SYNOPSIS
With about 7500 km long coastline and hundreds of ports, India enjoyed the position of “mistress of eastern seas”, in antiquity. Indians built boats and ships from the very beginning. Different environmental, geographical, social and economic conditions in different parts of the country resulted in development of several types of aqua crafts. The great archaeological importance attached to ancient ships was not fully realized till very recent past.

The study of ancient maritime technology remained much neglected subject and not much attention was paid to the study of ancient ship building technology by Indian archaeologists. In the absence of systematic studies it was very difficult to say - When the first ship was built in India? How they developed? How these early ships looked like? What material they were made of? How big they were? What purpose they were used for? How fast and far they could travel? Was their building technology indigenously developed or borrowed from others? How adoptive they were for foreign technology? etc.
Ships are not only complex moving machines but also the noblest artifacts of man’s multifarious skills. They represent the frontiers of technology, which any society could offer. They were the biggest and the most complex machines produced by pre-industrial societies. Ships were also the main instruments for trade and communications which in turn helped in the development of many great trading centers of the past.

Although, it is known since long, that the ancient Indian ships were of many varieties but the antiquity of Indian shipping could not be established satisfactorily being older than any written record pertaining to it. Almost all the previous works on Indian shipping started from the ships of Harappan period. These sailing ships were well capable of carrying passengers and appreciable quantity of cargo with reasonable degree of certainty, between one port to another. Study of development from primitive boats to Harappan ships was a challenging task due to lack of archaeological evidence prior to Harappan culture.

The known ancient ships were also described variously by various historians and archaeologists. These vivid descriptions made the danger of subjectivity very real leading to a multiplicity in
nomenclature of ancient ships and their types. The students of archaeology thus have to struggle through confusing descriptions that list a lot of data but from which it is difficult to derive much information.

Archaeological evidences such as finding of Indian artefacts on the sites of Mesopotamian and Egyptian civilizations and the artefacts belonging to these civilizations in India established that the ancient Indians were enterprising mariners who set voyages to distant lands across high seas. But the real information about their ships which they used for these interactions was lacking.

There were several factors for the development of shipping and shipbuilding technology in India. Besides the sea at three sides, many navigable rivers, skilled shipwrights, availability of suitable materials for construction, courageous mariners, etc. were some of the factors for flourishing of shipping industry in the country since antiquity.

Archaeological researches have established that the ancient Indians had trade and contacts with Southeast Asian countries on one side
and the western Asia, Africa and Europe on the other. Although plenty of evidences, both archaeological as well as literary, are available to prove these contacts in the past but our understanding of ancient ships, which were involved in maritime trade was inadequate.

Scholars of India and abroad have contributed some literature on ancient Indian shipping but they are hampered by an insufficient methodology and scientific study to examine the validity of various evidences to distinguish technical information from poetic imagination or artistic modifications.

On the interpretative side, this preoccupation with literary references restricted the amount of information, which could be gained from the archaeological study. In the present research ships construction, navigational instruments, steering methods, material and purpose have also been treated as a more basic criterion for establishing the development of shipping technology than the mere description.

Ship representations exhibit variable shapes, construction and uses. In most of the cases these are stylized and not much attention is
paid to technical details. But a careful study of associated representations reveals useful information about the shape, size, construction and navigation of the ship.

The origin of boats has been traced to the Upper palaeolithic / Mesolithic period. The purpose of these early boats was fishing and transport. During the Harappan period it had developed to sailing ships.

The changes in the shapes and designs were due to geographical compulsions than contacts. The changes were very slow and unless forced were not made. Study of traditional boat building makes it very clear that even today the boats are built without any change.

Hence the present work begins with the hypothesis that the boat building started with man’s experience with nature. It was a natural process of learning which caused the development of boat design and construction techniques.
The work thus aims to understand the development of shipping and its impact on the history. It attempts to gain a technological perspective of the shipbuilding, examine its impact and assess changes with time.

To be able to talk of aspects of material, construction techniques as well as changes and development the approach has to necessarily extend beyond conventional interpretation. The main tool adopted towards understanding the nature and type of construction of ancient ships is that of nautical study.

The objectives of the present work are:

1. Documentation of various archaeological evidences of ancient Indian shipping and shipbuilding

2. Recording of ancient and traditional aspects of the shipbuilding technology

3. Scientific study related to technological aspects of shipping
4 Comparative and analytical study of collected data in order to test the reliability of literary and artistic evidences

5 Trace the origin and systematic development of Indian shipping and shipbuilding technology

6 Comparative study of ancient boats with existing traditional boats

7 Study of different local factors affecting the ancient shipbuilding technology

8 Comprehensive study of these ancient Indian ships with known ships of that period

The data will be presented in the following manner:

Chapter 1: Indian Shipping: A Reassessment

This chapter highlights the issues surrounding the Indian shipping and shipbuilding and proposes to look at it from a different methodological point of view. Previous works on Indian shipping are
presented chronologically to trace predominant trends through the plethora of theories on it. The objective is to perceive the basis of these trends in the larger context of development of Indian archaeological interpretations. It is assumed that theories are born in contexts, which are specific to the need and major aims of the times. An attempt is thus made to assess them under those prevailing circumstances of ideology, available technology or maturity of the discipline. Having done so, they will be reassessed in the present context.

A comparative study of ancient ships and their construction is also presented here. This is followed by the central proposal of the thesis. This chapter ends with defining of major objectives.

**Chapter 2 : Methodology**

This chapter argues the potential of comparative and analytical study of ancient ships and its relevance for this specific study. It discusses the kind of questions it can answer and its limitations as a method. It also discusses the scope, assumption and limitations underlying techno-analytical analysis.
Chapter 3: Ships in Art

Antiquity of boats is traceable to Upper palaeolithic / Mesolithic period. In this regard evidences of the use of boat have been found in prehistoric rock paintings. The reliability of some of the pictorial evidences is often doubted on the basis of artist's knowledge of maritime technology, but the analytical study made them the major source of information about ancient ships. The systematic studies of these ships presents vary valuable archaeological evidences and a wide range of technological information embodied in them.

The chapter presents scientific study of the development of ancient ships and shipbuilding technology. It also contains documentation of ship representations in prehistoric rock art, proto-historic seals, terracotta models, paintings on pottery; historic seals, coins, sculptural reliefs on monuments, terracotta, paintings etc. The valuable information such as design and construction, building technology, ships ancillary fittings, rigging, propulsion and steering arrangements, anchor and equipment connected with the maintenance and running of the vessel, etc. which is derived from such representations is also presented in this chapter.
Chapter 4 : Ships in Literature

The antiquity of Indian shipping is older than any written record pertaining to it. But later on a variety of ships and shipping activities were referred in ancient Indian literature, such as *Rgveda, Ramayana, Mahabharata, Jatakas, Arthashastra, Puranas,* many other Hindu, Buddhist and Jain texts. Some of these texts, for example *Yuktikalpataru,* also describe technical aspects of ancient shipbuilding.

This chapter presents the information about ancient ships and shipbuilding as available in ancient literature. The data is logically analyzed to generate the information. The chapter concludes with the knowledge about ancient Indian ships through literature.

Chapter 5 : Traditional Shipbuilding

Indian shipbuilding technology has long tradition where changes were very slow. Despite modernization and mechanization traditional ships are still built through the length and breadth of the country. The materials used have also not changed and they are still built in the fashion as they were built in antiquity. Careful study of these
shipbuilding traditions provided the opportunity to reconstruct the techniques of ancient shipbuilding.

This chapter presents traditional shipbuilding technology and details such as selection of material, seasoning of wood, laying of keel, techniques of joining planks, methods of construction, various technical terms, etc.

Chapter 6: Conclusion

The thesis ends with a short recapitulation of the major aims of the study, the methods adopted and major findings from the study.