Preparedness for Recurring Cyclones in Andhra Pradesh and Coping Mechanisms for Rural Housing

Anil C Punetha IAS
Managing Director
A.P State Housing Corporation Ltd.

Abstract
Andhra Pradesh is the fifth largest state of India, located on East coast of Southern India. Nine districts of Andhra Pradesh located 974 kms of coastal line suffer recurring cyclones every year causing large scale damage to life and property. Wind velocity during cyclones is as high as 150-200 kmph.

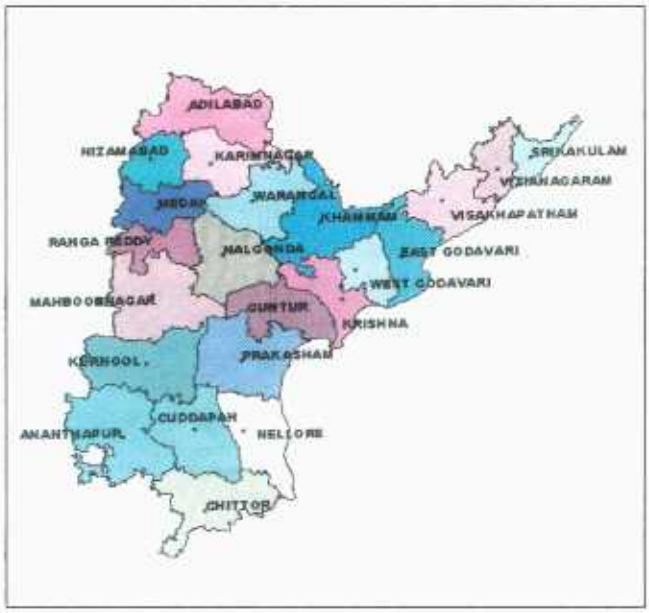
Cyclones have devastative effect on non-engineered buildings, especially shelters of poor settlements and infrastructure services as a result of not only winds but tidal upsurges and flash floods. Over a period of almost a decade AP government has been able to evolve preventive and curative mechanisms to cope up with the recurring menace. Action plans at the district level and department level to react to predictions and warnings on short term basis and long term improvement of shelters to withstand cyclone forces have been prepared. They are being implemented in a phased manner. Government of Andhra Pradesh has evolved a foolproof Cyclone Mitigation Plan which is being followed and has resulted into reduced damages to life and property for same intensity of disaster since 1977.

Introduction

Andhra Pradesh (A.P.), the fifth largest State in the country both in terms of area and population, is bounded by Madhya Pradesh and Orissa in the north, the Bay of Bengal in the east, Tamil Nadu and Karnataka in the south and Maharastra in the west. The State of Andhra Pradesh is broadly divided into three regions viz., Telangana (10 districts), Rayalseema (4 districts) and Andhra (9 districts).

Of the total population of 66.50 millions (1991 Census) in the State, 28.73 millions are living in 9 coastal districts which are prone to severe cyclones every year. A.P. has got a long coastal line of 974 kms. along the Bay of Bengal spread over 9 districts. The major and minor rivers such as Penna, Gudlakama, Krishna, Godavari, Gostha, Simhadri, Champavathi, Nagavali, Vamsadhara etc., are flowing from west to east in the State and the rivers merge into the Bay of Bengal.

All the coastal districts experience heavy cyclones at regular intervals. This article deals with the effects of cyclones and preparedness for recurring cyclones in general and rural housing in particular.



The map of Andhra Pradesh showing Cyclone-prone districts

Cyclone Effects

It is experienced that certain coastal districts are adversely affected by cyclones almost every year or alternative year thus causing large scale damage to the existing houses apart from the huge losses to other properties. During cyclones, wind gales in the range of 150 to 200 Kmph cause damage/ destruction of existing houses. The frequency of cyclone occurrence and corresponding losses in A.P. for the last five years is shown below.

The figures mentioned below reveal wide scale damage / destruction of houses. Extensive damage/loss is witnessed in respect of crops, roads, buildings, irrigation sources, human and animal life etc. It is a common phenomenon that cyclones cause damage not only due to heavy gales but also due to flash floods caused by heavy downpour and consequent tank breaches.

Sl. No.	Period of occurrence	Population affected (in lakhs)	Human lives lost	Houses damaged/ collapsed	Estimated loss* (Rs. in crores)
1	Oct & Nov 1995	2.30	229	1,46,525	917.00
2	June 1996	0.22	100	21,517	129.10
3	Aug & Sept 1996	0.21	140	12,100	159.00
4	Oct 1996	87.64	396	1,48,789	1,105.80
5	Nov 1996	80.62	2,425	6,65,553	6,129.25
6	Sept 1997	47.99	40	7,725	255.87
7	Sept & Oct 1998	47.32	260	1,50,196	2,525.20

** Total estimated loss includes damages to houses, roads, buildings, agriculture, irrigation sources etc.*

Pattern of Housing

The majority of the poor in coastal areas have thatched/ kutcha houses which collapse or get badly damaged due to cyclonic wind and/or heavy cyclonic rains. In certain districts like Srikakulam, Vizianagaram and Visakhapatnam palmyrah leaves are extensively used in the houses which are in circular shape with steep slopes. The people of other coastal districts prefer hipped roofing. Though the damage to these houses is less comparatively, such houses do need replacement by improved pucca shelters.

In general, tiles are extensively used for the pucca houses in coastal districts which also do not withstand severe cyclones. By and large, no cyclone resistant features are incorporated in the house designs popular in the coastal regions

Cyclone Preparedness

The A.P Government have prepared a Cyclone Mitigation Plan which consists of pre-cyclone and post-cyclone activities. Pre-cyclone activity consists of cyclone mitigation preparedness in which the vulnerable points are marked in the topographical map and the people are alerted with the cyclone warnings at regular intervals. People are evicted from the vulnerable villages and temporary rehabilitation is provided in the Cyclone Shelters / other suitable buildings. Temporary relief such as rice, kerosene, clothes etc., is provided during this phase. Moreover, precautionary measures include stoppage of electricity supply, positioning of relief teams, monitoring of river and reservoir levels etc Infact all Government departments have got their Action Plans to tackle such a situation

Gadimaga Village, East Godavari District : Damage caused due to cyclone

Post-cyclone plan aims at restoring normalcy at the earliest by enabling the people to get back to their villages. Adequate health measures are taken to prevent spread of epidemics Teams are formed for assessing house damages and relief is arranged for fully/partly damaged houses and agricultural crops of the poor. In addition, separate teams are constituted to assess the damage in other sectors i.e., electricity, roads, communication, irrigation and agriculture etc., and temporary relief / restoration is taken up apart from proposing/taking up permanent relief measures.

In normal course, the Government of A.P is ensuring that preventive steps are taken to minimise loss of life and property. Certain preventive steps include .

- (i) Shifting of the village/colonies from the low lying areas to the elevated and safer places.
- (ii) Construction of permanent houses for the poor through A.P.State Housing Corporation Ltd , (APSHCL).
- (iii) Provision of flood banks, flood protection walls and concrete canal lining to water bodies.
- (iv) Provision of culverts, cross drainage works to avoid damages to roads and widening and strengthening of surplus weirs in irrigation sources.

Vadapalem Village, East Godavari District : Damage to the houses due to cyclone

Cyclone Coping Measures in Housing

After the severe cyclone in 1996, an expert committee was formed to advise on cyclone resistant features The committee consisted members from Jawaharlal Nehru Technological University (JNTU) Hyderabad, Structural Engineering Research Centre (SERC) Chennai, Central Building Research Institute (CBRI) Roorkee and A.P.State Housing Corporation Ltd (APSHCL), Hyderabad to study and recommend various features that are to be incorporated in Housing Programme. The observations of the committee are as follows :

- (i) The houses with tiled roofs which are not provided with binder walls and wind ties at the eaves edge are blown off in heavy cyclone.
- (ii) Houses whose ridges are parallel to the direction of cyclone movement are not damaged. It is suggested to provide binder walls with wind ties and proper orientation of the ridge which will provide sufficient protection to the structure.
- (iii) R.C C Slabs which are having long cantilever projection are also blown off and it is suggested to anchor the roof firmly to the lintel beam.

After 1996 cyclone, the government have deputed all the (76) division level APSHCL engineers to SERC, Chennai and they were trained in "Disaster Mitigation Management" After successful completion of training at SERC, Chennai, the divisional engineers have conducted contact programmes in all the (9) districts and trained about 582 field level functionaries such as Assistant Engineers (Housing), Work Inspectors (Housing), NGOs associated with housing programmes and Village Administrative Officers (VAOs) In addition, wall posters depicting various methods of protecting the houses from cyclone damage were supplied through 582 contact persons in all the (9) coastal districts of A.P. for wide publicity.

A few model houses with cyclone resistant features have also been constructed at Nellore and Visakhapatnam Nirmithi Kendras (Building Centres). Following are the special features for cyclone resistant features incorporated in these model houses

Type of house	Special features
a) Thatched house	i) Hipped roofing
	ii) Tie bar at eaves edge
b) Tiled roof house	i) Binder walls at 1.5 M interval
	ii) Wind ties (MS flat) at eaves edge and at ridge
c) AC Sheet roof house	i) Wind ties (MS flat) at eaves edge and at ridge
	ii) Usage of "U" Bolts
d) RCC Slab roof house	i) Thickness of slab shall not be less than 10 cm
	ii) It shall be firmly anchored to column or at least with lintel beam.

After 1996 cyclone, the government have sanctioned 16,325 houses with financial assistance from KfW (Germany) in 4 districts. All the houses have been constructed with Cyclone resistant features such as basement lintel and roof level RCC bands in addition to anchoring of roof slabs in the corner columns. Besides these features sunken windows and doors, the high level of basements, rounded corners were adopted. Following results are noticed with adoption of cyclone coping measures :

(i) It has been observed that the pucca houses with RCC slabs, constructed in the coastal districts provided safe shelter.

(ii) As these housing colonies are located at elevated places, the problem due to floods and inundation is also minimised.

(iii) It has reduced financial burden (in terms of relief) on the government as house damages are few in the housing colonies constructed through APSHCL.

Madhavarayudupeta Village, East Godavari District. Permanent houses constructed with cyclone resistant features

Efforts are on to make the coastal people fully conversant with cyclone resistant measures and they are fully cooperating with the field functionaries of APSHCL

Conclusion

With the increased realisation of damages due to cyclones, the government of A.P. have initiated several measures of preventive and curative nature for cyclone mitigation. Each department has prepared its Action Plan to mitigate the damages due to cyclones and floods and is being implemented in a phased manner.

Due to the experience gained over the years, the Government of A.P. have evloved a fool proof cyclone mitigation plan which has helped in reducing losses to life and property. This is borne out by the fact that now the cyclones of the same intensity which caused phenomenal losses in 1977 during Krishna cyclone do not result in similar kinds of damages due to precautionary and preventive steps.

HUDCO GETS AWARD FOR LATUR PROJECT

The Housing and Urban Development Corporation (HUDCO) has received a South Asia region award for excellence in architecture on the Rehabilitation Project for the victims of the Latur Earthquake 1993.

Rajasthan Chief Minister Ashok Gehlot presented the '**Commendation Award**' to HUDCO. The Housing and Urban Development Corporation has constructed 1,319 houses for the earthquake victims in the Latur district of Maharashtra.