new *oru*. When it was double-ended *oru* had only a 'windward' side (which was where the outrigger was) and the other side was, therefore, the 'leeward' side. Perhaps more importantly, there was no longer any use for sail, mast, rudder and leeboard. Not all *oru*, however, were/are mechanized. Mechanization was opted for only by fishermen whose chosen mode of fishing called for greater speed, larger hulls and fishing grounds located further off-shore.

Fibreglass hulls

While this transformation was taking place, another new material was marking its appearance. "Glass reinforced plastic", or GRP, locally called "fiberglass" was already in use for building mechanized fishing craft. It first entered to *oru* scene as a material for applying patches to even old wooden hulls. Soon, small paddled *oru* hulls, complete with washstrakes, were made on moulds (made from discarded wooden hulls) and found to be satisfactory (Fig.14): however only the hulls were of GRP, with the booms and balance logs being yet of wood and lashed to the hull. Next, hulls of larger, seagoing *oru* were made on moulds. By this time it was no longer necessary for moulds to be made of existing craft and the manufacturer now made moulds based upon the demands of the user. Thus the stern was specifically fashioned to accommodate larger outboard motors. Greater power meant greater speed. The stern-mounted motors, when 'revved-up', "dug" into the water lifting the bow partly out of the water.

The change in the way the hull behaved under extra power required it to be redesigned. Accordingly, the prow was sharply – and exaggeratedly – raked upwards to lift as much of the hull as possible out of the water to reduce resistance (Fig.15). In some, a fin-like feature was incorporated lengthwise along the hull, on the purpose of which the writer cannot comment.

Fig. 15: Small *oru* with hull and washstrakes moulded as one. Behind: a *mā-däl-pāru* of GRP

Fig 16: Large *oru* with prominent prow, and GRP outrigger but retaining wooden booms

Interestingly, given the versatility of GRP as a boat-building material, the fiberglass hulls continued to follow the linear shape of the log in the older form.

Since a GRP hull could be made to any specifications, there was no technical need to be bound to this 'canoe' form, a form which calls for an outrigger to ensue stability. One can attribute this to an ingrained conservatism or a culturally determined bias. In the long history of outrigger craft is Sri Lanka, the *oru* morphed into a plank-hulled, outrigger-equipped cargo ship (*yāthrā dhōni* – last stage of evolution in Fig.1). At that stage, the dugout was replaced by a keel log around which a boat-shaped plank hull was built, but even then the outrigger was retained. In the GRP *oru* both the 'canoe' shape of the dugout hull (as opposed to the 'boat shaped' *yāthrā dhōni* hull) and the outrigger are retained, although they are now made of fiberglass. A distinction can be drawn between the *oru* that opted for fiberglass and the *vallam-oru* that followed the

same path: in the latter, a variant form, the hull component is beamier and the washstrakes narrower.

A possible reason for preferring the dual-element configuration is economic, not technical. There are large numbers and types of wooden and GRP Motor Fishing Vessels (MFV) fitted with inboard engines, in the country. Their range of operations is cross-oceanic and they are often used in people smuggling. Their cost of purchase and operations are quite beyond the *oru* fishermen and their improved sea-keeping qualities of little interest. To them, it is obvious that a modest OBM fitted to an *oru* hull can give them a very respectable turn of speed to take them to the known off-shore fishing grounds and to the edge of the continental shelf. Using diesel powered motors they can achieve all this at a comparatively modest cost: the cost of purchase and maintenance are also within limits. These craft do not need built-up Fisheries Harbours as the beach is free for their use. All these factors, considered together, could give a fair rationale for one to opt for a GRP *oru* equipped with a 'Yamaha' OBM.

Yet booms and (most) outriggers from old craft were, for a long time, lashed onto these "state of the art" GRP hulls. GRP outriggers are common now, but none yet with booms of GRP (Fig.15).

It is interesting that the booms have been the last to fall victim to GRP. Vitharana (2009:175) says:

> "Of any dugout outrigger canoe it is the boom, of all its parts, that comes under almost constant and, at times, the most tremendous strain; and a broken boom means, invariably, a capsized hull. If a mast, rigging and sail stand the onslaught of a gale-force wind and the outrigger remains buoyant, a weak boom – just one of the pair – can spell death to the crew."

Perhaps the safety levels required of a boom cannot yet be met by GRP.

The last aspect of the transformation process that has to be noted is "ornamentation". If we take surviving *oru* as the standard what stands out is that no ornamentation was used. Ornamentation was in use in all other Asian countries, whether for aesthetic or ritual purposes, and even in the ships of Kayts and Velvettiturai where *oculii* (eyes on either side if the bow) and *surul* (inward-coiling stem post) were the norm. This is an area that needs to be explored. The *oru* that we know are no-nonsense, workmanlike craft, quite advanced technologically though retaining a vernacular form. We do not know whether they were equally plain a thousand years or more ago, when a "grand" culture prevailed in the country, and not a post-medieval folk culture. The use of colour is an aspect of ornamentation different from the ritualistic type mentioned earlier. The *oru* were traditionally unpainted, undecorated craft. At a point in time, some paintwork was used, particularly in the Negombo area, among Roman Catholic fishermen and by Muslim fishermen of the east coast. The use of paint became more popular when wooden Mechanized Fishing Vessels (MFVs) made their appearance. With their wooden hulls and inboard engines they were no lineal descendents of the *oru* and paint was a common way of establishing individuality. Slight traces of paint began to appear,

gradually, on wooden *oru.* When fiberglass hulls came to be factory made, the new craft ceased to have the same emotional bond between "user' and "craft", as the craft were bought off the shelf. Ornamentation thus became the decision of the manufacturer (Fig.15) and not of the fisherman-owner. Even then, the purpose of ornamentation is not ritualistic and does not follow traditional decorative motifs (which are far from lacking in Sri Lanka).

The process of transformation can be summarized as follows:

- Hulls are not made of dugout logs but moulded of synthetic material.
- Sewing is no longer common as the vertical washstrakes are now part of the moulded hull. Where still essential, lashing is done with Manila and nylon – not coir – rope.
- The hull form is no longer double-ended, but has a considerably modified prow and a transom stern.
- The seagoing *oru* are no longer sailing craft but mechanized craft. They do not need to 'tack' or 'change ends' and have acquired a fixed 'bow' and 'stern', and one can now speak of their 'port' and 'starboard' meaningfully.
- In smaller sailing *oru* on the east coast Polypropylene fertilizer bags are used for sails instead of the costlier cloth.
- *Theppam*, are also moulded of GRP in one piece without any lashings.
- River *pāru* hulls have been known to have been constructed of steel.
- *Mā-däl-pāru*, which were not built a decade or two ago due to high cost, have re-emerged in GRP, courtesy of aid flowing in after the tsunami of 2004 (Fig.14).

4. Question: Is "transformation" the end to the "vernacular"?

This is the question that the writer would like to pose. The *oru* was, earlier, a regional craft, built of wood and coir rope (available materials) to suit a particular maritime environment. It was double-ended, married to an outrigger and propelled by sails. To day it is built of GRP and nylon; powered by an outboard motor; not double-ended; and not a sailing craft. It uses no single material of which it was originally built. The traditional shipbuilders have gone, and factory-built craft are bought off the shelf. On the other hand, the craft – though considerably modified – still retains its dual-element form and, its use is still limited to the same region. Significantly, the hull form has not changed: a change could easily make the outrigger unnecessary.

In India and the Gulf States the same phenomenon has been witnessed by the writer: old boat forms cloned in GRP, or the use of new materials for old. Reviewing '*Boats of South Asia'* (McGrail *et al:* 180) for the International Journal of Nautical Archaeology (Devendra:355-57), the following question was raised in relation to our own fishing craft:

> "… how far must the materials of traditional boats change before they [i.e the boats] cease to be traditional? In extreme cases—as in the *vallam*, *oru*, and *teppam* of Sri Lanka and more complex craft seen in the UAE—the traditional form is reproduced completely in fibreglass and made on a mould".

Today, the present writer would re-phrase this question: If the craft retains the form of the older, vernacular craft, but is built of completely different materials and is used within the same regional limits, can we consider it as continuing to belong to the vernacular tradition? If one seeks a parallel in the built architecture of the country, it can be found between Devendra *Mulachariya's* timber-built Audience Hall of the Temple of the Tooth, Kandy, and the concrete Independence Memorial Hall built by Wynn-Jones in Colombo. Can, or cannot one say that the latter represents the same tradition as the former?

Conclusion: Summing up

The paper was, first, undertaken as a case study of the major changes that a vernacular (nautical) architectural form underwent in the course of the last century. It carried the findings of a previous paper (readers are referred to Devendra:2011:301-401) – where the *oru* was identified as a vernacular craft – another step forward. The nature and extent of changes identified gave rise to the question: when does a vernacular form cease to be vernacular? To formulate this as a question, however, it was not sufficient to merely record the changes: it called for an inquiry into the definition of "vernacular" and why the architectural form in question is, in fact, considered "vernacular". Since it could not be assumed that the expected readership was familiar with nautical architecture, the "*oru*" had to be explained in a fair amount of detail, and this led to some disproportion in space allocated to the background material at the expense of the process of change itself. However, it is felt that the background necessary to appreciate the question posed has now been sufficiently described and that informed comment on the question will be forthcoming. It is also expected that the description of the *oru* will bring about the realization that this vernacular nautical architectural form is one which merits greater appreciation and further study: both of which are lacking now. It is also hoped that this case-study will generate interest in vernacular architectural forms that have grown up outside the ambit of the built environment.

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