INTRODUCTION

Natural disasters like cyclones, floods, earthquakes and landslides affect almost all countries in the world. They destroy substantial human and economic resources, and stand as formidable barriers against regional, national or global development at regular intervals, almost every year. Tropical cyclones can be considered to be the most destructive natural hazard when viewed in terms of their occurrence, intensity and area affected by the disaster. Amongst the average of 80 to 90 cyclones recorded per year all over the world, atleast five to six occur in the Indian subcontinent. India ranks high among the countries prone to cyclonic storms. This is because of the special nature of the coastline, the shallow coastal ocean topography and the characteristics of tides in the Bay of Bengal region. Further, the high density of population, low awareness of the community about cyclones and their risks, inadequate preparedness and cyclone warning systems add to the severity of the problem. India has a coastline of about 7,516 km, 5,400 km along the mainland, 132 km in Lakshadweep and 1,900 km in the Andaman and Nicobar Islands. The long coastal line of peninsular India is frequently affected by cyclonic storms originating in the Bay of Bengal and Arabian Sea resulting in colossal loss of life and property in the affected regions. More cyclones form in the Bay of Bengal than in the Arabian Sea in the ratio of 4:1.

PERIOD OF STUDY

The study period chosen from 1800-1900 A.D coincides with some significant events political, meteorological and nautical. Maritime history in India is largely influenced by the presence of European trading companies. Their presence in India and their political machinations to gain trading advantages, present a hyperactive period upto 1800 A.D and there has been considerable work by historians on different companies. By the turn of the 18th century the British became the undisputed rulers of India.
The political monopoly of the English began with the formation of the Madras Presidency and the British Empire was consolidating itself gradually. The tough political situation in India coupled with the threat of Napoleonic Wars made the English reconsider the need to carry on commercial activities and there were hectic parleys both in India and England about the continuance of trading activities, by the company.

The technological advancements as a result of Industrial Revolution gave fillip to improvement in naval architecture, leading to construction of large size vessels. To take such big vessels across the ocean and for their safe landing, the need for improvement in navigations was increasingly felt. Meanwhile England started extending its power in the east also. In order to keep the expanding interests under firm control, an effective handling from Madras was thought fit and hence the Coromandel Coast in the Indian Ocean region was considered suitable on all aspects. All the above put together, spurred a lot in the direction of improving navigation. Pre-eminent and pioneer observers of the Bay of Bengal cyclones were Elliot and Piddington. Piddington who, in the 19th century contributed much to the meteorology, collected ships weather observations and wrote voluminously on the law of storms. He contributed to information regarding storms, and was able through his investigation to formulate the laws of motion of these storms, and to suggest rules for the sailors to observe in order to avoid the hardships of these hurricanes.

The period of study 1800-1900A.D, witnessed the formation of Marine Board, which later on developed into Marine Department to cope with the stupendous growth in marine matters. The study of cyclones became possible after the introduction of synoptic charts of brands. From a modest beginning in 1875, Indian Meteorological Department has progressively expanded its infrastructure for meteorological observations, communications, forecasting and weather services. By 1886, the system of early warning of cyclones was extended to all the Indian Ports. During this period power communication and transport systems underwent a great change.

**Study Area**

The study area is situated on coastal plains. India has a long coast line of 7,516 kms. The Coromandel Coast is a term applied to the east coast
of the peninsula of India, which means “The realm of choral”. It was in use among the Portuguese, who were a century ahead of the English in establishing their trade centers in India. The consultation bodies and diaries were thus inscribed: ‘The Diary and consultation Books of the Agent governor and council their proceedings and transactions for the affaires of the Honorable English East India Company in the Agency of the Coast of Choramandel and the Bay of Bengal’. The term ‘Charamandel’ to the coast of the present day Tamil and Telugu regions. At the close of the nineteenth century, there were about 65 ports in the Madras Presidency, among which many were in the coast of Tamil Nadu.¹

Later the Coromandel Coast was considered to be the south of the Godavari River and the north was known as Golkonda Coast. By the 17th century the term denoted the coastline of the modern state of TamilNadu, Andhra Pradesh and the southern tip of Orissa. This study makes the region south of Pennar River called southern Coromandel as the study area. After limiting the geographical area of the study, the factors that contributed to the study of history of cyclones are taken up for exploration. The southern Coromandel Coast is an ecologically important coastal area, straight and narrow without much indentation except at Vedaranyam. Fringing and patch reefs are present near Rameswaram and Gulf of Mannar. Pitchavaram, Vedaranyam and Point Calimere have well developed mangrove systems. In Madras Presidency about 46 rivers drain into Bay of Bengal forming several estuaries adjoining coastal lagoons. The Cauvery River and its tributaries form large delta supporting extensive agriculture. The other landforms of the Tamil Nadu coast are rock outcrops of Kanyakumari, mudflats, beaches, spits, coastal dunes and strand features. Deposition is observed at Point Calimere, Nagapattinam, South Madras etc., while erosion is reported at Ovari Paravarnattam, Mahabalipuram and North Madras near Ennore. Rich deposits of heavy minerals are available in Muttam-Manavalakuruchi coast. The Madras Presidency was made up of twenty one districts; eleven districts of Madras Presidency form the part of this study. ²

SCOPE OF THE STUDY

In recent years abnormal climate events have caused widespread concern among historians, meteorologists and climatologists. The impact of climatic fluctuation and change has long been recognized by historians, historical geographers, and archaeologists as one of the factors that demand consideration, though there is and always has been dispute about
just how much attention needs to be paid to this variable. Hence, it is reasonable to suppose that some useful lessons might be learnt from past events especially perhaps from the study of the impact of climatic variation and conditions which have not been experienced in recent times. Accordingly, policy makers and administrators have begun to show a lively interest in identifying and measuring the effect of climatic fluctuations and changes on past societies. The dictum that the past is the key to the future has frequently been used to justify scientific research. It is particularly appropriate to the present study.

The purpose of this work is to set down in chronological order, as far as available historical sources permit, the meteorological situations attending the occurrence of cyclones prior to 1900.

Reconstruction of a long, past record of climate is necessary because,

1. For meteorology to trace and identify any long term and recurrent processes of climatic change and fluctuation, and
2. To enable historians to see when and where significant shifts of climatic behaviors may have introduced vital stresses into human affairs.

LIMITATIONS OF THE STUDY

The study, though novel, has its own share of limitations. The period being the 19th century, the consultations are of manuscript series and many details are missing. The annexure like maps, tables are not available for many aspects like Peddington’s Law of Storms proposed during the period. Moreover the records were shifted from place to place and from time to time with the rearrangements of departments and many should have perished thereby leaving gaps. This has posed a problem in the process of preparation of this work.

In addition, the subject chosen for research encompasses various aspects that are essential components. All the chapters are modular in nature, but being contemporaneous, they are historically linked to present a picture in unison. As the topics studied are new areas, secondary sources having direct relevance to the subject are scarce, scattered thereby leaving the scholar to build up the work mostly on the basis of primary sources.
and they speak for themselves in many places. They are also fragmentary in many places leading to gaps in the collection of sources. But still, great care has been taken to make use of the secondary sources of preceding and succeeding periods, so that necessary frame work could be arrived at.

**REVIEW OF LITERATURE**

Some of the research works on the history of cyclones on the Coromandel Coast are reviewed below:

The power and fury of cyclones have fascinated humanity for centuries. Many ancient writings describe nature’s violent storms. The late seventeenth century was the starting point for the era of quantitative, instrumental meteorology. Among historians Utterstrom, Braudel and more recently Smith and Parker, have made interesting contributions to the study of cyclones. In recent years, new breed of historians interested in climate-history have emerged. These scholars, of whom Pfister, De Vries, Post and Party, are the most outstanding, who admit the possible importance of climate variation of human affairs both in the long and short term, making serious attempts to investigate the possibility with the aid of all the available methodological resources of history, economics and climatology, but demanding the highest standards of proof.

In America, Redfield was the first to publish a series of papers demonstrating what was then called the law of storms. Redfield in America, Reid in England, Piddington in India, all contributed to our information regarding storms.

F. Braudel’s *The Mediterranean and the Mediterranean World in the Age of Philip II* is considered to be a great contribution to maritime history, going into the details of land and coastal societies. He blended the social, geographical, economical, intellectual and political aspect of the period. He stated that the world changed according to three different rhythms. Emmanual Le Roy Ladurie has also set in his major studies like *The Peasants of Languedoc, The History of Rain and Fine Weather*. His aim to write the ecological infrastructure of human society i.e. sea, water, climate, flora, fauna etc. ought to be related to the socio-cultural sphere for they mutually influence one another. Braudel and Ladurie, made a serious
attempt towards a history of material culture which is based on empirical and quantitative history, taking into account biological, geographical and even climatic factors.

_The Hurricane and its Impact_ by Robert H. Simpson and Herbert Riehl published in the year 1981, provides us with the basic details to understand hurricanes, their consequences and human responses; a common framework for linking climate and societal impacts. I.V. Tannehil’s, _Hurricanes_, helps us to understand the details about cyclone and their impact.

Dr. Marlene Bradford has traced the background of tornado forecasts and warnings in _Historical Roots of Modern Tornado Forecasts and Warnings_ Piddingtion, Henry’s The Sailor’s Horn-Book for the Law of Storms being practical exposition of the theory of the law of storms, and its uses to mariners of all classes, in all parts of the world, shown by transparent storm cards and useful lessons, published in 1848, explains to the seaman, the theory and the practical use of the law of storms for all parts of the world, and teaches how to avoid storms, how best to manage in storms and how to profit by storms.

Arasarathanam’s work _Merchants, Companies and Commerce on the Coromandel Coast 1650-1740_ offers a graphic description of the Coromandel region, but the work confines itself to the trading practices.

Brebner, C. W’s _The New Handbook for the Indian Ocean, Arabian Sea and Bay of Bengal, with miscellaneous subjects for sail and steam, Mauritius Cyclones and Currents, Moon Observations, and Sail-Making_, is an extremely rare and wonderfully interesting book. Brebner was a sea captain largely travelling between India and Mauritius and the book focuses on the weather, currents, cyclones, nautical history, quarantine laws, along with a sailing directory and sailing history for the southwest Indian Ocean.

R.K. Mookerjee’s _Indian Shipping—A History of the Sea-borne Trade and Maritime Activity of the Indians_ from the earlier times published in 1912 still holds its place as a pioneering study in the field of Indian shipping and it is a classic work giving fundamentals in various aspects.
Memories of Map of Hindustan by James Rennell published in 1793 is of great historical value, and has been profitably used in this work. Rennell’s work provides us with minute details about the construction of the map of India.

Papers connected with the Construction of the Madras Harbour by A.T Mackenzie 1885, are of great historical value. The work provides us with minute details about the damage done to construction by the storms.

The Edited work of Rev. J. Frederick Price and E. K Rungachari The Private Diary of Ananda Ranga Pillai, Vol III. Asian Education Services, provides insight to the importance of weather.

A Scientific Report on A Catalogue of Storm Surges in India by N.Jayanthi and A.K. Sen Sarma highlights information of storm surges mainly culled out from old District Gazetteers, State Administrative Reports, old journals of Asiatic Society of Bengal and transactions of Royal Geographic Society, which traced the historical roots of cyclones in India.

‘Notice of the Storm’ by J.J.Franklin, an article published in the Madras Journal of Literature and Science in the year 1847 has analyzed the storm of 1846. It gives a wide backdrop for the understanding of past climate.

Cyclone Memoirs Part II, III Bay of Bengal Cyclone by M.A. Eliot was published in 1888. This work is useful for the understanding the natural disaster. The Bengal Cyclone and Storm Wave of the 31 October and 1 November 1876 and the Subsequent Cholera Epidemic by George Edward Eyre and William Spottiswoods, is a pioneering study of Indian cyclone.

The present study attempts to study the cyclones and their impact on the Coromandel Coast spanning the period 1800-1900. An intensive study of this area and over a period of time has not been attempted so far. The fact that the history of coastal Tamil Nadu has been greatly influenced by cyclones provides significance to this work.
Objectives

The following are the objective of the study:

1. Understanding the nature and general character of cyclones on the Coromandel Coast.
2. Analysing the classification of cyclones, different names, evolution or life cycle of a tropical cyclone and physical structure of a tropical cyclone.
3. To study the chronological account of storms of the 19th century.
4. Identify the storm prone areas, and study the years with cyclones, years without cyclones and super cyclones.
5. Assess the impact of cyclones on administration, economy and society.
6. Study the cyclone disaster management, and the evolution of meteorological department.
7. Tracing the psychology of the people during the cyclone threat.
8. Study of shipping technology to counter cyclones.
9. Evaluate the status of relief, rehabilitation and reconstruction activities undertaken during the post cyclone period.

SOURCES

The sources used in the study are both primary and secondary. The Tamil Nadu Archives is the major source of information so far as the primary sources are concerned.

The primary sources consulted are the Consultations of Marine Department, Public Department, Secret Department, Mayor Court Records, Mayor Court Miscellaneous, Board of Trade and Commerce, Reports of the Public Works Department, Report on Settlement Records, Despatches from England, Despatches to England, Sailing Directions to the Commanders of the Company’s ships from 1794 to 1819, and also a few selected reports of this period.

With regard to the secondary sources, the following libraries, research institutions, and organisations are extensively used: Tamil Nadu Archives Library, Egmore, Chennai, National Archives in Pondicherry,
Meteorological Department, Chennai, Meteorological Department and Collectorate offices in all the coastal districts in Tamil Nadu, Structural Engineering Research Centre, Taramani, Chennai, the Connemara Public Library and the Raja Muthaiah Research Library, Chennai, Madras University Library, Maraimalai Adigal Library, British Council, Madras, Pondicherry University Library, French Institute Library, Pondicherry.

METHODOLOGY

This study has adopted an inter-disciplinary integrated approach in historical perspectives. The theory of cyclone formation has been drawn from meteorology department. Field study method was used to collect meteorological related sources. The presentation has been narrative of individual storms and descriptive of their impacts. Comparative method is used to compare the cyclones. In order to describe the 100 years of data chronological method was used. In addition, cross reference, verifications, narrative discussion, comparative study and critical evaluation have been adopted. The study has adopted the historical and analytical methodology.

CHAPTER SCHEME

The study is divided into six chapters excluding Introduction and Conclusion.

The Introductory chapter deals with the scope, nature, importance, aim and the area of study.

The First chapter traces the general characteristics of the storms, features of cyclones, areas vulnerable to storm surges, role of Piddington in naming the storm and the different names of cyclones in different regions of the world.

The Second chapter deals with the hundred years of tropical cyclones and cyclonic floods. Here it is pointed out how Madras was subjected to various cyclones during the 100 years of the study period.

The Third chapter analysed the impact of cyclones on society, economy, polity and infrastructure. Cyclones created unprecedented devastation in the coastal districts. Surface communication (including
Railways), tele-communication, power supply, water supply and irrigation systems sustained severe unprecedented damage.

The **Fourth chapter** deals with the most challenging tasks of coastal dwellers who were severely affected by the intrusion of saline and contaminated water into the water table. This chapter also examines the overall socio-economic, cultural, psychological and environmental implications of cyclones on the livelihood of coastal people. The hazards of shipping were more near the shore than in the high seas, because of the notorious character of the Coromandel Coast and cyclones. In this chapter an attempt has been made to trace the initiation and improvements made in the sailing directions like incorporating the logs of ships and also a few shipwrecks that occurred on the Coromandel Coast.

The **Fifth Chapter** explains the different stages of disaster management like prevention, mitigation and preparedness in the pre-disaster stage, and response and rehabilitation, reconstruction in the post-disaster stage. Mitigation and preparedness measures go hand in hand for vulnerability reduction and rapid professional response to disasters. This chapter deals with the methods of prediction, warning system, different warning signals, History of Meteorological Operation in Southern India, and the growth of the Meteorological Department.

The **Sixth Chapter** examines the important and crucial role played by governmental organizations in the rehabilitation process. Raising funds for relief of victims and rushing emergency relief by providing food, clothing and health checkup were standard responses of the government. Moreover, this chapter estimates the early warning system and disaster management.

The Conclusion contains the findings of this research study and proposed suggestions.