

ABSTRACT

In India, cyclones originate in the Bay of Bengal as well as in the Arabian Sea before and during the monsoon. The coastal districts of India are generally susceptible to severe cyclones. House is the primary immovable property and also the first casualty of a cyclone. Traditional houses built of indigenous materials and non-engineered conventional techniques have suffered the most by cyclones. The present level of research and development efforts directed towards better understanding of the effects of extreme winds, particularly with reference to their damage potential on buildings and structures, is limited.

This study aims at documentation of data on the cyclones in Orissa and developing a new housing technology for coastal people of Orissa after having an in-depth study of people's attitudes, social habits, their accumulated experience with the use of local materials, and their approach to cope with the environment. After exploring new materials and techniques, it is aimed to formulate guidelines which may enable to transfer results of the study into actual practice.

Literature survey shows that the required attention has not been paid in India, either on documentation of cyclones or disaster preparedness. The government efforts are limited to post-disaster relief and rehabilitation. To understand and study the settlements' and buildings' with their response to cyclones, a questionnaire survey including opinion survey in the selected three study-areas of Orissa has been designed. The survey shows that the poor people of coastal Orissa are the most sufferers during and after severe cyclones. Existing materials and building technology used by the people are inappropriate to make them safe during cyclones. Various types of damages due to cyclones are also described in details, to have a clear vision of the intensity of damage in the districts of Orissa.

Extreme wind calculations in the study-areas shows that the extreme wind calculations based on the new Indian Wind Code are similar with the

values checked from the other procedures. The results of the Code may therefore be used safely for cyclone-affected areas of Orissa. Wind tunnel tests have been conducted on individual buildings, buildings with various overhangs and predominant clusters. The purpose of the experimental study is to provide the data base necessary in order to determine design pressure coefficients for predominant buildings and clusters. The results have also been used in anchor designs of roofs and proper orientation of buildings.

In the events of cyclones traditional mud houses are heavily damaged due to rain beatings resulting in its reduced durability and frequent repair of walls and roofs. Soil has been collected from the each study-area and soil stabilization tests have been conducted to find out the required compressive strength of samples and compressed blocks. Spray test has also been conducted on the compressed soil blocks. Tested mud blocks are proposed for the coastal areas of Orissa and for fishermen community of coastal Orissa. Plasters/coatings have been suggested for the areas whenever is necessary.

Three types of roof-systems have been suggested. The common feature of all the three seemingly very different systems are standardization, responsive-^{ness} to local expertise, adequate dead weight on completion, speed of construction and use of components that can be manually handled. Guidelines are also suggested for appropriate jointing details. Design of anchor bolts has been proposed for various types of roofs and overhangs. Under one roof type, corrugated G.I. sheets have been tested as permanent formwork acting as tension steel in the final composite. By adoption of this type of composite slabs, corrosion problem of the slabs may be reduced.

Cost-effectiveness analysis of the developed technology has been carried out. Guidelines are suggested to disseminate the developed technology. General guidelines are also suggested for overall housing in cyclone-affected areas.