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Report of the

GOVERNMENT OF INDIA/GOVERNMENT OF ANDHRA PRADESH/FAO WORKSHOP ON MEASURES TO REDUCE LOSS OF LIFE DURING CYCLONES

Vishakapatnam, Andhra Pradesh, India, 4-6 March 1999

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PREPARATION OF THIS DOCUMENT

This is the report of the Government of India/Government of Andhra Pradesh/FAO Workshop on Measures to Reduce Loss of Life during Cyclones. The workshop was held in Vishakapatnam, Andhra Pradesh, India, from 4 to 6 March 1999.

The report comprises a record of the proceedings of the workshop, including the recommendations of the four working groups. The appendixes of the report comprise the programme of the workshop, list of participants and selected papers as presented at the workshop by the authors.

The report was prepared by Dr Y.S. Yadava, Fisheries Development Commissioner, Ministry of Agriculture, Government of India, J.M.M. Turner, Senior Fishery Industry Officer, Fishing Technology Service, Fishery Industry Division, FAO Fisheries Department, Rome and P. Calvert, FAO Consultant.

Distribution:

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FAO Fisheries Department
FAO Fisheries Field Projects

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ABSTRACT

This is the report and the proceedings of the Government of India/Government of Andhra Pradesh/FAO Workshop on Measures to Reduce Loss of Life during Cyclones. The workshop was held in Vishakapatnam, Andhra Pradesh, India, from 4 to 6 March 1999.

The workshop was organized by the Government of India in cooperation with the Office of the FAO Representative for India and the FAO Fishery Industries Division (FII).

Seventy-five participants attended the workshop from four Asian countries and from regional organizations and development agencies. The participants represented National and State Governments, National and State fisheries administrations, National and State meteorological organizations, fishers' associations, Indian Coastguard, Mercantile Marine Department, gender specialists and NGOs.

After making a detailed analysis of the events occurring at sea and on land on 6 and 7 November 1996 in East Godaveri District (when a severe cyclone caused large loss of life on the east coast of India), the workshop addressed the issues of cyclone forecasting and dissemination in India and in the region, awareness programmes for disaster preparedness, gender concerns with regard to disaster preparedness and management, search and rescue operations, the use of radio transceivers at sea and on land for cyclone warnings, improvements of mechanized fishing vessels and their equipment. Four sets of recommendations were made by four working groups covering these areas.

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SUMMARY

On 4-6 March 1999 in Vishakapatnam, Andhra Pradesh, the FAO and Government of India and Andhra Pradesh co-hosted a workshop "Measures to reduce loss of life during cyclones" to discuss and make recommendations on reducing the vulnerability of fisherfolk to such disasters.

The workshop complemented an FAO project in East Godaveri District of Andhra Pradesh that responded to the tragic loss of life caused by the cyclone of 6 November 1996 in which 1 435 fisherfolk lost their lives. Of these, 569 were reported to have been lost while fishing in mechanised boats at sea, while 830 fisherfolk were lost while carrying out shrimpseed collection in areas remote from the villages. The causes of death in these two activities were of a totally distinct nature, wherein the former were lost at sea owing to high winds and heavy seas, and the latter were lost through storm surge on land. For this reason the project carried out two distinct sets of activities towards these two groups: community-based disaster preparedness and improved safety at sea.

The workshop provided a forum to share the experience of a wide range of experts, government and non-government officers involved in cyclone prediction and disaster management and relief. It brought in the experience of experts from the Philippines and Thailand, from Indian Meterological Department (IMD) and the Coastguard, from the fishing community and the Department of Fisheries, from central and state Governments and participants in the FAO project. Nine papers were presented and discussed by the participants. These papers covered cyclone warnings, forecasting, disaster preparedness and awareness, safety of mechanised fishing vessels and gender concerns in disaster preparedness and management.

The two and half day workshop produced a set of recommendations on how to reduce loss of life amongst fisherfolk during cyclones. These recommendations are included in this report and are intended to improve the speed and quality of communication of cyclone warnings to the fishing communities. Recommendations are included for the promotion of community based disaster preparedness and the improvement of opportunities for communities to take local shelter rather than resort only to large-scale evacuation. The recommendations also propose legislation and education to improve safety at sea for mechanised boat crews.

1. BACKGROUND

A report by the Indian Meteorological Department (IMD) notes that of all the natural disasters occurring globally, cyclones account for about 64 percent of lives lost. Since 1970 over 1.5 million people have died as a result of cyclones in the Bay of Bengal region alone. The major causes of cyclone damage are strong winds, storm surges and torrential rains. Of these, the most destructive phenomenon is the storm surge, which accounts for more than 90 percent of loss of life and property. The storm surge is a rapid rise in the sea level along the coast and is caused primarily by the winds driving the waters ashore.

Areas most vulnerable to severe damage and flooding, as a result of storm surges and rain induced by cyclones, are low-lying coastal plains and river deltas. Owing to the geography of such areas, they also suffer from poor roads and communications; furthermore they are characterised by highly fertile land and coastal resources, and therefore have high population densities.

Measures undertaken by governments to reduce the loss of life amongst fisherfolk during cyclones are wide ranging and include cyclone forecasting, monitoring and tracking, the issuance of cyclone warnings and detailed contingency plans of action. For coastal communities, evacuation procedures and cyclone shelters are normally provided, while regulations to ensure the seaworthiness of fishing vessels at sea are often prescribed. Notwithstanding the existence of the above, loss of life on a large scale continues with the occurrence of almost every severe cyclone in vulnerable areas.

In November 1996, following a severe cyclone, approximately 1 435 fisherfolk were reported as dead or missing (assumed dead) in the State of Andhra Pradesh on the east coast of India. Of these, 569 were reported to have been lost at sea while fishing in mechanised boats, while 830 fisherfolk were lost while carrying out shrimpseed collection and other shore-based activities in areas remote from their villages. The causes of death in these two activities are of a totally distinct nature, wherein the former were lost at sea in conditions of high winds and heavy seas, the latter died on land, largely as a result of the storm surge. The remainder died largely because of collapsing houses and falling trees.

The reason for the continued loss of life are various, but action by those at risk to ensure their own survival can only be taken if there exists the capacity to receive cyclone warnings. It is also essential that the warnings are readily comprehensible and perceived to be accurate and reliable for their locality. For communities living near the sea, survival is dependant on the availability and effectiveness of evacuation measures, cyclone shelters or other safe buildings. Similarly survival at sea is dependant on the capacity to receive warnings as well as the capability of the vessel and crew to either run for shelter or ride out the storm. For those that survive the immediate effects of the cyclone, timely rescue and relief may be required to ensure survival in the aftermath.

Following a study of the events, which occurred before and during the November 1996 cyclone in India, it is of interest and concern to note that many of the prerequisites for survival of those at risk were either lacking or require improvement:

- capability of fisherfolk on land and at sea to receive cyclone warnings;
- perception of accuracy of cyclone warnings by fisherfolk;
- ability to evacuate fisherfolk from the area;
- desire of fisherfolk to be evacuated from the area;
- availability of sufficient and adequate shelters from the storm surge;
- capability of the vessels and crew to either run for shelter or ride out the storm;
- existence and capacity of rescue and relief organizations to ensure survival in the aftermath.

An FAO Technical Cooperation Project in India designed to improve certain aspects of disaster mitigation was completed at the end of April 1999. The experiences gained from this project were discussed at this workshop together with experiences of relevant professionals from India and other countries in the region actively working on cyclone disaster preparedness and management.

2. OPENING CEREMONY

The opening ceremony commenced with a welcoming address by Dr Yadava, Fisheries Development Commissioner, the Government of India (GOI) and was followed by J.M.M. Turner, Senior Fishery Industry Officer, FAO, who delivered an address on behalf of FAO.

The Chief Guest Dr R. Radhakrishna, Vice Chancellor of the University of Andhra Pradesh, opened the workshop. He called for advances in modelling of cyclone behaviour and prediction of their track to enable better quality and more timely warnings to be given. However, he added that improving the living conditions of fisherfolk, ensuring good education in the fishing villages and promoting community participation disaster preparedness would have a major impact on reducing loss of life during cyclones.

Mr T. Gopal Rao, Principal Secretary, Government of Andhra Pradesh presented the keynote address and related his experiences as relief commissioner during the Nellore Prakasham cyclone of 1989. He noted that the warning had been remarkably accurate that time and that they had received eight hours warning of the exact location of the cyclone landfall. Consequently they had been able to alert everyone and evacuate people to cyclone shelters. By comparison he said the 1996 cyclone was much harder to predict and consequently there was much greater loss of life. He drew attention to the Government's efforts to construct more shelters. He appreciated the efforts of the FAO in promoting sea safety, through VHF radios and lifefloats for the mechanised boat crews and also for the work in community disaster preparedness with the Storm Safety Action Groups. By way of a summary, and setting the tone for the workshop he said, "We cannot prevent disasters, but we can be better prepared".

3. DISCUSSION OF PAPERS

There were nine presentations during the two and a half day workshop. The titles and presenters were as follows:

1. *Cyclone warning and disaster preparedness* Dr J.V.M. Naidu, Director of the Cyclone Warning Centre IMD, Visakapatnam
2. *Cyclones and cyclone forecasting at the national and state level* Dr R. R. Kelkar, IMD
3. *Cyclone forecasting, warning and dissemination system in the Philippines*, Lucrecio O. About Jr., PAGASA, Philippines
4. *Ensuring fisherfolk welfare during cyclones* Juan Blenn Huelgas, Social Reform Council, Philippines
5. *A description and analysis of the events occurring at sea and on land on 6 and 7 November 1996 in East Godaveri District*, C. Muralidharan, AFPRO, Hyderabad
6. *Gender concerns with regard to disaster preparedness and management*, Jean D'Cunha, ADPC, Thailand
7. *The use of radio transceivers at sea and on land for cyclone warnings*, P. Raghuram, FAO National Consultant (Radio Communications), Vishakapatnam.
8. *Awareness programmes for disaster preparedness*, Paul Calvert, FAO Consultant (Team Leader), UK.
9. *Measures for improving the safety of mechanised fishing vessels*, Jeremy Turner, Senior Fishery Industry Officer, FAO HQ, Rome.

Cyclones and cyclone forecasting

The Indian Meteorological Department (IMD) made two presentations. The first by Dr J.V.M. Naidu, Director of the Cyclone Warning Centre at Vishakapatnam was entitled *Cyclone warning and disaster preparedness*. This was followed by a presentation on *Cyclones and cyclone forecasting* at State and National Level by Dr R.R. Kelkar, Director of IMD, New Delhi. It was reported that out of some 80 tropical cyclones occurring each year only six, on average, are in the North Indian Ocean. However, the Bay of Bengal cyclones are generally particularly devastating because of the severe storm surge effects they produce on the low-lying coasts of the Bay. The speakers showed very clearly how the IMD is enhancing its capacity to detect and track cyclones in the Bay of Bengal with improved satellites and Doppler radar. These improvements will permit more accurate monitoring of the wind speeds and movement of the cyclone and its destructive potential. However, notwithstanding the development, IMD with its long experience (established in 1875) and current technology has a very good capability indeed. In fact IMD is designated by the World Meteorological Organization as a Regional Specialised Meteorological Centre for Tropical Cyclones and is responsible for providing advisories to neighbouring countries. IMD is also developing the Cyclone Warning Dissemination System, which provides direct, selective, spoken warnings via INSAT satellite to 250 locations, 80 of them in Andhra Pradesh. Dr Kelkar observed that no matter how precise warnings become the warnings alone cannot save lives without fast and appropriate actions by government and media.

What has become clear from the FAO project work in the villages in East Godaveri is that whilst IMD warning information is impressive it can take a long time to filter through the government Cyclone contingency plan of action (CCPA) system until it is broadcast by All India Radio (AIR) using terminology and in a style which makes it sadly inaccessible to fishing communities. It is also clear that whilst improvements in technology continue to increase the quantum and quality of live cyclone data, which can be collected, the prediction of their landfall is still a matter of extrapolation tempered by climate records and synoptic observations. As Dr Naidu pointed out, "Cyclones do not behave like gentlemen but like madmen and thus our (IMD) predictions have to be taken with a good deal of precaution".

A description and analysis of the events occurring at sea and on land, 6 and 7 November 1996 in East Godaveri District

Mr C. Muralidharan, Senior Fisheries Researcher and Specialist of AFPRO, Hyderabad, was the primary author of the baseline survey commissioned by FAO at the beginning of the project. The study investigated the events occurring in the two worst hit villages, Balusuthippa and Bhairavapalam, during the November 1996 cyclone. The presentation focused on the fact that the villages did not receive warnings through the channels laid down in the cyclone contingency plan of action of the state government. The route was explained that cyclone warnings take from CWC down through the chain to the district collectors, mandal revenue officers (MROs) and finally to the villages. The chain is tortuous and lengthy and is prone to breaks or delays that can significantly or completely erode the useful time left for a response at the village level before the cyclone strikes. The main loss of life was amongst shrimp seed collectors (830), and mechanised boat crews (540). The lack of reliable communication to the villages was stressed, for example the fact that in both villages the single telephone was either not working, or no one called, on the night of the cyclone. Neither of these telephones work today some two and a half years after the cyclone. Mr Muralidharan observed that fishers did not heed the AIR warnings, or did not take them seriously until it was too late. This indicates the lack of credibility that these warnings have to the fishing community. What has become clear during the FAO implemented project is that people have a very poor comprehension of the warnings.

Cyclone forecasting, warning and dissemination systems in the Philippines

Mr Lucrecio O. About Jr, Weather Specialist of the Natural Disaster Reduction Branch, Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) presented the paper. In the course of reformatting cyclone warnings PAGASA had conducted a series of consultations and workshops that revealed that the impact of their warnings was low, because of perceptions by the user that accuracy of weather forecasts should be total. The degree of preparedness of the public in coping with adverse weather phenomena is only as good as the level of awareness and understanding. As a result of these consultations, PAGASA attempted to win the trust of the users and reformatted warnings to offer the required sense of urgency and to simplify the message.

Ensuring Filipino fisherfolk welfare during cyclones

Juan Blenn I. Huelgas, a sectoral representative of the Social Reform Council of the Philippines and also national coordinator of the Philippines Inter-agency Network for Disaster Response presented the paper. Disasters of significant magnitude continued to affect the Filipino population in spite of considerable efforts by the Government. Over many years this has led to changes that have seen the development of strong partnerships between the Government, NGOs, peoples' organizations, business communities and churches together with the general public in improving disaster management, preparedness and response. The last six to ten years has seen the fruition of these partnerships resulting in effective strategies, policies and mechanisms to maximise the effectiveness of each of these sectors in disaster mitigation and relief. In the early 1970s and earlier the responsibility and action lay very much with the Government and was almost entirely relief oriented. Currently there is a National Disaster Coordinating Council (NDCC), which strengthens the disaster response capability but also runs a national programme on community disaster preparedness.

Below the NDCC are a series of tiers of Disaster Coordinating Councils (DCCs) operating at the regional, provincial, municipal, city and barangay levels (equivalent to mandal level in India). Even at the lowest level they are mandated to act on receipt of a cyclone warning, they do not have to wait for instructions from a higher level. The DCCs include government, non-government, private sector and professional persons and are not the sole preserve of government employees. These DCCs are charged with three phases of service, before, during and after the disaster. They are to coordinate and ensure communications and provision of warnings, logistical facilities, relief, evacuation, rescue and engineering, public information, rehabilitation and the provision of basic social services. What is also interesting and valuable is the private sector participates in this process recognising that they can also contribute to disaster mitigation.

Mr Huelgas said that there is still much to be done to further improve disaster mitigation in the Philippines not least in disaster preparedness and awareness at the community level and in the ability to understand the warnings and warning systems. In this regard, there is much in common with the experience in India. Poverty in the fishing community was stressed as a key determinant in fisherfolk's vulnerability to cyclones and other natural disasters. Thus all developments to improve education and minimum standards of health and nutrition all contribute towards improved disaster mitigation. Disaster and development cannot be separated, in cyclone prone regions they are part of the same process and must be addressed together.

Gender and disasters

Ms Jean D'Cunha in her paper stressed how gender issues were, until recently, ignored or at best only tagged on to disaster mitigation programmes as appendages. This stems from a very stereotyped view of women and their assumed secondary role in society as the weaker and inferior sex. It is the social and socio-economic traits in society that men have developed and sustained (to favour themselves) that leads to the marginalization of women and thus increases their vulnerability during disasters such as cyclones. Examples of this are the ways that social norms in some societies prevent women, at first as girls, from playing in the water and learning to swim. As such they never do learn to swim. There are cases in India where in cyclone struck villages most of the women drowned and now most of the men, who largely survived, have remarried. But it is not just the women's socially imposed inability to swim that caused their deaths but also their socially imposed dress code hampering them in climbing to safety or wading through torrents of flood water. The generally stronger maternal bond to offspring, causing them to take greater risks to save their children, also results in greater vulnerability. The traditional paradigm would put these things down to women being weaker and less able to survive.

Another example is from Bangladesh where women perished in their houses whilst men, who are free to move around the markets and meeting places receive and exchange news and warnings easily. Social and religious norms dictate that women should not move out of the house alone, especially in the dark, and thus they can become more vulnerable to disasters, such as cyclones, unless disaster preparedness and management plans specifically address these issues with appropriate strategies. Similarly in a male dominated society women are easily marginalised when it comes to relief and rehabilitation unless the programmes consider the position of women headed households from the outset and ensure that distribution mechanisms do not favour men by default. Disaster resilient development, building on the special strengths of women such as their wealth of local knowledge, skills and resourcefulness in their socially constructed role as nurturers and as key consumers of environmental resources should receive far more emphasis than bureaucratic, inequitable and unsustainable disaster relief. Where relief is required it should be approached with a holistic gender perspective and include gender sensitive women staff both in the field and in the planning and management. One particular point that Ms D'Cunha made is the importance of the co-ownership of houses by husband and wife. The World Bank made this mandatory in the Latur reconstruction work. Co-ownership has a lot to recommend it anywhere, but not least in the cyclone vulnerable areas of India's east coast.

Search and rescue

The Indian Coastguard presented their work on search and rescue. Experiences were shared of the Coastguard's encounters with fishing boats while on regular patrols. It was reported that the Coastguard finds, without exception, that fishing boats fail to carry the mandatory safety equipment. However, as the Coastguard is not empowered to take any action in this regard they are unable to do anything other than encourage compliance. The Coastguard stated this is obviously ineffective in improving safety standards and called for legislation to increase their powers of enforcement. When so universally ill equipped it is not surprising so many fishing crews perish if their vessels founder. The Coastguard also expressed its willingness to cooperate with any efforts that would help to reduce loss of life at sea and recounted how difficult the job of search and rescue is made by the lack of information. When requested to search they are severely handicapped by the fact that no one is able to give them any information on where the missing vessel may have been operating. They suggested that if coast operators could at least give an indication of their anticipated fishing grounds to port authorities, fishing cooperative, or even family, it would increase the chances of search operations being effective. In this regard they endorsed the use of VHF communication by fishing boats. They also were strongly in favour of transistor radios being carried by all craft as standard practise for receiving weather forecasts and cyclone warnings.

Awareness programmes for disaster preparedness

This paper by Mr Paul Calvert, Team Leader, stressed the importance of community based disaster preparedness to compliment the state plan and stressed the need for a highly participative approach to the extension work required to achieve this. Stating the achievements of the project it was emphasised how the project had facilitated

the development of community contingency plans of action in 30 villages covering pre-cyclone, during and post cyclone phases. The importance of these plans being developed and operated by the community themselves - of the community having a strong sense of ownership - would be a key to their sustainability. The importance of this work being tied in to development work in the villages was stressed. The project had tried from the outset to obtain, at least 50 percent, participation of women both amongst the 20 extension officers recruited and trained and amongst the 750 volunteers of the 30 Storm Safety Action Groups (SSAGs) in the pilot villages. While this was not achieved, the extension officer teams (they worked in pairs), which included women, showed a clear advantage in encouraging active participation of women in the village groups and women's issues in the plans. The poor level of literacy and education in the fishing communities combined with the style and terminology of the cyclone warnings was seen as a key factor in the lack of preparedness amongst such communities. Specific and significant improvements in these two areas coupled with the development of sound Storm Safety Action Groups could reap significant reductions in vulnerability.

The use of radio transceivers at sea and on land for cyclone warnings

In his paper on radio communications, Mr P. Raghuram, National Consultant Radio Communications gave a general background to radio communications and stressed the value of voice communication through VHF radio for fisherfolk at sea. Currently fishers at sea have absolutely no communication link with the land or even other vessels out of hailing distance. In the face of danger or difficulty they have to cope alone and un-aided. With VHF communication the fisherfolk have the opportunity to call another vessel nearby or shore-based organizations for assistance. Weather bulletins and cyclone warnings can also be broadcast to fisherfolk via this link with the advantage of using local dialects and terminology and making the messages quite specific to groups of vessels in different locations. Remote villages, otherwise isolated, can also benefit from VHF systems permitting them to send and receive not only general information but also that relating to cyclones and disaster mitigation. Mr Raghuram explained how the FAO project has installed two VHF shore stations with 90' antennae masts to maximise range and would soon have some 140 VHF sets operational in mechanised fishing craft. The system has already been responsible for coordinating the assistance of craft with engine failure, recalling fishing boats heading out into seriously deteriorating weather, and directing a boat to the nearest port where some engine parts were available.

Measures for improving the safety of mechanised fishing vessels

Mr Jeremy Turner, Senior Fishery Industry Officer, FAO Rome, focused on the key safety deficiencies of mechanised boats on the Andhra Pradesh coast. Unsafe practises, poor design and construction details and blatant disregard and lack of enforcement of rules regarding carrying of safety equipment were responsible for the 569 deaths of crew members in the 1996 cyclone disaster. He pointed out that these deficiencies are largely the product of lack of awareness at builder, operator and inspector levels and therefore stressed the need for effective legislation and enforcement. There is also a great need for improved technical and practical training to overcome such deficiencies. The cost of certain crucial technical improvement to the vessels was minimal at all these levels even if carried out on existing craft. If done during the construction of new vessels the cost of these improvements would be negligible in comparison with the total cost. The ten-person lifefloat developed by the project and manufactured locally (with 100 units being distributed free of cost by way of demonstration) was highlighted as a most significant and appropriate piece of lifesaving equipment which if carried out would dramatically reduce loss of life at sea.

4. WORKSHOP RECOMMENDATIONS AND FOLLOW-UP

For the purpose of preparing workshop recommendations and preparing follow-up proposals, four workgroups were formed to consider four distinct issues:

1. Cyclone contingency plan of action: communication from state to fisherfolk
2. Evacuation and protection
3. Improved safety at sea for small, mechanised fishing vessels
4. Fisherfolk storm safety action groups and disaster preparedness

The workshop recommendations and a list of the members of each working group follow.

5. REPORTS OF THE WORKING GROUPS

WORKING GROUP 1

CYCLONE CONTINGENCY PLAN OF ACTION: COMMUNICATION FROM STATE TO FISHERFOLK

Dr R.R. Kelkar and subsequently Dr J.V.M. Naidu chaired the group. There was discussion of the various problems faced by fisherfolk at sea as well as in the coastal areas in receiving cyclone-warning bulletins. Under the present system the cyclone warning dissemination network at the national and state level has been fairly adequate. However, from state headquarters down to the fisherfolk it is very lengthy and weak. Hence it is to be significantly strengthened and streamlined. In view of this, action plans have to be prepared at village/mandal levels and properly implemented by the fisherfolk and officials for better disaster preparedness.

Recommendations

1. Coverage of All India Radio (AIR) network is very sparse along the coast. Each district should be provided with a relay station mainly catering to entertainment/weather so that it has wide coverage of fisherfolk villages.
2. Following the CWC bulletin broadcast by AIR Collectors of the Districts threatened by a cyclone should broadcast specific instructions to the concerned mandal/village officers. (This should be done at specified hourly intervals and as frequently as required, cutting the entertainment programme for the best results).
3. Every mechanised fishing boat at sea or group of fisherfolk working away from the villages should carry a transistor radio.
4. For dissemination of warnings, Doordarshan, commercial and other channels popular amongst the fishing communities should be used as extensively as possible, and the content of these warnings should be provided in clear, easily comprehensible terminology, language and local dialects.
5. As part of the pre-cyclone actions, the telephone and fax numbers of important village or mandal officials/societies/NGOs should be collected and kept at police, district and mandal headquarters.
6. Telephones/faxes in all the fishing villages should be inspected, tested and confirmed operational before the cyclone season.
7. All minor ports/fish-landing centres should be provided with a staffed VHF communication system for weather/distress information and communication.
8. It should be made mandatory that all the mechanised boats/fishing trawlers should be fitted with VHF sets.
9. Additional use of radio communications should be explored (such as handheld VHF, VHF sets, ham sets, etc.) by communications experts in order to identify effective means of alerting vulnerable fisherfolk. The police wireless communication network at mandal/village levels should be further strengthened. All existing and recommended radio links should be subject to a comprehensive study such that a coherent and realistic proposal for reliable and sustainable communications can be made. Such a study should take into account the channels of communications laid down by the cyclone contingency plan of action.
10. Participation of the armed forces may be explored for the dissemination of cyclone warnings.
11. Village level action plans should be developed by communities with the assistance and support of the officials/NGOs concerned.
12. The cyclone contingency plan of action should be reviewed annually and amended as appropriate.
13. The content, style and terminology of cyclone warnings should be reviewed to improve their clarity.

14. Working Group 1 Members

Chair, Dr R.R. Kelkar	Director-General	IndianMeteorological Department,
Dr J.V.M. Naidu	Director, Cyclone Warning Center	IMD Visakhapatnam, co-chair
Mrs P Malakondaiah IAS	District Collector	Vizianagaram.
Mr Lucrecio About	PAGASA	Manila Philippines.
Mr C.M. Muralidharan	Senior Fisheries Specialist	AFPRO, Secunderabad.
Mr Abdul Salam	Visakhapatnam Port Trust	Visakhapatnam.
Mr C.S. Reddy	Director	CARE, Hyderabad.
Prof. A.R. Subramaniyam	Professor of Meteorological Dept	Andhra University, Visakhapatnam.
Dr K. Radhakrishna	Consultant FAO	New Delhi.
Mr D. Sharad Sharma	Dy. Comdt	Indian Coastguard, Visakhapatn'm

WORKING GROUP 2

EVACUATION AND PROTECTION

Receiving the signal

Cyclone warnings received by fisherfolk from radio, TV and government officers are usually taken lightly. This is because, in their experience, they have received warnings but the cyclone has not struck. (The interpretation of this is that the fisherfolk do not understand the unpredictable nature of cyclone tracks or the intention of warnings. They imagine that if IMD track cyclones "with science" they should know exactly what they are going to do and the warnings should be 100 percent correct. The fact that on many occasions warnings are not followed by a cyclone strike indicates to the fisherfolk (most incorrectly) that IMD do not know what they are doing).

However something can be done to further the evacuation and protection with the participation of community and NGOs.

Preparation for evacuation

1. People should be adequately informed and motivated, duly impressing upon them the need for evacuation.
2. A major constraint is that people are reluctant to move out of their dwellings. The main reasons for this are:
3. In fisherfolk's past experience the cyclone has not struck after warnings or evacuation so the process has been traumatic and unnecessary.
4. They fear loss of their personal property and belongings that will be left unattended when they are forced to evacuate (obviously only the bare minimum of personal effects are permitted to be carried when they are evacuated).
5. It is emotionally very difficult to abandon ones home. People prefer to stay and try to save what they can.
6. They are unsure how safe they will be and how they will be taken care of if evacuated.
7. They feel that suitable safe places, or the access to them, are inadequate.
8. Capacity of safe-havens/shelters is insufficient for all members of the community.
9. There is, in any case, a shortage of transport for evacuation.

Process of evacuation

Important note from the Secretariat to readers: the term e*vacuation* can be used in two ways (1) LOCAL evacuation; i.e. from a person's home to a safe building in the same village. (2) REMOTE evacuation, i.e. from the person's village to a safer place that is some distance away and requires vehicle transport.

The process of evacuation can be improved by:

1. Organizing small action groups (e.g Storm Safety Action Groups) in the community with specific responsibilities for disaster preparedness.
2. Community developed village level contingency plans, (i.e. by the village for the village).
3. Identifying the safer and most accessible places for evacuation.
4. Identification of the most vulnerable groups in each village plan, e.g. children, pregnant women, physically handicapped, etc. Ensure they are taken care of during the disaster.
5. Ensuring basic needs are met during times of disaster, e.g. food, drinking water, medicines, kerosene, etc. have been stored earlier.
6. Ensure transportation (where required).

Protection

In all matters relating to disaster preparedness, certain protection is required, e.g.:

1. Protection of houses and property (left untended during evacuation)
2. Drinking water resources
3. Communication system.
4. Power supply
5. Livestock safety
6. Safeguarding of the existing bunds and embankments in the village

Recommendations

1. Awareness raising campaigns on cyclones and cyclone warnings should be implemented by state officials and NGOs in the community on a regular basis.
2. Means and mechanisms (lock-ups, police, insurance, etc.) should be provided to ensure the protection, safety and preservation of property and belongings of evacuees from the effects of the cyclone as well as from theft.

Awareness should be raised of simple and appropriate means of preserving personal belongings, food stocks and market produce.

3. More cyclone resistant housing schemes should be implemented for vulnerable communities.
4. Cyclone resistant community halls and school buildings should be designed and constructed in lieu of stand-alone cyclone shelters. This should be done with the full participation of the community. The designs should incorporate specific facilities for use by women, the elderly and the handicapped in times of cyclone, as well as adequate sanitation, water storage and emergency lighting, etc.
5. Construct and improve coastal road networks and general transport and telecommunications.
6. Improve functional literacy in the community.
7. Earmark an allocation in the budget for disaster preparedness training, including risk assessment at all levels with reference to priority sectors.

Working group 2 members

Sri. D.S. Murty, IAS	Director of Fisheries AP	Deptment of Fisheries Hyderabad
Mr Roger Bellers	Consultant	Dutch Relief and Rehab Agency
Mr Juan Blenn Huelgas	Sectoral Representative	Social Reform Council, Philippines
Mr Narasinga Rao	Asst. Director	Department of Fisheries, Rajahmundry
Mr Gurudut Prasad	SSEO Field Coordinator (FAO)	ACTION Rajahmundry
Mr Satyam	Regional Dy. Director of Fisheries	Deptment of Fisheries Visag
Ms. C Mohanna	Programme Coordinator OXFAM	OXFAM Kakinada

WORKING GROUP 3

IMPROVED SAFETY AT SEA FOR SMALL MECHANISED FISHING VESSELS

Dr Yadava and subsequently Dr Sudarshan chaired the working group. Where appropriate the working group's proposals relate to ***small, mechanised fishing vessels having a maximum length of between 10 and 20 metres.*** It was noted that to ensure consistency with the Torremolinos Convention of 1977 on the safety of fishing vessels, this limit might be more conveniently set at 24 metres. The working group's proposals should be fully harmonised with Merchant Shipping and Fisheries Acts. Following active discussion on a number of topics related to improved safety at sea for these vessels, the following recommendations and proposals were made:

1. States should review, amend and enforce legislation related to the design, construction and equipment of small, mechanised fishing vessels operating in their territorial waters on the basis of guidelines provided to them by the Government of India. The Government of India should expedite the enactment of similar legislation for larger vessels operating beyond the territorial waters of the Coastal States. Such legislation should be periodically reviewed and amended as appropriate to reflect current fishing operations and modern technologies.
2. The necessary legal framework, together with the appropriate implementing mechanisms, should be provided to permit the inspection and enforcement at sea of regulations pertaining to safety equipment.
3. All small mechanised fishing vessels under 20 metres in length should be registered with the competent authority, and insured.
4. Legislation should be enacted to ensure that a comprehensive range of safety equipment is carried on small, mechanised fishing vessels. This equipment should include the appropriate number of lifefloats, life jackets, life buoys, torches, an aneroid barometer, flares, fire extinguishers, a first aid kit, a two-band transistor radio and spare batteries, a compass and an emergency hull repair kit.
5. Small, mechanised fishing vessels should have on board the requisite number of certified officers/crew appropriate to the size of the vessel. Training syllabi, with particular regard to safety requirements and relevant procedures, should be reviewed on a regular basis and amended as appropriate to reflect current fishing operations and modern technologies.
6. Awareness building with regard to all aspects of safety at sea should be provided to boat builders, owners, operators and crew of small mechanised fishing vessels using appropriate media and demonstration equipment by Fisheries Departments, MMD, Coastguard and other interested organizations through fisher's associations, as well as educational, social and cultural organizations.
7. Prior to departure from its port or village by a small mechanised fishing trawler, a certified crew member should file a departure report in a record maintained by the Fisheries Department/Association/Village Elder

providing comprehensive details of the intended trip in order to facilitate search and rescue operations in time of need.

8. Small mechanised fishing vessels should be equipped with a VHF radio set to be operated by a certified operator. A procedure should be established by the competent authority to facilitate the allocation of a VHF licence. Adequate (at least four) operating frequencies/channels should be allocated and dedicated for use by fishing vessels to ensure they are not overloaded.
9. Sufficient human and financial resources should be made available to the competent authority to ensure the effective enforcement of new or amended legislation. Additional resources should be provided to strengthen the institutional capacity and ensure the training and competence of the staff of the authority to effectively carry out this responsibility.
10. The MMD should be requested to view, inspect and test the lifefloat constructed by the FAO project TCP/IND/6712 with a view to certifying its design and construction, and approving it as a part of the vessel's safety equipment.

The working group endorsed a proposal made during the Plenary session that the safety at sea of motorised and non-motorised fishing craft and their crews should be improved through local level awareness campaigns and training by the Department of Fisheries and other competent groups. Suitable training materials should be developed advising of minimum standards. In this connection, the group clarified that "motorised" refers to traditional artisanal craft into which an engine has been installed, whereas "mechanised" refers to craft specifically designed for propulsion by an inboard engine.

Working group 3 members

Dr Y S Yadava	Fisheries Development Commissioner	Ministry of Agriculture, GOI
Dr D Sudarsan	President	Forum of Fisheries Professionals
Mr J M M Turner	Senior Fishery Industry Officer	FAO, Rome
Mr Y Sundarayya	Joint Director and National Project Director	Department of Fisheries
Mr B V Raghavulu	Regional Deputy Director	Department of Fisheries
Mr C Haridas	Assistant Commissioner	Ministry of Agriculture, GOI
Mr B Rama Rao	President	East Godavari Fishermens' Cooperative Society
Mr G P Raj	Commandant	Coastguard HQ, Delhi
Mr B S Yadav	Commandant	Coastguard, Visakhapatnam
Mr K Nautiyal	Commandant	Coastguard, Visakhapatnam
Mr M Nautiyal	Commandant	Coastguard, Visakhapatnam
Mr Dixitulu	Editor	Fishing Chimes, Visakhapatnam
Mr Prakash Rao,	IAS District Revenue Officer	Revenue Department
Mr P Raghu Ram	National Consultant	TSSDP/FAO
Dr K Radha Krishna	National Consultant	TSSDP/FAO

WORKING GROUP 4

FISHERFOLK STORM SAFETY ACTION GROUP/DISASTER PREPAREDNESS

The group strongly endorsed community based disaster preparedness and management programmes such as the Storm Safety Action Group formation of the FAO project TCP/IND/6712 Training in Sea Safety Development Programmes.

The following recommendations are made to directly and indirectly strengthen the efficacy of such programmes:

Recommendations

1. Following a positive evaluation the programme, for storm safety action groups (SSAGs) and gender sensitive community-based disaster preparedness and management, should be extended to all vulnerable coastal villages. It should include specific training for village communities on comprehension and interpretation of AIR/IMD/Doordarshan weather bulletins and warnings.
2. Fisheries development officers, mandal revenue officers and mandal development officers and local police should review (familiarise themselves with) community cyclone contingency plans with the community at the mandal and village level during the pre-cyclone months and help ensure that the plans are up to date and the SSAGs are in a state of readiness.

3. Training in disaster preparedness and management should be provided to all central, state, district, divisional, mandal and village level government officials, NGOs and CBOs (state and Asian regional level training programmes including exposure to effective disaster preparedness and management programmes in neighbouring countries). Gender should be an important component in the content of this training and women must be strongly encouraged to participate.
4. Revenue and Fisheries Departments should conduct annual surveys to assess risk, vulnerability, capacity, damage, relief and reconstruction needs, on the basis of class, gender, age, occupation, etc. to guide planning and implementation of disaster preparedness and management work. These surveys should be conducted with the participation of the storm safety action groups.
5. Disaster preparedness and management should be integrated into all government development plans and programmes.
6. National and state television and radio networks should broadcast, and commercial television and radio networks encouraged to broadcast quality information and educational material on cyclones and disaster preparedness and management in local languages and dialects.
7. Formal and informal education (including children's camps and adult formative literacy) should incorporate awareness and training on the nature and behaviour of cyclones, understanding and interpretation of cyclone warnings and disaster preparedness and management. These subjects should be integrated into the school curricula.
8. The implementation of cyclone resistant housing programmes should be accelerated, new multi-purpose community buildings constructed in villages lacking shelters and repair reconstruction or demolition of damaged or derelict cyclone shelters should be undertaken. This work should involve the participation of the local community at all stages from conception to completion.
9. Replanting and protection of forest and mangroves and shelterbelt plantation should be undertaken in all vulnerable areas and the CRZ Act fully implemented.
10. Reliable and appropriate two-way communication systems should be established and maintained in all vulnerable areas.

Working group 4 members

Chair Ms Jean D'Cunha,	ADPC Consultant on Gender and Disasters	
Mr P. Calvert	FAO Consultant, Team Leader, (TSSDP)	TCP/IND/6712
Mr B. Rasheed	Communication Expert	Disaster Management Unit
A.P. Hazard	Finance and Planning	Mitigation and Emergency Cyclone Recovery Project,
Ms C. Mohanna	Programme Coordinator	OXFAM (later shifted to Group 2)
Mr C. Ailaiah	Aquaculturalist	Department of Fisheries (Hyderabad)
Mr M. Ram Gopal Rao	Deputy Director Fisheries	Department of Fisheries (Visag)
Mr P. Bramhaji Rao	Assistant Director	Department of Fisheries (Visag)
Mr P. Ramakrishna Raju	Storm Safety Extension Officer, Fisheries Development Officer	Department of Fisheries, (Kakinada)
Mr P. Sriramulu	Storm Safety Extension Officer, Fisheries Development Officer	Department of Fisheries, (Kakinada)
Mr V. Ram Mohan Rao	Storm Safety Extension Officer, Fisheries Development Officer	Department of Fisheries, (Kakinada)
Mr G. Saikumar	Storm Safety Extension Officer	SRAVANTHI (NGO)
Ms. C. Radhika,	Storm Safety Extension Officer	ACTION (NGO)
Ms. E. Seeta Ratna Kumari	Storm Safety Extension Officer	ARISE (NGO)
Mr Pinapothu Annavaram	Fisherman survivor	Matalapalem, East Godaveri
Ms. E. Subhadra	Fisherwoman survivor	Matalapalem, East Godaveri
Ms V. Dhanalaxmi	Fisherwoman survivor	Matalapalem, East Godaveri
Mr P. Nagoor	Fisherman survivor, mechanised boat crew	Etimoga, East Godaveri
Mr P. Nageshwar Rao	Fisherman survivor, mechanised boat crew)	(Etimoga, East Godaveri

NB: Storm Safety Extension Officers are in the FAO project training in Sea Safety Development Programmes.

A number of complimentary themes, other than cyclones and disasters, unite the papers and presentations of this workshop. Not least of these is awareness. It is clear that the lack of awareness of a number of aspects contributes significantly to vulnerability and consequently loss of life during cyclones. Lack of awareness about the real cause

of loss of mechanised fishing craft; lack of awareness that cyclone warnings are not comprehended by the majority of those they are intended to serve; lack of awareness of the specific vulnerabilities and strengths of women in disaster preparedness and management; lack of awareness of the synergies that can be achieved through combining the strengths of government, NGOs, private sector and communities in combined and complimentary efforts to improve disaster preparedness. The recommendations, which form the key component of this report, reflect the urgent need for greater awareness of all levels to ensure that all of the recommendations reap tangible and sustainable improvements in disaster preparedness and management.

6. DISCUSSION AND ADOPTION OF THE WORKSHOP REPORT

The reports of the working groups and the proposals and recommendations contained therein, were endorsed by Plenary who requested the secretariat to finalise the Meeting Report in draft form for clearance by the Government of India, which was given by Dr S. Yadava, Fisheries Development Commissioner, Government of India in March 2000.

On behalf of the organizers of the workshop, Mr Peter Rosenegger, FAO Representative for India and Bhutan expressed his appreciation of the active participation of all participants and observers, and of their valuable contributions to the workshop. He noted that recommendations made by the four working groups ccould contribute to reducing the loss of life amongst fisherfolk during cyclones. The working group recommendations have an element of overlap and compliment each other. This is a strength rather than a weakness and reinforces the how, whilst some may be responded to in a very specific and individual manner, together they will contribute to a comprehensive, effective, practical and sustainable revision of cyclone disaster preparedness and management in India at the National, State and community level.

In his closing address, Dr A Chandrasekhar, the Honourable Minister for Fisheries, Government of Andhra Pradesh, stressed the active efforts of his State for the improvement of education amongst fisherfolk, and recognized that education lay at the heart of social improvement. He noted that the exchange of views, ideas, plans and techniques amongst such a wide cross section would be of value to the administrators, and that such an activity should be repeated. In thanking FAO for the assistance, he assured the participants that all the cooperation and help required from the Government of Andhra Pradesh in the implementation of their recommendations would be forthcoming.

Annex 1

WORKSHOP PROGRAMME

Day 1: 4th March		
Registration		0900 - 1000
Welcome address	Dr Y.S. Yadava, Fisheries Development Commissioner, Government of India	1000 - 1005
Message from FAO	J.M.M . Turner, FAO HQ, Rome.	1005 - 1010
Message from ADPC	Ms J. D'Cunha, ADPC Representative	1010 - 1015
Chief guest's address	Prof. R. Radha Krishna, Vice Chancellor, University of AP	1015 - 1020
Keynote address and inauguration	Mr T. Gopal Rao, Principal Secretary, GOAP	1020 - 1040
Vote of thanks	Mr Y. Sundarayya, Jt Director, GOAP	1040 - 1045
Tea/coffee		1045 - 1115
SESSION I	Chair: J.M.M. Turner, FAO	
Cyclones, Cyclone Forecasting and Dissemination at National Level	Dr R.R. Kelkar, Director-General, IMD, Delhi	1115 - 1200
Cyclone Forecasting and Dissemination at State Level	Dr J.V.M. Naidu, Director of Cyclone Warning Centre, Visakhapatnam	1200 - 1245
Lunch		1245 - 1400

SESSION II	Chair: Mr Peter Rosenegger, FAO Rep. India and Bhutan	
A Description and analysis of the events occurring at sea and on land on 6 and 7 November 1996 in East Godaveri District	Mr C. Muralidharan, AFPRO	1400 - 1430
Discussion		1430 - 1500
Cyclone warning and dissemination system in Philippines	Mr Lucrecio About Jr, PAGASA, Philippines	1500 - 1530
The Philippines Social Reform Council and its role in ensuring the welfare of fisherfolk during cyclones	Mr Juan Blenn Huelgas, Social Reform Council, Philippines	1530 - 1600
Gender concerns with regard to disaster preparedness and management	Ms J. D'Cunha, ADPC	1600 - 1630
Discussion		1630 - 1730

Day 2: 5th March		
SESSION III	Chair: Dr Y.S. Yadava, Fisheries Development Commissioner, GOI	
Awareness programmes for disaster preparedness	Mr Paul Calvert , FAO Consultant	0900 - 0930
Role of coastguard in search and rescue (SAR) operations	Coastguard, Delhi	0930 - 1000
The use of radio transceivers at sea and on land for cyclone warnings	Mr Raghu Ram, National Consultant FAO	1000 - 1030

Improvements of mechanised fishing vessels and their equipment	J.M.M. Turner, FAO Senior Fishery Industry Officer	1030 - 1100
Tea/coffee		1100 - 1130
Discussion		1130 - 1200
Introduction to Working Groups	J.M.M. Turner, FAO Senior Fishery Industry Officer	1200 - 1230
Working groups: 1. Cyclone contingency plan of action: communication from state to fisherfolk 2. Evacuation and protection 3. Improved safety at sea for small trawlers 4. Fisherfolk storm safety action groups/disaster preparedness		1230 - 1300

SESSION IV		
Lunch		1300 - 1400
Resumption of working groups		1400 - 1600
Tea/coffee		1600 - 1630
Resumption of working groups and drafting of reports		1630 - 1730

Day 3: 6th March		
SESSION V		
Presentation and adoption of the report	Co-chairs: Dr Y.S. Yadava GOI and Mr Jeremy Turner, FAO	0800 - 1000
Valedictory	Mr Peter Rosenegger, FAO Representative for India and Bhutan	1000 - 1005
Address	Sri A Chandra Sekhar, Minister of Fisheries, GOAP	1005 - 1015
Vote of thanks	Mr Raghu Ram, National Consultant, FAO	
Tea/coffee		1015 - 1030

Annex 2

WELCOME ADDRESS

Yugraj S. Yadava
Fisheries Development Commissioner, Ministry of Agriculture
Government of India

Vice-Chancellor, Andhra University,
FAO Representative in India,
Principal Secretary, Government of Andhra Pradesh,
Distinguished Guests,
Ladies and Gentlemen

On behalf of the government of India, Ministry of Agriculture, I would like to extend a warm and hearty welcome to all of you on the occasion of this workshop which is being held in this beautiful city of Visakhapatnam. The workshop on Measures to reduce Loss of Life during Cyclones in concerned with the safety and security of our fisherfolk from the vagaries of nature and is perhaps the first of its kind in the country.

The fisheries sector in India, since the launching of the First Five Year Plan in 1951 has witnessed a remarkable transformation from a highly traditional activity to one based on a well developed and diversified infrastructure with immense potential for industrialization. India is now the sixth largest producer of fish in the world with 4.2% contribution to global fish production. The sector plays a very important role in the socio-economic development of the country. It has been recognized as a powerful income and employment generator which stimulates the growth of a number of subsidiary industries. Fisheries is a source of livelihood for a large section of economically backward population and provides employment to about 6.0 million fishermen. The sector is also a valuable foreign exchange earner for the country.

Fish production in the country has been showing an increasing trend and has reached a record level of 5.39 million tonnes in 1997-98. The earnings from export of fish and fishery products crossed US$ one billion mark in 1995-96 and have since been on the increase. Fisheries sector contributed Rs. 22,2230 million to Gross Domestic Product (GDP) during 1998-99, which is 1.4% of the total GDP. There has been an increase of about 13.6% in the GDP from fisheries over 1997-98 figure.

India has a long coastline of 8041 kms and an equally large area under estuaries, backwaters, etc. After declaration of the Exclusive Economic Zone (EEZ) in 1977, the area available to India is estimated at 2.02 million sq. km, comprising 0.86 million sq. km on the west coast, 0.56 million sq. km on the east coast and 0.60 million sq. km. around the Andaman and Nicobar Islands. The marine fishing fleet comprises 0.191 million traditional craft (including about 31,726 motorised traditional craft), about 46,918 mechanised craft and 180 large fishing vessels of over 20m OAL. The large coastline, EEZ and an equally large fishing fleet places enormous responsibility on the Government for the safety and security of fishermen.

The State of Andhra Pradesh has also been playing a pivotal role in the development of fisheries in the country, especially in marine sector. The State has about 12% of the total length of the coastline contributing to about 5% of the total marine fish production in the country. It has also got a large fishing fleet of about 27% of the total number of fishing fleet. The city of Visakhapatnam has also played a pioneering role in the growth of marine fisheries sector, especially in the development of marine fishery sector as an industry in the country.

However, the issues regarding safety and security of fishermen while at sea and those living in vulnerable coastal areas have started receiving the attention of the Government from recent times as a result of the devastating cyclone which occurred in Andhra coast in November, 1996 causing loss to hundred of human lives, fishing crafts and gear, property, etc. While the Indian Meteorological Department and the electronic media like television and radio have been playing an important role in dissemination of proper and timely warnings, yet considerable work is still to be done by both the Central and State Governments and other agencies in the field in providing adequate safety and security to the fisherfolk.

In this context, the initiative taken by the Food and Agriculture Organisation of implementation of the project on **Sea Safety Development Programme** in Andhra Pradesh with generous assistance under their Technical

Cooperation Programme has been a welcome step. The major activities accomplished through the Programme include erection of Radio Towers and providing communication equipment, outboard/inboard engines, life buoys, jackets, etc. to traditional and small fishermen, training them for adoption of sea safety measures at times of such natural distress, etc on pilot basis. A base line survey has also been successfully completed under this Programme which has recommended various effective measures to be taken up for controlling such calamities in future. This workshop in conclusion of the programme has been organised to share the experience gathered by the implementation agencies and the user groups.

I hope this workshop would be able to discuss core issues involved in facing natural calamities such as cyclones and also in creating awareness among the fisherfolk towards the necessity for preparedness to face such natural calamities in future. Besides the experience of fellow fisherfolk in south and south east Asian countries such as Bangladesh, Philippines, Vietnam, etc. in containing such calamities in their countries would also be useful.

Finally, I would like to express our sincere gratitude to FAO for their generous assistance for implementation of this Project and the national and international experts for their untiring tasks and guidance and also to the media for the successful implementation of this Project and for conducting this workshop. My sincere thanks are also to the Andhra Pradesh State Government Officials and our fellow fisherfolk who have made this Programme a great success.

OPENING SPEECH

Jeremy M.M. Turner
Senior Fishery Industry Officer, FAO

Vice Chancellor,
Distinguished guests,
Ladies and gentlemen,

On behalf of the Director General of FAO and the FAO Representative for India, I would like to extend a warm welcome to all of you on the occasion of this workshop on Measures to Reduce Loss of Life amongst Fisherfolk during Cyclones. I would particularly like to welcome those who have travelled the long distances from Thailand and Philippines to share with us the benefit of their experience and expertise.

In Europe, a comparison of the safety record of the fishing industry with other dangerous industries such as mining and the manufacture of steel and others indicates that the fishing industry continues to be the most dangerous by a significant margin, and there is no evidence to suggest that this will change. While the casualty rates in these other industries are gradually dropping, this is not the case in the fishing industry. The reality, it seems, is that while legislation becomes stiffer and fishing vessels are designed and constructed to be safer, their crews push these vessels further towards the limit of their operational safety in the quest to find fish resources less accessible to others. Inevitably, some vessels and their crews are lost.

While data from developing countries on casualties is generally difficult to come by, it is clear that the casualty rate in the fishing industry globally remains one of the highest amongst all industries. Not only is there no evidence to suggest that the number of casualties is dropping in the fishing industry in developing countries, but there is a very real probability that the number of casualties is actually increasing. Why should this be so?

Almost all over the world, as a result of the high concentration of fishing effort close to shore, inshore resources are generally over-fished or highly stressed. Management measures aimed at addressing this problem have in general not been able to stem the problem, let alone reverse the decline of some of these overexploited resources. The need to diversify fishing is acute, but due to the poor safety record and known limitations of the fleets in many developing countries, governments are understandably reluctant to legislate to send fishers offshore. Notwithstanding this, many fishers are left with little alternative but to seek new stocks, and take the risk of operating further offshore in craft which are often unsuitable for the chosen area of operation, from the points of view of design, construction and equipment. In this situation, it is inevitable that the number of casualties is increasing, and this sad fact is confirmed by sporadic reporting on casualties back to FAO.

The subject of safety at sea is therefore one of great concern to the Fisheries Department of FAO. FAO has carried out technical projects in many parts of the world aimed at improving the safety and seaworthiness of fishing vessels. The subject is addressed in the Code of Conduct for Responsible Fisheries, which states specifically that administrations should ensure the safety of fishers and fishing vessels. FAO continues to work with the International Maritime Organization on the issues of crew training and certification as well as on international conventions for the safety of fishing vessels. FAO is currently working on the revision of the Code of Safety for Fishermen and Fishing Vessels, and the Voluntary Guidelines for the Design Construction and Equipment of Small Fishing Vessels to ensure their consistency with the 1977 Torremolinos Convention on the Safety of Fishing Vessels.

FAO is not only concerned with the fishers and their fishing vessels at sea but also with the welfare and well-being of fisherfolk on land. Our programmes in sustainable rural development recognise that preparedness for disaster must be fundamentally linked to many aspects of rural development such as education, health, housing and infrastructure, and that integration and implementation of the two cannot be achieved without the full participation and support of the intended beneficiaries. Integration of disaster preparedness with rural development is cost effective. Disasters are costly in both human life and resources, and they disrupt social and economic development; improved development actually reduces the need for emergency relief and subsequent recovery.

Currently, FAO through its Technical Cooperation Programme is assisting Government of India and Government of Andhra Pradesh in the implementation of a pilot project in and around Kakinada, which is investigating and introducing measures that could reduce casualties amongst fisherfolk both on sea and on land in times of cyclones.

You will hear much more about the project during the course of this workshop. You will hear presentations on the natural phenomena of cyclones and storm surges, eye witness accounts by survivors of what actually happened during the cyclone of November 1996 when nearly 1 500 fisherfolk lost their lives, what the project is doing with VHF networks, life saving equipment, and particularly on facilitating the formation of self help groups in 30 remote villages. Following these presentations, it will be your turn, ladies and gentlemen, to start work. Tomorrow, you will be invited to join one of several working groups, each of which will discuss a particular issue in detail, and then formulate recommendations and proposals which will lead to the implementation of realistic, affordable and effective measures which in turn will result in the reduced loss of life of fisherfolk during cyclones. These proposals and recommendations are to be the real output of the workshop, to be endorsed by all those present, and forwarded to the policy makers. I hope you will find the presentations interesting and informative, and I wish you well and all success in your efforts to ensure a constructive meeting.

Annex 3

SELECTED PAPERS

PRESENTED AT THE WORKSHOP

CYCLONE FORECASTING, WARNING AND DISSEMINATION SYSTEMS IN THE PHILIPPINES

Lucrecio O. About Jr.
PAGASA

Introduction

Tropical cyclone is a natural phenomenon that has become a part of the way of life of the people in the Philippines. Its disastrous effects on lives, livelihood, on properties and on the national economy have cause increasing concerns not only of the Government but also of the Filipino people. The experience of Filipinos with typhoons is replete with memories of typhoon related disasters which caused the loss of numerous lives and which seriously impaired the productive capacity of the country, owing to the destruction of croplands, vital infrastructures and the loss of capital goods. With such dreadful experience, certainly the Filipino people should by now not only accept and live with the reality of typhoons, but hope the effects would be minimal to lives and property.

A typhoon is certain to cause disaster if it strikes vulnerable and poorly protected areas, where there are concentrations of population with their supporting economic and social organizations. It is believed that the best defence against typhoon-related disasters are carefully planned measures, both structural and non-structural, which are implemented by efficient organizations. Disaster preparedness is a short-term non-structural measure designed to minimize loss of life and damage, and to alleviate the suffering of victims by timely and effective rescue, relief and rehabilitation. The structural measures include legislation and regulatory policies such as urban planning, land use, public works and building codes, which are designed to prevent the occurrence of disaster situations.

Awareness of the hazards brought about by tropical cyclones is very important. It is believed that the ability of people in the community to respond to emergency countermeasures for the minimization of the severity, if not the prevention of the calamity depends on their awareness of the hazard. It can be said that the behaviour of people under the threat of typhoon is directly related to their understanding of mitigation measures based on typhoon warning messages.

Nature classification of tropical cyclone

Tropical cyclone is a general term given to describe a major weather disturbance in the tropics. This destructive weather disturbance is characterized by a low central atmospheric pressure and stronger winds relative to its environment. It is generally a large circular system area in which the atmospheric pressure decreases from the outer periphery towards its centre. The centre, which is called the “eye", in a stronger tropical cyclone is surrounded by bands of clouds associated with the wind flow that spiral inwards in a counter clockwise direction in the northern hemisphere.

The strength of the wind increases towards the centre. The lower the central pressure the most intense is the tropical cyclone. Consequently, the more intense the tropical cyclone, the stronger are the associated winds. Thus, the intensity of tropical cyclones depends on the pressure at the centre while the strength of tropical cyclones depends on the maximum wind velocity around the centre of the “eye”.

The tropical oceans of the world, except the South Atlanti, are favoured spawning areas of tropical cyclones. In different geographical areas, tropical cyclones are known in popular local terms. In the Philippines they are known as “Bagyo” regardless of the strength or intensity of the tropical cyclone. The Greeks called them “Typhon” after the mythical Greek monster “Typhoeus” while the Chinese use the term “Taifung”. The Australian, tropical cyclone is called “Willy Willy”. The Arab sailors use the term “Tufang” for tropical storms.

Formation of tropical cyclones

Tropical cyclones can only form over the ocean. The tropical ocean is a vast source of water vapour. The water vapour is the source of energy for the tropical cyclone.

Tropical cyclone develops from a pre-existing weather disturbance such as an easterly waves or Inter-tropical Convergence Zone (ITCZ). Its genesis must be supported by sufficient interaction among various necessary environmental conditions. The pre-existing disturbance must be sufficiently away from the equator to allow the

Coriolis force to operate in deflecting the wind to form a cyclonic spiral pattern. The air at upper levels must have high relative humidity to favour the growth of tall clouds, which eventually serve as a conduit in spewing excess heat to the top of the tropical cyclone system. The ocean surface temperature must be greater than 26° C and the wind changes in the vertical in the basic wind flow must be small. And there must be an outward flow above the surface disturbance to blow away the excess heat. Once the tropical cyclone is formed the tall clouds or deep convecting together with the anti-cyclonic flow or outflow at the top serve, like the exhaust manifold of an internal combustion engine, to keep the system going.

Most of the tropical cyclones that affect the Philippines form to the east of the country particularly over the Caroline Island area. This area is in the western part of the North Pacific Ocean. Some tropical cyclones that eventually affect the Philippines also form over the South China Sea to the west of the country.

Size of tropical cyclone

The size of the tropical cyclone circulation can be inferred from the coverage of the rain clouds and the radius of strong winds. In short, one can infer the physical dimension of a tropical cyclone from the area covered by its bad weather. Some strong tropical cyclone circulations are small in diameter while some weak tropical cyclones are large.

A full-grown tropical cyclone could have an outer rim diameter of 1000 km. In a large and strong typhoon, wind exceeding 100 kph can be within the 100 km, radius. On the other hand, in small but strong typhoons, the 100 kph wind can just be within 50 km radius or even less. The maximum wind is usually confined to a narrow band of 1 - 2 km width around the edge of the eye. The eye is normally about 30 km. distance from the geometric centre of the typhoon. Generally strong typhoons with small circulation are likely to have more destructive winds due to the sudden drop in pressure between the eye and the outer rim of circulation. This is so because the faster the decrease in pressure from the periphery of the centre, the steeper is the pressure gradient and consequently the stronger is the wind.

Classification of tropical cyclone

Tropical cyclones are classified according to their strength. The strength of a tropical cyclone is determined by the speed of the maximum winds near the centre. Thus, tropical cyclones are categorized into: Tropical Depression, Tropical Storm and Typhoon. It is a tropical depression when the maximum winds near the centre is less than 63 kph.

When the maximum wind associated with a tropical cyclone is from 63 to 118 kph near the centre, it is a tropical storm. Then, when the maximum wind speed near the centre is greater than 118 kph, the tropical storm is classified as typhoon. It must be noted that a tropical cyclone once formed progressively develops and intensifies when the environmental condition is favourable. It therefore usually occurs that during the life episode of a tropical cyclone it goes through the stages of tropical depression, tropical storm and typhoon.

Tropical cyclone season in the Philippines

The necessary conditions for the formation of tropical cyclones almost always exist in the western North Pacific Ocean and the South China Sea. Thus, the formation of a tropical cyclone is possible in any month of the year. However, the period of the year when most tropical cyclones affecting the country occurs is from June to December. During this period each month has an average of more than one tropical cyclone occurrence, while the rest of the months have an average occurrence of less than one over a period of 46 years. Fig.1 shows the average monthly frequency of tropical cyclones within the Philippine territory from, 1948 to 1993. Table 1 shows the monthly and annual frequency of occurrence of tropical cyclones that threaten or affected the Philippines for the 46-year period covering 1948 to 1993. On average, 21 tropical cyclones threaten or affect the Philippines annually. The month of July and August have the highest frequency with an average of 3.4 tropical cyclones.

Tropical cyclones move towards the Philippines generally in a west-northwest direction at an average speed of about 20 kph. During the months of September, October and November the tropical cyclones move faster while during January, April and May they move slower. When crossing the Philippines the speed of movement generally accelerates.

Characteristics of tropical cyclones crossing the Philippines

The topography of the Philippines can greatly influence the speed, the intensity and the circulation of tropical cyclones that cross the country. Crossing the Philippines north of Manila, the forward speed of tropical cyclones decreases some 12 to 18 hours before the centre hits land and then accelerates as they cross the land. The typhoon

also weakens as it hits land or upon landfall. The decrease in strength is more drastic in the case of intense tropical cyclones than the weak ones.

For tropical cyclones crossing south of Metro Manila, the profile for speed of movement and intensity is considerably different. Here the weak but fast moving storms increase speed significantly from 48 to 24, with erratic behaviour before landfall. The speed increases again on crossing the country then the speed decreases gradually as the tropical cyclones proceed toward the South China Sea. On the other hand, the weak and slow moving cyclones decrease speed from 30 to 24 hour before landfall. They gradually decrease speed up to the time of landfall, while crossing the country their speed decreases then finally slightly increase speed over the South China Sea. For intense typhoons the speed decreases steadily from 24 to 18 hours before landfall. An erratic acceleration is observed, while crossing the country, then a gradual decrease as they move towards the South China Sea.

It has been observed that the greatest speed of tropical cyclone movement occurs in the month of November (average speed of 25 kph), while the least speed occurs in April (average speed of 15 kph).

Tropical cyclone detection and prediction
Detection of the existence of a tropical cyclone is the first necessary step before the prediction of its movement and changes in characteristics can be made. The advent of the meteorological satellite technology has greatly improved the detection prediction of tropical cyclones not only in the western Pacific, but also in other areas where tropical cyclones occur. International cooperation among the various countries such as the Philippines, United States of America, Japan and Hong Kong made the exchange of meteorological information possible.

Locating on positioning of the eye
The most important information required by meteorologist in order to make a reliable forecast of the cyclone movement, is the accurate position of the “eye” or the centre of the cyclone. The “eye” can be defined as: (1) centre of the rain-echo pattern in the radar screen; (2) the area of minimum pressure; (3) area where the wind is light or calm, or (4) centre of a cloud system from satellite picture. But due to a lot of factors ranging from equipment limitations to the complex interactions of the various atmospheric variables affecting the cyclone, these positions rarely coincide to give an accurate position of the eye. This difficulty limits the accuracy of all the forecasting techniques used by most weather offices, including PAGASA.

Prediction of tropical cyclone movement
A timely and reliable prediction of the movement of the tropical cyclone is ideally the goal of every weather office. Operational forecasters make use of various techniques available to them, which are applicable in the region, since there are no general rules governing the movement of tropical cyclones. These techniques include:

Empirical techniques that forecast the movement of cyclones used regression equations or computer facilities. There are three categories:

Persistence and climatology
Persistence is the simplest method used for predicting the motion of tropical cyclones. It assures that the integrated effect of all the forces acting on the tropical cyclone during the past period will continue to operate and steer the cyclone in a similar manner during the forecast period. Thus, the extrapolation of the past 12 or 24-hour motion of the cyclone gives a relatively good persistence forecast for speed and direction for periods up to 12 hours.

In climatology, the preferred path of a tropical cyclone is established using a large number of cyclone tracks over a great number of years. The mean direction and speed of movement at a number of specific locations are obtained and used as the basis for the prediction of the movement of future cyclones.

Persistence and climatology forecasts can readily be prepared as soon as the current tropical cyclone position is available, and give good results for areas with relatively high frequency of tropical cyclone occurrence.

Synoptic techniques utilize the knowledge from the existing synoptic conditions in the area where the tropical cyclone is located. These are:

Surface pressure change for the 24-hour period prior to the approach of a cyclone is a very good indicator of the possible movement of a cyclone. Studies by Asuncion and Parong (1978) showed that in the Philippines, tropical

cyclones actually move at an angle 10 - 15' to the right of the axis of the 24-hour maximum pressure fall (at least for the next 24 hours). Also experience at PAGASA has shown that a 5 mb or more pressure fall in 24 hours, indicates that the locality is in the direct path of the approaching cyclone. This method is very useful in short range forecasting and can help determine landfall or no landfall forecasts.

Other synoptic indicators, which can be used as pointers in forecasting include:

1. Position of the cyclone relative to the strong subtropical high-pressure cell;
2. Orientation of the ridge-line;
3. Presence of well def-med trough;
4. Origin of formation of the cyclone;
5. Presence of another tropical cyclone.

Satellite/radar observation and satellite photographs are analysed to predict changes in intensity using the Devorak methods.

On the other hand, statistical techniques employing the use of regression equations with various predictors that have been derived from statistical processes are also acceptable. In the 1983 TOPEX (Typhoon Operational Experiment) regression equation models were used.

The analogue methods that capitalize on the ability to identify tile characteristics and behaviour of tropical cyclone tracks provide the future movement of the storm. Availability of powerful computers makes this forecasting tool very useful.

Statistical/dynamic models, such as the Model Output Statistics (MOS) is conceptually the most effective means of introducing numerically forecasted data into a statistically predicted framework.

Dynamic techniques based on the equation of motions and the vorticity equations. This includes the filtered barotropic models and the primitive equation models, which are used in the prediction of tropical cyclone movement.

PAGASA as a warning agency
The Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), through its weather branch is solely responsible for the monitoring, diagnosis and prediction of tropical cyclones. It is incumbent upon the office to issue weather bulletins and typhoon warnings to the general public.

Types of warning
PAGASA issues three types of forecasts and warnings, as distinguish by the type of the end-users such as aviation, shipping and public forecast/warnings. Aviation forecasts are supplied to the airports both international and domestic for the use of the pilots and crews. Navigators are supplied with shipping bulletins to assists them in the decision-making prior to and during sailing, while public forecasts/warnings are issued for the proper guidance of the general public.

SIGMET or significant meteorological information is issued in consonance with our international commitments to safeguard international airlines. Whenever a tropical cyclone is within the Manila Flight Region (MFR). This warning is issued every six (6) hours until the tropical cyclone is about to leave the area.
For the general public, a public forecast/warning is issued to forewarn the populace of the impending danger posed by an approaching tropical cyclone. This is issued every six hours once a tropical cyclone is spotted within the Philippine Area of Responsibility (PAR) or when a cyclone is expected to enter the area. Issuance of warning is continued until the tropical cyclone has moved sufficiently away and no longer affects the country.

The PAGASA weather forecasts and tropical cyclone warnings
Mandated by law to mitigate losses of life, property and the economy of the nation, PAGASA continues to develop important innovations in its weather forecasting and warning systems for enhanced services delivery to the people. PAGASA has introduce various improvements in its weather forecasting and warning system which is foreseen to bring great benefits to our people.
Statistics on human casualties and property damage by tropical cyclones and other severe weather disturbances appear to increase in time. PAGASA is deeply concerned about this increase in disaster trend. So much so, that in June 1990, the agency modified its weather warning for tropical cyclones and other severe weather disturbances.

Prior to the modification, PAGASA conducted a study with series of consultations and workshops that revealed flaws on PAGASA warning.

The degree of preparedness of the public in coping with adverse weather phenomena is only as good as the level of awareness and understanding. The study revealed that impact of the warning is rather low. This is compounded by doubts on the ability of PAGASA to detect on time, the early stages of a tropical cyclone. To win the trust and confidence of the people in the warning system, the format had to be modified to correct the perceived deficiencies. Also, a sense of urgency needs to be installed in the warning.

The principal aim in modifying the format, therefore, is to impress upon people's minds the preparedness aspect of the message, since on this shall be based their future actions to effectively cope with tropical cyclones. This goal could be achieved by providing enough forecast lead-time thus increasing their awareness of the threatening cyclone and the preparedness activities to be undertaken.

Cyclone warning is divided into three stages in ascending order of threat. These are:

1. Weather advisory
2. Severe weather bulletin: Tropical Cyclone Alert
3. Severe weather bulletin: Tropical Cyclone Warning

The weather advisory is classified into weather advisory for tropical cyclones and weather advisory for other severe weather systems.

Weather advisory for tropical cyclones contains the general information on the presence of a cyclone even if it still too far away from the country to pose threat in the next three days. This gives the people ample time to become aware of a potential threat. As soon as a severe weather system is detected and the forecasters decided that this might affect the Philippines. The advisory is issued once a day at 3:30 pm.

While, the weather advisory for other severe weather systems is an advisory issued for the occurrence of monsoons, active low-pressure area and a complex weather system, which is a combination of two or more interacting systems. These systems are capable of causing floods because of the prolonged rains it may bring.

There is no lead-time in these cases. It is issued only when there are indications that the rains may prolong and may be capable of causing floods. The advisory is also issued once a day at 3:30 pm except for the initial issuance, which may come out any time when a severe system is detected.

A severe weather bulletin is on two levels: the tropical cyclone alert and tropical cyclone warning. The tropical cyclone alert is the second stage of a cyclone warning. The alert stage indicates that a tropical cyclone poses an impending threat to any part of the country, but still falls short of the basis for raising a storm signal. It provides more detailed information about an existing tropical cyclone. This includes a description of the tropical cyclone's current location, movement and intensity, as well as a 24-hour forecast or outlook of said characteristics. The alert stage gives advice to the public to undertake appropriate safety measures and to continue monitoring the tropical cyclone developments. The weather advisory is upgraded to a cyclone alert when the forecaster decides that there is an impending threat to the country. This is issued twice a day at 11:00 am and 11:00 pm or at any time as conditions warrant.

A tropical cyclone warning is the third stage of the cyclone warning. It indicates that there is real and immediate threat from a cyclone to any parts of the country. It provides detailed information about the tropical cyclone. This includes a **description** of the **cyclone's current location,** movement and intensity. Further, it indicates the areas where public storm signals are in effect. Finally, it advises the public to take appropriate safety.

The warning also includes a 24-hour forecast or outlook that gives more details in terms of future cyclone's location and movement with respect to a particular area of reference. The warning is issued four times a day, at 5 am ~ 11 am, 5 pm and 11 pm.

Public storm warnings

Storm signals are raised during the tropical cyclone warning stage. The description of each signal is enhanced with the addition of statements pertaining to the perceived degree of associated damage based on typhoon passage surveys and empirical analyses.

Meaning and description of the public storm signals

Public storm signal No. 1

Meteorological condition:

- A tropical cyclone will affect the locality.
- Winds of 30-60 kph may be expected in at least 36 hours.

Public storm signal No. 2

Meteorological condition:

- A moderate tropical cyclone will affect the locality.
- Winds of greater than 60 kph up to 100 kph may be expected in at least 24 hours.

Public storm signal No. 3

Meteorological condition:

- A strong tropical cyclone will affect the locality.
- Winds greater than 100 kph up to 185 kph may be expected in at least 18 hours

Public storm signal No. 4

Meteorological condition:

- A very intense typhoon will affect the locality.
- Very strong winds of more than 185 kph may be expected in at least 12 hours.

Dissemination of forecast/warning

Warning dissemination is the responsibility of the Office Of Civil Defence (OCD), which is also the Secretariat of the National Disaster Coordinating Committee (NDCC).

The forecast/warning is dictated over the telephone or copies are sent directly by telefax machines a few minutes after completion and are immediately sent to the OCD and NDCC, which take charge of the dissemination to all sectors of the population.

However, the PAGASA also helps in disseminating the forecast and warning, (see Figure below: Dissemination Organizational Chart).

Table No. 1 – Monthly distribution of tropical cyclone by intensity in the PAR (1948 - 1993)

	Tropical depression		Tropical storm		Typhoon		Total
	No.	% of monthly total	No.	% of monthly total	No.	% of monthly total	
JAN	6	31.6	6	31.6	8	40.0	20
FEB	3	23.1	7	53.8	3	23.1	13
MAR	-	-	6	54.5	5	45.5	11
APR	2	12.5	3	18.8	11	68.7	17
MAY	6	18.8	8	25.0	18	56.2	32
JUN	12	20.0	17	28.3	32	52.5	61
JUL	31	24.6	30	23.1	69	53.1	130
AUG	30	22.4	37	27.6	70	51.1	137
SEP	21	17.5	29	24.6	70	58.3	120
OCT	16	15.8	29	28.7	58	56.3	103
NOV	14	15.9	18	20.0	58	64.4	90
DEC	13	22.8	16	23.1	29	50.0	58
TOTAL	154		206		431		791

Figure 1 – Frequency of tropical cyclones in Philippine Area of Responsibility (PAR) (1948 – 1993) 46-year period

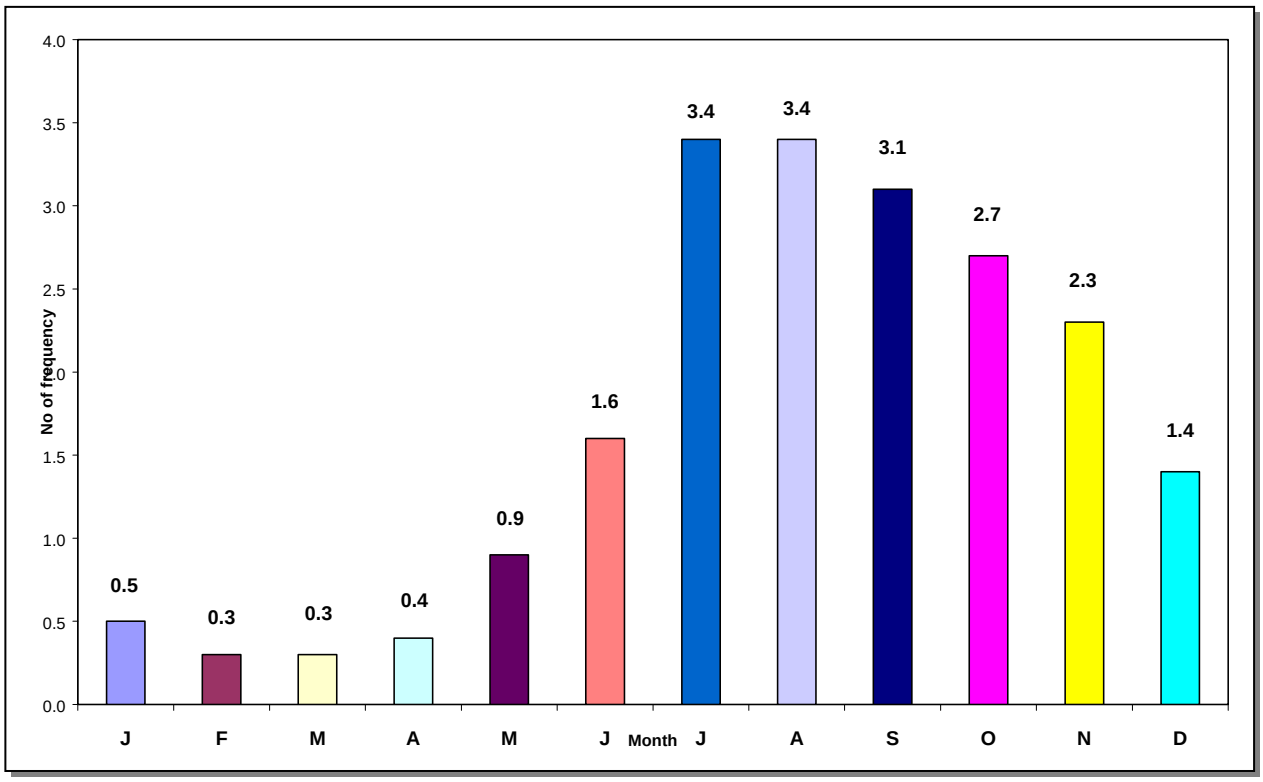
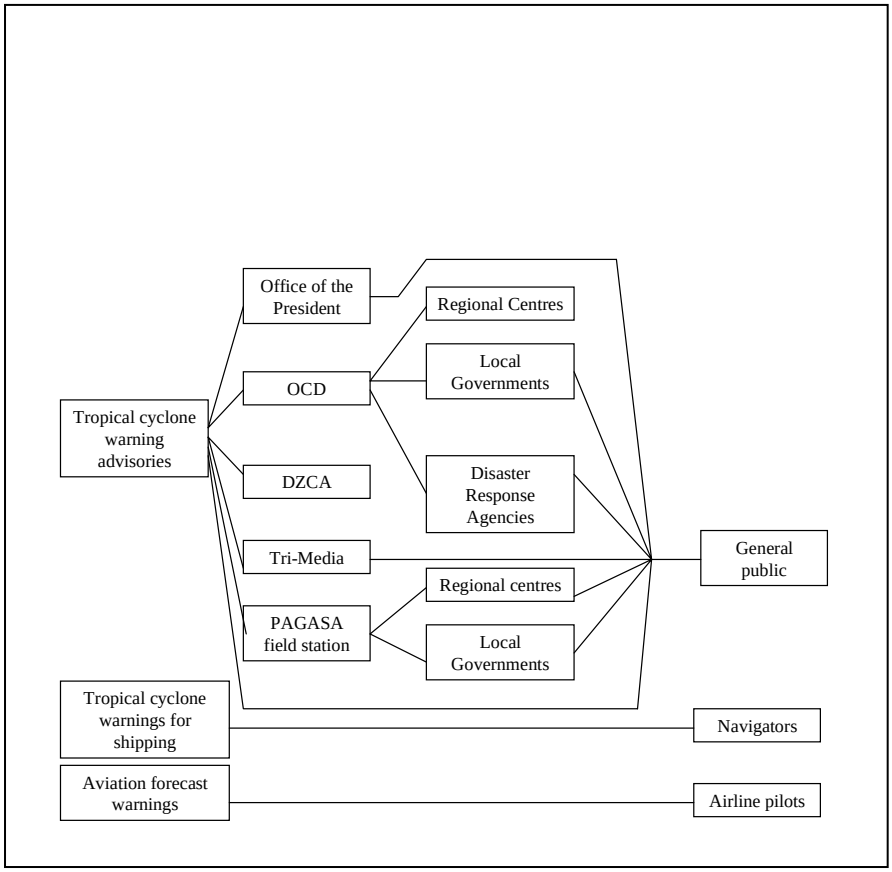


Figure 2 – Dissemination organizational chart



THE PHILIPPINE SOCIAL REFORM COUNCIL ENSURING FISHERFOLK WELFARE DURING CYCLONES

Juan Blenn I. Huelgas
National Coordinator Sectoral Representative, Inter-agency Network and Social Reform Council, For Disaster Response, Office of the President, The Philippines

This paper consists of three parts: First, it will establish the Philippines vulnerability to tropical cyclones and the fisherfolk situation, second, it will provide an overview of Philippine disaster management structure vis-à-vis the Social Reform council, and finally provide the interventions being undertaken in the Philippines to address fisherfolk vulnerabilities to tropical cyclones.

Storms/typhoons and the Philippines

The Philippines, with its 7 100 islands, is geographically situated in the typhoon belt, which is dubbed as the "typhoon alley" of the world. Visited by an average of 21 typhoons annually, approximately six are disastrous.

Storms and typhoons that fall on Philippine territory are usually formed in the northwestern Pacific Basin, particularly in the area between the Philippines and the Marianas. The western North Pacific Basin has recorded the highest frequency of tropical storms and typhoons at an annual average of 30. Each year 21 of these typhoons occur in the Philippine area of responsibility, of which an actual 9.2 cross the country. In addition, an average of two typhoons do not make landfall but cause damage.

Though tropical cyclones are known by different names in various countries, it is the wind velocity that determines the terminologies used. In the Philippines, tropical cyclones with maximum wind velocity below 60 kph are called tropical depressions, while those with maximum winds of 63 to 118 kph are tropical storms. Those whose wind velocity exceeds 118 kph are typhoons. However, all these are generally known as "bagyo" in the local language.

The most frequently affected are the northern Luzon provinces, Eastern Visayas, Bicol and Central Luzon. However, the whole Philippine archipelago is vulnerable at different levels to the hazard.

The typhoon season in the Philippines starts as early as April or May, and lasts until December or January. The most devastation of these typhoons usually occurs in the month of July, August and September. At least three tropical cyclones per month occur during this period, with the small ones occurring in the early or later part of the year.

Like most tropical cyclones or typhoons, destructive effects are caused by the combination of high winds and inundation from storm surges which batter houses and other structures, especially those that are poorly built. Historically, the Philippines have experienced typhoon winds blowing away house roofs, toppling electric posts, billboards and fences, shattered windows, and uprooted fully matured trees. Rough seas as a result of typhoons had sunk many sea-craft, often with their passengers drowning, and coastal communities totally devastated. Another after effect that causes destruction during a typhoon is the flooding that is caused by heavy rainfall.

In 1995 alone, 13 destructive typhoons entered the Philippines area of responsibility and affected some 1.8 million families or 8.5 individuals. Properties were not spared. Damage to houses alone total at least one million PhP, with cost of assistance reaching to some PhP 68 M. This does not include other hazards causing destruction in the Philippines, such as earthquakes, the continuing devastation caused by the lava flows from Mount Pinatubo volcanic area and civil conflicts.

The fisheries sector situation

Fisheries in the Philippines are categorized into commercial and municipal fisheries. Commercial fishing is restricted to areas more than 15 km offshore and involves the use of vessels having tonnage of more than 3 GRT. Municipal Fishing is defined as utilizing vessels of 3 GRT or less and operated in waters of the municipality within which they are registered.

Commercial fishing vessels of more than 7 GRT numbered 4 014 in 1994. The total number of municipal fishing vessels was around 464 000 in 1990 (latest data available), of which motorized vessels accounted for 42 percent and the rest were non-motorized bancas.

It is estimated that there are about 990 000 fisherfolk involved in capture fisheries, of whom 676 000 were municipal and small-scale fisherfolk and around 257 000 were involved in aquaculture and inland fisheries and 58 000 in commercial fisheries. Besides, some 50 000 are engaged in fishery-related activities such as post-harvest handling, processing, marketing, boat building, and net manufacturing.

Around 270 000 municipal fisherfolk households form part of the poorest groups in rural communities with incomes not even reaching a third of the 2 500 pesos considered as the poverty line. The Philippine fisherfolk community has since started to organize into viable associations, basically for the protection of the rights of the small fisherfolk. At present, there are 15 national federations and fisherfolk associations (Fas), 14 regional associations and over 200 provincial associations.

Generally, issues and problems faced by the fisheries sector include limited participation of local community in resource management, weak law enforcement to resource management, lack of education and information dissemination in coastal barangays, lack of management knowledge and capabilities at the level of LGUs, NGOs and POs.

Partnership: the Philippine disaster management imperative

With the Philippines geographical vulnerability to hazards, especially tropical cyclones, disaster management is not an option but a must and is a responsibility of all sectors, if it has to achieve development.

Disaster management in the Philippines is considered to be the primary function of the state. Government, as the lead actor in the management of disasters, responds at different levels of interventions: policy development, structure and systems installation, and human resource capability building, service delivery. It also covers interventions in the areas of preparedness, mitigation, prevention, relief, rehabilitation and reconstruction.

These interventions are indicators of the Government’s recognition of the threats posed by the natural hazards and their dismal effects on the country and its people. In relation to this the Philippine Government, like any other disaster-concerned country supports all efforts directed towards the reduction of loss of life, property damage, and economic and social disruption caused by disasters.

However, the magnitude of disasters that continue to affect the Philippine people, created a level of awareness and triggered civil societies to be equally concerned and responsive at different levels and in different ways of involvement. Civil societies, however, stress that their role is to complement government efforts. Complementation is usually achieved through aggressive pursuit of the development of partnership mechanisms that integrate involvement, yet maintains the integrity and autonomy of the civil societies.

The efforts of government will always have its limitations, the same way that contributions from other sectors of society will have their own limitations. Pooling the resources, expertise and capabilities of all sectors, means maximization of limited resources and avoidance of possible duplications and waste of efforts in the response to disasters.

This realization led Philippine disaster management to develop partnerships between three major sectors: Government, playing the lead, the private sector composed of people's and Non-Government Organizations, business communities, church academe and media, complementing through resource mobilization, and the general public, through their own resources and determination in rebuilding their lives.

This partnership between and among sectors was not developed overnight. The process took years to achieve. Significantly, the last six or ten years saw the development of the full circle in partnership. The tactical relationship of yesterday has evolved into a full strategic partnership through parallel mechanisms, policies and consultations to define roles and understanding of the way to proceed for each organization involved.

The National Disaster Coordinating Council (NDCC)

First of these, is the presence of a government led coordinating body, the National Disaster Coordinating Council (NDCC), created by virtue of a legislative policy, Presidential Decree 1566 in 1978. NDCC was established to strengthen the Philippine disaster response capability and to establish the national programme on community disaster preparedness, and ensure the implementation of the revised Calamities and Disaster Preparedness Plan or CDPP. Through NDCC and the CDPP, national government assumes responsibility in planning, implementation, and allocating resources for disaster management.

Under the provisions of the PD 1566, the Secretary of National Defence convenes the council the members are representatives of 14 government departments or line agencies, the Office of the President, the Armed Forces and the Philippine National Red Cross. Serving as the Executive Officer is the Administrator of the Office of Civil Defence. Under the CDPP, all the agencies, national and local, are mandated to establish an operational preparedness and emergency response plans in accordance with their common functions. These functions coordinated by the NDCC during operations facilitate the delivery of responses required before, during and after disasters. These plans and identified roles and functions have shown a level of effectiveness and efficiency among nine response agencies.

Disaster Coordinating Councils (DCC) are also established at the regional, provincial, municipal, city and barangay levels where the actualisation of operations occur. These local bodies are charged with three phases of services, pre-disaster, during the disaster and post-disaster in their areas of jurisdiction. Among these services are communications and warnings; provision of logistical facilities; relief, evacuation, rescue and engineering; public information; rehabilitation; and the provision of basic social services.

The presence of the NDCC and local DCC's facilitate the process of partnership with other actors. The national body providing directions for response through policy directives and integrated operation of the CDPP, while the local DCC's provide the operational mechanism to actualise the partnerships. These structures are also the entry points of partnership from the private sector. In all these councils, membership and participation of the private sector is encouraged in various national and local decision and policy making bodies, such as the National Relief and Rehabilitation Committee, Special Rehabilitation task forces, disaster response teams.

Parallel to the organized structure of government in response to disasters, the private sector has organized networks particularly to address concerns and complement efforts in disaster management. As networks, they offer an alternative mechanism for the delivery of services, as well as, a body that government can rely on to provide organized and appropriate mobilization of resources and programmes for the affected communities.

In partnerships, the private sector recognizes the social investment, shared accountability and ownership and participatory processes, among and between organizations, as vital principles in the pursuit of effectiveness and efficiency in their work. These same principles are manifested as it enters in congruence with government efforts. Operating in an atmosphere of unity and mutual respect, these sectors define unifying factors as they proceed to the shared risk in response to the threats pose by the different hazards.

Given the policy and structural frameworks of operation during disasters, these structures or bodies operate before during and after a disaster such as a typhoon enter the Philippines area of responsibility. In operational terms, the partnership of government and civil societies cover the whole disaster management spectrum/cycle. Government and private sector complement and collaborate in search and rescue operations, relief distribution, medical aid missions, evacuation site management, community organizing, communications and information management, disaster needs assessment, trauma/psycho or social care, and resource or logistical mobilization.

In the long term, the partnership is further seen in the conduct of rehabilitation programmes such as housing, resettlement, and livelihood generating programmes for the victims. Also continuing collaboration is seen in the conduct of preparedness activities, such as training for service workers and victims, hazard and vulnerability assessment of areas, logistical and systems installation and evaluation, curriculum development for schools and community-based organizations, disaster response technology development, and networking with other sectors.

However, even with the involvement of government and the different sectors, there is still much to be desired in the management of disasters and emergencies in the Philippines. Among the more urgent issues that need to be addressed are in the area of preparedness of communities especially in establishing delivery, receipt and understanding of warnings and warning systems; information dissemination and feedback systems, vulnerability assessments tools, planning frameworks, conduct of public education, training, and rehearsals.
Further, policy issues and operational mechanisms have to be reviewed and strengthened to adequately respond to the growing magnitude and frequency of different hazards, especially tropical cyclones and its secondary hazards.

The Social Reform Council (SRC)/ National Anti-Poverty Commission (NAPC)
Recognizing the private sectors valuable contribution in Philippine disaster management and development as a whole, the Philippine Government through the local government Code of 1991, especially enshrined people's empowerment and participation as vital strategies in achieving Philippine growth.

This development brought about the formation of the Social Reform Council (SRC), now known as the National Anti-Poverty Commission (NAPC). NAPC is a policy oversight body created by Philippine Congress under Republic Act 8425 to oversee the Government's antipoverty programme. NAPC is a body represented by government agencies, leagues of local governments and fourteen (14) basic sectors and headed by the President of the Republic of the Philippines. This serves as the governing arm for institutionalising the Social Reform Agenda for improving the plight of the poor.

The SRC/NAPC, a cabinet level council, further recognizes the valued Sectoral Representation from the basic sectors, which includes fisherfolks, and victims of disasters as sectors, together with representations from other sectors such as, the farmers, children, youth, women, cooperatives, labour, and Non-Government Organizations.

The SRC/NAPC like the NDCC is replicated in the local level through the creation of the multi-agency and multi-disciplinary technical working groups. The working groups now are the structures for integrated and convergent efforts in making operational the poverty alleviation agenda of the Government that includes the marginalized fisherfolk and other victims of calamities and disasters.

SRC/NAPC programmes focus on policy and legislative concerns as well as monitoring poverty related interventions at the national and local level. It also focuses its programs on marginalized sectors, helping them empower themselves and eventually alleviating them from oppressive and poverty related situations.

Given the two major bodies focused on disaster management and involvement of the sectors, the NDCC and SIRC/NAPC collaboration propels the sectors to both policy and operational efficiency and effectiveness. The SRC/NAPC provides the policy framework, while the NDCC provides the operational machinery to translate legislative and local policies to effective programmes.

SRC/NAPC role for fisherfolk in tropical cyclone related situations

Generally, the SRC/NAPC looks at the poverty issue as a conglomeration of different vulnerability situations. Alleviating the communities form the situation of poverty through people empowerment, convergent and needs focused response is a major strategy. Increasing capabilities in the context of poverty, subsequently reducing vulnerabilities are key to poverty and disaster management. The interventions primarily focus on the provision of the minimum basic needs with the belief that a communities where minimum needs are addressed, vulnerabilities are decreased and capacities to cope with disasters are increased. Specifically:

For preparedness concerns, the NAPC/SRC, being a policy body, provides for the policy framework that governs fisherfolk interventions. In disaster cases, it facilitates the development of a more developmental approach to policies. It also facilitates the integration of the fisherfolk agenda to the development agenda of the community and local government. It facilitates legislative policy development at the local level. The policy framework provides for the non-structural mitigation component for fisherfolk response.

For capability building, the SRC/NAPC's empowering mechanism ensures that disaster management in integrated and mainstreamed in the trainings given to the fisherfolk. It also facilitates planning and structure development for response.

In terms of warning systems, it coordinates with appropriate agencies and the NDCC in effectively disseminating warnings through the social structures organized in the communities.

For response, the convergence approach provides mandate for all government agency interventions to be focused on a particular area or sector. Thus providing adequate support mechanism to the fisherfolk in time of disasters. For rehabilitation and reconstruction, it facilitates the intervention to take a development, pro-poor and culturally sensitive programs and interventions.

Conclusion

In the Philippines where development is geared towards alleviating the poverty situation of the Filipino poor, disaster management in all aspects from policy to operational systems has to be integrated or mainstreamed into the development processes. The integration shall ensure that development and poverty reduction are not heavily affected by the onslaught of disasters such as cyclones. The presence of the two multi agency and multi-disciplinary structures in government, the Social Reform Council/National Anti-Poverty Commission and the National Disaster Coordinating Council provides the venues for the needed integration. The former provides the

venue for the strengthening of policy and framework and the latter offers the venue for operational systems and human resource capability enhancement. The integration process is further enhanced by the recognition of the plight of the different sectors. The recognition for adequate participation in the development processes of the two government structures, the SRC/NAPC and the NDCC, ensures that people's real needs and situations are ventilated and acted upon, both at the policy and executive levels.

Managing emergencies and ensuring the welfare of the marginalized sectors, such as the fisherfolk, during tropical cyclones necessitates the effective convergence of the policy environment (SRC/NAPC), operational systems (NDCC) and the private sector’s participation in all processes at all levels. For in disasters such as tropical cyclones, no one has a monopoly on appropriate response. The collaboration and coordination of the sectors is vital in maximizing resources and reaching a vast scope of affected peoples. The integration and interface of appropriate structures, systems and personnel ensures success in ensuring that lives are safe and properties are protected and the margianlized sectors’ situations are alleviated. The SRC/NAPC hopefully provides that venue as the flagship institution in alleviating the situation of the Filipino poor.

The Philippine disaster management strategy of a multi-agency approach is still in the process of perfecting itself. The challenge is to make it work at all levels and systems of operations.

A DESCRIPTION AND ANALYSIS OF THE EVENTS OCCURRING AT SEA AND ON LAND 6 AND 7 NOVEMBER 1996 IN EAST GODAVARI DISTRICT, ANDHRA PRADESH, INDIA

C.M. Muralidharan
Sr Specialist (Fisheries), AFPRO Field Unit – VI, India

Introduction

The following paper is based on the baseline study conducted by Action For Food Production (AFPRO) at East Godavari District of Andhra Pradesh after the 6 November 1996 cyclone tragedy. The study was sponsored by the Food and Agriculture Organization of the United Nations (FAO) for the project "Training in sea safety development programme in East Godavari district of Andhra Pradesh."

The paper focuses on the loss of life during the above-mentioned cyclone, the reasons found to be the cause of the same at various levels, the actual preparedness and some indicators for possible measures to avert such a tragedy in the future.

The cases of the two worst affected villages, viz. Bhairavapalem and Balusutippa where a detailed study had been conducted is the basis of the paper in addition to the information collected from various official channels responsible for the cyclone warning dissemination system.

Cyclone of 6 November 1996 in technical terms

3 / 4 Nov 1996
A low pressure area developed in central Bay of Bengal off Ongole in South Andhra coast at 16.4 Degree N Latitude and 90.4 Degree E latitude.

5 November 1996
Low-pressure area develops into depression and lay centered at, 350 KMs southeast off Vishakapatanam.

6 November 1996 - Morning
Depression intensified into severe cyclonic storm and located 300 Kms southeast off Vishakapatanam.

6 November 1996 - Evening
Intensified into more severe cyclonic storm with hurricane winds and crossed coast of East Godavari District along Gautami Godavari River between 2000 hrs and 2400 hrs.
Wind Speed- 220 km/Hr Tidal Surge -2.2 metres or higher.

Certainly the language above conveys very little to the layperson except the last paragraph to some extent. Hence in the following sections we shall try to see the seriousness.

Overall death toll during the cyclone in East Godavari District

The State Governments statistics show the following figures: Total deaths 1 077; total mission cases, (most of these are confirmed deaths, may not be officially, 1 683; the total dead is 2 760.
Deaths of fisherfolk (including missing cases) – 1 435; Life lost at sea in mechanised boats – 569; Life lost at shrimp seed collection sites along the coast – 830; Life lost at fisherfolk villages- – 36.

Specific life losses in Bhairavapalem and Balusutippa

The baseline study shows that the loss of life during the 6 November 1996 cyclone in Bhairavapalem and Balusutippa were as follows. The various places where the deaths occurred, the reason for the death as stated by the fisherfolk, and the factors that saved the survivors in the same place are also given

Deaths in Bhairavapalem and Balusutippa during 6 November 1996 Cyclone

Deaths occurred	Deaths from Bhairavapalem	Deaths from Balusutippa	What caused the deaths	What saved the survivors
Seashore shrimp seed collection sites	66	331	Shrimp seed collectors were away camping in the remote open seashore areas away from the villages. No warning or rescue team reached them. They were washed away by the tidal waves.	Mangrove trees on the inshore side wherever they were fortunate to be pushed there by tidal waves.
Mechanised boats fishing in the sea	33	21	The mechanised boats were away at sea, days before the cyclone or warnings. They get no warnings except those who had transistors. They got caught up in the path of the cyclone. Some of those who got warnings also couldn't move to safer locations in time.	Cyclone Warnings over All India Radio wherever they had transistors with them and listening to them and had the time to move into safer areas/shore.
River fishing areas	7	23	Many fisherfolk families especially from Balusutippa migrate out into various parts of the Godavari river for fishing for months together and camp on the boats (shoe dhonies and navas). Many of them did not get any warnings.	Taking shelter in protected villages (mangrove sheltered, higher elevation or embanked) on the river bank
House collapse in the village	6	1	Both the villages are low lying, exposed to water bodies and close to river mouth. Most of the houses thatched. Warnings only through transistors and TV. The warnings were not taken seriously or they were seriously only at the last moment.	Taking shelter in RCC houses and temples in the village

Why were they not prepared for the disaster

The last experience of a serious cyclone in this area was in 1969. Most of the younger generation hardly remembers the incident.

The only source of cyclone warning during this period (November 1996) was the All India Radio transmissions on transistors and some warnings on television. Though the AIR warnings started early on 5th November morning and became more frequent and serious by 5th night, the fisherfolk took note of the same only by afternoon of sixth November. By then it was too late.

There was no information to both Balsutippa and Bhairavapalem from any local official sources including the MRO (Mandal Revenue Officer) or the VAO (Village Administrative Officer).

Many of the older people among fisherfolk has some traditional wisdom on predicting cyclones by observing the water currents, wind patterns and even rings on the moon. But these predictions are possible only very close to the real occurrence of cyclone. They are not able to assess the intensity of the cyclone.

There was hardly any community level preparedness to face such an intense cyclone.

Infrastructure and communication links at village

Both the villages had one telephone each. It was confirmed to be defunct in Balsutippa well before the cyclone. The telephone in Bhairavapalem was reported to be functioning until the date of the cyclone. But was damaged and was disconnected during the cyclone. Still Bhairavapalem did not receive any warning through the telephone before the cyclone. Both the telephones are defunct since then and have not been repaired to date.

Bhairavapalem had one dilapidated cyclone shelter, not worth using. In Balsutippa there were three cyclone shelters of which two were in very pathetic condition.

Out of about 927 houses in Bhairavapalem and 1 745 houses in Balasutippa only 5 percent were of concrete. The 80 percent house at Bhairavapalem and 87 percent at Balasutippa were thatched while the remaining were tiled. Both the thatched and tiled houses bore the brunt of the cyclone.

There were five temples in Bhairavapalem and seven in Balasutippa that saved many lives.

The drinking water source of Bhairavapalem was a single open tank. In Balsutippa there were three open tanks out of which only one was very dependable. All the drinking water tanks were flooded with saline water during the cyclone, thereby cutting off the only source of drinking water in the villages.

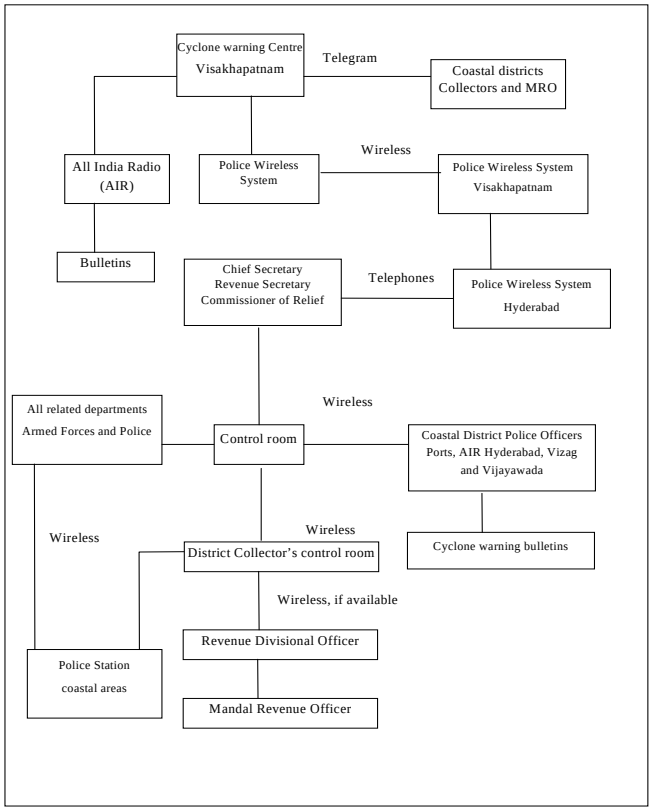
An analysis of the seasonal pattern of fishing activities in both villages show that during the cyclone prone months of May and November mechanised fishing as well as shrimp seed collection are the peak activities. This puts both the groups at risk during cyclones. It is also the season when fisherfolk from Balsutippa are away migratory fishing.

Cyclone contingency plan of action of the Andhra Pradesh and cyclone warning dissemination during 5 and 6 November 1996

The Government of Andhra Pradesh has a well-defined Cyclone Contingency Plan of Action (CCPA) in a book form. The chapters covered are as follows

- General set up at state and district level.
- Visuality of Natural calamities, cyclone forecasting and warning.
- Action immediately before the occurrence of the cyclone
- Action after the receipt of second warning.
- Post cyclone measures
- Community preparedness – Mass publicity.
- Visuality of natural calamities floods warnings.
- Measures to be taken by government departments
- Establishment of cyclone stores.

The path of cyclone warning dissemination according to the CCPA is as follows:



The messages started flowing into the Collectorate of Kakinada by the 5 of November 1996 afternoon and the control room was opened in the Collectorate by 5 evening. Though messages were passed on to the Revenue Divisional and Mandal level, but many did not receive them as the wireless systems were not installed (Katrenikona Mandal) or were defunct (I. Polavaram Mandal). The Talarevu Mandal office had a VHF set. The respective Mandal offices received serious messages only by the afternoon of 6 November. By then it was too late for them to inform the remote villages such as Bhairavapalem and Balasutippa with the limited facilities and infrastructure they have. They could not take the risk of hiring vehicles to warn the villages.

Strengths and weaknesses of the CCPA

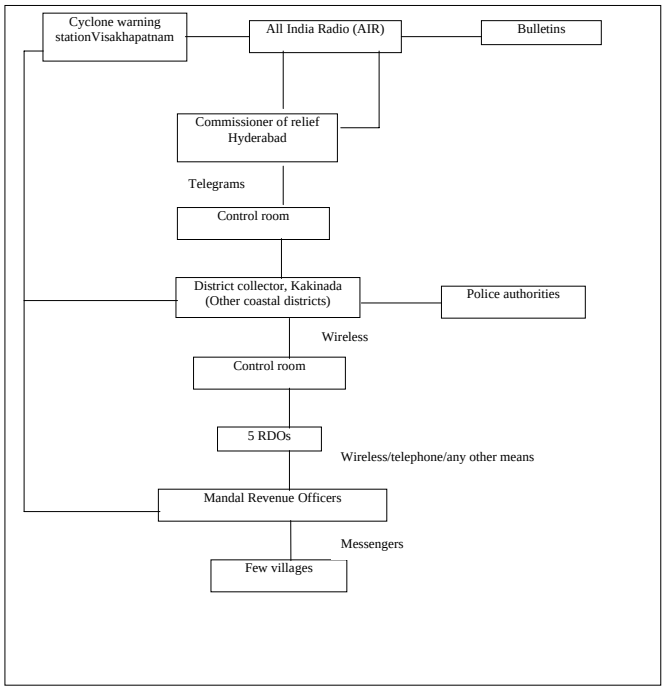
Based on the experience of 6th November 1996 an attempt is made to assess the Strengths and Weaknesses of CCPA of Andhra Pradesh Government. This may through light on the areas to be strengthened in future.

Strengths of CCPA

- Systematic plan
- Control room at various levels
- Involvement of other departments
- Precautionary /preparedness measures at various levels
- Services of armed forces for aerial survey and wireless communication
- Village evacuation and use of cyclone shelters in low lying villages
- Community preparedness at village level and role of different officials in warning dissemination system.

The network and the path are long and complicated. The path of cyclone warning dissemination followed during 5th and 6th November 1996 was as follows:

Cyclone warning dissemination path followed on 5 and 6 November 1996



Weaknesses of CCPA

- Very LONG CHAIN of communication
- Seriousness of message gets diluted down the line
- All advanced communication systems not used well
- Preparedness at Mandal level and further down very poor
- Equipment at MRO levels not kept in readiness
- Means of fast Communication to the village very weak
- Officers hardly work according to AIR Bulletins
- Television hardly mentioned in CCPA
- Village telephones almost always non functional
- Role of police in Cyclone Warning Dissemination hardly felt
- Role of Deptartment of Fisheries in Cyclone Warning Dissemination minimal
- Armed Forces not involved in Warning dissemination to fisherfolk at sea
- Unpredictability of cyclone result in less seriousness to messages by officials and villagers (people) - very little motivation
- HARDLY ANY EVIDENCE OF COMMUNITY PREPAREDNESS AT VILLAGES AS MENTIONED IN CCPA
- Accurate maps of low-lying coastal villages not available to officers.

Conclusions

The experience of 6 November 1996 indicates the need to increase the efficiency of the cyclone warning dissemination system at various levels. The need of community level preparedness in all vulnerable fisherfolk villages is also an important area where efforts are need to be made both by the Government, NGOs and communities.

GENDER CONCERNS WITH RESPECT TO DISASTER PREPAREDNESS AND MANAGEMENT

Jean D'Cunha and Aloysius Rego
Asian Disaster Preparedness Centre

Introduction

It is satisfying for the Asian Disaster Preparedness Centre to participate in this important National Workshop focusing on the protection of lives and reduction of losses among rural fishing communities in coastal states in India, faced with threats from natural disasters such as cyclones. As the lead regional resource centre in Asia focusing on disaster preparedness and mitigation; and a regional focal point for the International Decade for Natural Disaster Reduction, ADPC has been pleased to be associated in a small but meaningful way in this important pilot project. We believe that the project scope, focus and approach is meaningful and has wider lessons for the entire coastline of Andhra Pradesh, other states on the east coast of India facing risks from cyclones and floods; as well as communities facing similar threats in coastal areas of Bangladesh, Vietnam and the Philippines.

The workshop is being held in the week immediately after the Asian Regional Meeting reviewing IDNDR in Bangkok, and immediately preceding the meeting of the Panel on Tropical Cyclones in the Maldives. The work under the project and the lessons of this workshop have significance for these two forums particularly as IDNDR comes to a close, and we plan our activities for disaster reduction in the coming decade and millennium. ADPC congratulates the key partners, FAO, Government of India and its Ministry of Agriculture, and the Government of Andhra Pradesh and its Department of Fisheries. We will be pleased to be associated with the efforts to disseminate the 'success stories' and lessons learnt from this Project and to promote its replication in other similarly placed communities.

Significance of community-based approaches to disaster management

Communities particularly rural ones face the brunt of natural disasters as victims, but are also the first responders in dealing with its impacts. They undertake this task in difficult circumstances and with limited resources and even more limited advances, if any at all. Yet they face the situation with courage drawing on local resources, and using indigenous coping mechanisms often developed over centuries prior to any organized efforts to what we now call disaster preparedness and management. This is even truer of fisherfolk living in coastal areas, periodically affected by cyclones, such as Andhra Pradesh.

Community-based disaster management builds on pre-existing capacities and integrates this community effort into the mechanisms organized by Government. This project has rightly attempted to adopt such an approach. ADPC has been pleased to reinforce this element of the project through its participation in capacity building of key lead project personnel. Two officials participated in our second regional training program on 'Community-based Approaches to Disaster Management', held in Bangkok in May 1998, followed by an ADPC facilitated study tour to the Cyclone Preparedness Progamme (CPP) in Bangladesh. We believe that the exposure to new concepts and the practical observation of CPP in the wake of a cyclone that hit Bangladesh has helped deepen their understanding and hence enrich the orientation of this Project.

Our presentation on the integration of gender concerns in this workshop, the topic of which has been selected by the FAO, again focuses attention on a key theme, which must be seen in a wider context. Community-based approaches must begin with a sound local level analysis of various aspects of vulnerability as well as an understanding of the potential capacities of these vulnerable sections. Our preparedness and mitigation programmes must use this understanding to develop practical sub-programmes, which deal with each specific vulnerability, develop specific programmes to involve such vulnerable sectors, while building on pre-existing capacities. Other presentations during the workshop, including that on the CPP will contribute to a better understanding of community-based approaches.

Our task is to make a presentation on Gender Concerns with respect to Disaster Preparedness and Management. We propose to divide this presentation into four broad sections: the first describes the specific flesh and blood experience of a woman in disaster; the second foregrounds the dominant paradigms of disaster preparedness and management, and their treatment of gender concerns. It further defines the category gender and the gender approach and emphasizes the significance of integrating this approach into the core of disaster preparedness and management theory and practice; the third section highlights the specific socially determined vulnerabilities and

capacities of women in disaster, more specifically in cyclones; and the last makes certain recommendations that need to be incorporated into disaster preparedness and management planning and practice.

The experience of women in disaster

In that dark sinister night, the wind howled with frightening fury; the rain lashed down in torrents flooding the hut; She clasped her four little boys paralysed with the fear-of being alone, of nature's wrath, of death, of the men outside! But she steeled herself for the struggle - to save herself and her children - for being a widow there was only her, for them.

She ran out of the house into the blinding madness slipping, falling, losing grip of her boys. Bruised, cut, breathless and drenched she could not reach the cyclone shelter. It was too far. She finally reached safety-the top of a tall, sturdy structure, the village landlord's home in the nick of time. Then the overpowering surge of the waters swallowed the rest alive.

In the hours that passed, with a body wracked with pain and numb with cramps, she held and comforted her clinging children, shrieking from fear, hunger, thirst and cold. After the terrorizing long night, she (and her children) confronted at dawn, the stark horror of an all enveloping death and devastation. Then the hoodlums whom she feared were out again looting, haunting women. Not even female corpses were spared!

When help finally came, she battled with big, strong men in serpentine queues, for food, clothes, medicines, shelter. She was on nobody's lists for her husband was dead and 'she' was household head. But she survived with nothing but her four boys begging, pleading, scouring her surroundings and fighting for immediate relief. When life returned to 'normal', she eked out a living from door-to-door sales of jewellery in the village.[1]

This was Savitribai of Chandaliyapara, Teknaf, (in South Bangladesh), who had survived the devastating cyclone of April 29th, 1991, to narrate her harrowing experience of her close brush with death and her determined fight for survival. In contrast to the larger than life, 'women as victim' image, Savitribai's experience sharply foregrounds women in disasters both as victims and as active survivors and turns the spotlight onto the special socially determined needs, interests, concerns and capacities of a vulnerable section of half the human population-women - until recently peripheral to disaster preparedness and management practice and theory.

Disasters and the political economy of development

Mainstream conventional paradigms on disaster preparedness and management have been predominantly functionalist and technocratic, defining disasters as exceptional natural events, resulting from extremes in geophysical processes. Following, was the technocratic assumption that the only way to deal with natural disasters, was by the application of 'geophysical and engineering knowledge', to predict the hazard and then contain its impact.[2]

The 1970s and early 1980s however, saw a paradigm shift, towards an approach that challenged the naturalness of disasters, asserted the human connection between natural hazards and disastrous outcomes, and argued that the cause, precipitation or exacerbation, of disasters blamed on nature was often a result of human action and the development process on the environment. This paradigm of disasters distinguished it from merely the occurrence of a natural hazardous event and equated disasters with socio-economic, environmental and infrastructural damage, the magnitude of whose impact is contingent on the extent and type of vulnerability of the population and the socio-technical issue of how a society deals with hazard preparedness and mitigation. As vulnerability was the critical new concept in which this approach was grounded, this framework of analysis has come to be designated-'Vulnerability Analysis.'[3]

Quite evidently conditioned by theories of the political economy of development, vulnerability analysis rooted development for some, underdevelopment for others and resulting population vulnerability in the inequity and unsustainability inherent in the very paradigm of global development. In other words, it defined vulnerabilities of

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[1] Personal interviews with women in Teknaf, Chakaria, and Matabari Island of Cox's Bazar District, Bangaldesh, August 1997.

[2] Hewitt, K. (1983). The Idea of Calamity in a Technocratic Age, in K. Hewitt (ed), Interpretations of Calamity from the viewpoint of Human Ecology. Allen and Unwin, Boston 3-32, cited in Varley, A. (ed) (1994). The Exceptional and the Everyday in Disasters, Development and Environment. Wiley and Sons, Chichester, New York, Brisbane, Toronto, Singapore.

[3] Maskrey, A. (1997). Disaster Risk: A Conceptual Framework, paper presented at the Training Course on Community-based Approaches to Disaster Management, March 1997, conducted by the Asian Disaster Preparedness Center, AIT. 1997. Promoting Community-based Approaches to Disaster in Asia and the Pacific. ADPC Bangkok, Vol 3. No. 2. May

different population groups within a geographical area or between societies to disaster, largely as a function of the dominant socio-economic, political structures and processes within societies and between societies, analysed in terms of class, gender, ethnicity etc. Having framed vulnerability, as a consequence of a growth oriented world capitalist development process, attempts to deal effectively with disasters warranted interventions that reduce the vulnerability of populations to disaster.[4] This would differentially impact the interests of different population groups within a society and between societies, challenging the very basis of the present development process and is very much a political intervention. Against this background therefore, disasters have come to be defined as a development issue; a political issue.

The gender blind spot of disaster management

Not surprisingly however, gender concerns have traditionally found little or no reflection in disaster preparedness and management theory or practice. Conventional functionalist and technocratic traditions rightly critiqued as gender blind subsumed women under the rubric of a 'universal humanity'. This made invisible the special socially determined needs and capacities of women in disasters and the latter's differential impact on men and women, with women bearing the brunt.

However following the United Nations (UN) Decade for women 1975-1985, that made it difficult for development theorists and practitioners to marginalize women's distinctive experiences, together with the larger numbers of disaster casualties and deaths among women than men, the vulnerability approach's designation of women as a vulnerable group and the insistence of international donor and funding agencies to address women's 'relief beneficiaries', women have gradually begun to figure on the agenda of disaster organizations.

The treatment of women's concerns by these organizations however leaves much to be desired. For women are by and large constructed as 'prisoners of their own peculiar and inferior biology' as 'weak and hapless victims' with special biologically determined needs who must be protected and rescued by 'stronger' men. This is perhaps attributable to the profoundly gendered worldview, culture and practices of these organizations that frame masculinity and femininity and asymmetrical gender equations, as natural and biologically determined. It is also perhaps the consequence of the 'historic links of these organizations to military and paramilitary emergency response'[5], which is deeply male-centred.

To begin with, this biological determinist frame of reference of disaster preparedness and management organizations to women conceals the complex interacting social processes that largely account for women's special needs, vulnerabilities and capacities in disasters and otherwise; it categorizes women as a separate target group isolating their concerns from mainstream social life and development activity; it overlooks the responsibility of men to women's domestic and reproductive roles and reinforces existing gender role/trait stereotypes. In further assuming that these stereotypes and unequal gender relationships are natural givens and hence immutable and in placing women as mere additives on the disaster response agenda. This perspective lacks the methodological tools to move to a further level of systematic identification and analysis of women's concerns in disaster in complex, changing social contexts.

What logically follows is a simplistic construction of women as victims and passive recipients of relief. This denies women their subject-hood and masks their creative contribution to the survival process before, during and in the aftermath of a disaster. It is imperative therefore for disaster preparedness and management theory and practice to weave into its core 'gender' as an analytical category and 'gender analysis' as a methodological tool of analysis.

The gender approach

This is an approach that asserts that:

1. There exists a critical distinction between the concepts sex and gender. While sex refers to the anatomical differences between males and females, gender refers to the historically specific social construction of masculinity and femininity.
2. Gender addresses both men and women separately and in relation to each other.
3. Ensuing gender relations characterized by male power and dominance over women are not just biological, but largely structural grounded in historically specific interacting socio-economic-political and cultural structures

[4] Varley, A. (ed) (1994). The Exceptional and the Everyday in Disasters, Development and Environment. Wiley and Sons, Chichester, New York, Brisbane, Toronto, Singapore.

[5] Enarson, E. (1997) From the Margins to the Centre: Women, Global Disaster and Sustainable Development in Frap-Net News. A Publication of the Feminist Researchers for Action and Policy Network. Vol. 3. No.1. April.

and processes. This discriminatorily impacts women's opportunities and access to material and non-material resources of every kind-land ownership, inheritance, education, training and the like.

4. The special needs and interests of women consequently emanate not just from biology, but from women's subordinate location in society and their rigid relegation to domestic and reproductive roles within the family. Even when women engage in production or community roles outside the home, these are primarily either extensions of their reproductive roles or in areas that reinforce the traditional stereotypes of women as nurturers, care givers and the like.
5. Every aspect of human life and societal process, including the development process and the terrain of disasters is gendered. Put otherwise, prevailing gender role stereotypes and gendered relations in their specific cultural contexts, both condition and are inherently built into the assumptions of the development process.
6. Development planners, who are predominantly male, either simply add women to the mainstream gendered development paradigm or may even recognize the gendered context of development work as a necessary consideration. In either case however, gender and development are treated as inter-related, but analytically distinct and separate phenomena. The health policy for women in India, designed to enhance women's health status is a case in point. Predicated on the assumption of women's natural roles as wives and mothers, it is primarily geared towards maternal and child health, ignoring in the process other health problems of women and women outside the reproductive age.

An issue that begs urgent consideration is that while the practical significance of gender is recognized for development work, it has not been analytically integrated into the heart of development theory- historically anchored in male-centred perspectives. As a result, the very development process, avowed to empower women, disempowers them. A case in point is the globalization of the economy and structural adjustment policies, that has resulted in women being eased out of jobs, impoverishing women, especially women headed households and diminishing women's access to social services that are crucial to women as producers, consumers of services, caregivers and nurturers-a phenomenon resulting from cuts in state expenditure on the provision of the fore-mentioned services.

7. Finally as gender relations are socially constructed, they can be transformed in the direction of gender justice, mutuality, reciprocity and partnership-an approach that needs to address itself to the needs, interests and reality of both women and men separately and in conjunction with one another. The simultaneous engendering of the central paradigms and theories of development and disasters, will similarly contribute greatly towards the empowerment of women.

Women's socially determined vulnerabilities in various phases of disaster

Given the critical link of disasters to development processes, gendered development processes that generally marginalize women from the fruits of development coupled with socio-economic milieus that subordinate women, only sharpen women's vulnerabilities in disasters, diminish women's capacities to cope with disaster rendering them even more dependent on men and slow down their long-term recovery from disasters, even more than it does for men. This evidently indicates that disasters impact men and women differently, with women being more discriminated against and forced to bear the heavier burden. This has been amply demonstrated in the cyclones of April 1991 and May 1997 in Bangladesh, which form the reference point of this paper. Before identifying the specific vulnerabilities and capacities of women in these disasters, it is necessary to create a context for them very briefly within the socio-economic, political and cultural fabric of Bangladesh and the location of women therein.

Bangladesh, one of the youngest states in Asia has had a chequered history. While at one level it has undergone a number of political vicissitudes, with political stability being elusive, it has also been plagued by every conceivable problem peculiar to development. Bangladesh is in fact the largest of the world's least developed countries. In addition it has had the distinction of being one of the most disaster-prone countries in the world.

Within this general culture of deprivation women are even more acutely impacted. For economic factors interact with the patriarchal culture of Bangladesh, as in other South Asian countries to marginalize women economically, socially politically and culturally and deny them autonomy. The key mechanisms through social control over women is maintained and reproduced are family and kinship structures, gender segregation and the world view embedded in these systems and practices. Family and kinship structures vest strict control in males who are defined as household heads, a rigid gender division of labour, and inequities in the intra-household allocation of resources, both material and non-material, weighted in favour of males. Circumscribing the lives of Bangladeshi women is the institution of purdah that restricts women's interaction outside the immediate family through

gendered spatial segregation that rigidly relegates women to the space of domesticity. Purdah also stipulates appropriate behaviour codes for women as a mechanism of sexual management. These factors severely impinge on the lives of women and seriously impact them in every phase of a disaster.

To begin with, documented evidence points to the fact that that the largest number of casualties and deaths occur among women, children and the aged. Let us therefore look at the specific socially determined vulnerabilities of women in three phases of disaster-the immediate pre-disaster, during disaster and post-disaster phases.

Pre-disaster

In the cyclone of 1991, women had little or no information about cyclones. Their preparedness awareness too was low.

Warning signal No 10 in the cyclone of 1991 did not reach large numbers of women toiling within the home or homestead. This prevented them from reaching cyclone shelters in time, resulting in death.[6] A major reason for this lack of access to warning information is that in a male-centred society such as Bangladesh marked by a rigid gender division of labour and a culture of female seclusion with restrictions imposed on male-female interactions and women's mobility, warning information was transmitted by males to males in public spaces where males congregated. It was assumed that this would subsequently be communicated to the rest of the family, which by and large did not occur. A peculiarity of this cyclone also was that people, who heard the warning, did not act, believing that no harm would befall them. This is because cyclones occurring after 1970 had not caused much devastation. Evacuation was also hampered by the fear that if, or that if, they left their homes their belongings would be stolen or their property usurped. In the vacillation and procrastination about whether or not to move to cyclone shelters, women who had little or no knowledge about the cyclone as compared to men and were dependent on male decision-making, perished. [7]

Moreover, large numbers of women perished with their children waiting for their husbands to return home to take them to safety.[8] Not only were they afraid of venturing with their children and the aged at home into the dark and into the torrential rain and furiously blowing wind, they were afraid of sexual harassment and being indicted by their husbands and the community as 'be-purdah', for moving out unescorted.

The impact of the cyclone in May 1997 was substantially less. Several factors accounted for this: early warning and evacuation; improved disaster preparedness and management activity by NGOs, Government, and Community-based organizations, even among women; the frightening memories of 1991 that are still alive; the occurrence of the cyclone during the day and its non-accompaniment by a surge.[9]

During disasters

In the throes of the 1991 cyclone, more women died trying to save themselves and their children.[10] Women found it particularly difficult to scale rooftops and trees and swim against the surge with their children, a difficulty compounded by their sudden engagement in vigorous masculine activity which they are socialized to actively refrain from in their routine living. Further in a culture with a high premium on female modesty, the dress code the sari, a long piece of cloth in which women dress, became a death trap for women inhibiting, as it did, quick movement [11].

Some problems experienced by women in 1991 however still persisted in 1997. Women maintained that access to shelters was difficult for the following reasons: the distance of shelters from their homes; the inadequate number of shelters; the absence of 'pucca' approach roads; the difficulty of carrying belongings, animals, children, and helping aged family members, often single-handed, in the heavy rain, high wind-speed, and across slush and flooded ground that was often barricaded by uprooted trees. Women complained of falls, bruises, backaches by the time they reached the shelter.

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[6] Personal interviews with women in Teknaf, Chakaria, and Matabari Island of Cox's Bazar District, Bangaldesh, August 1997.

[7] Masood, M.J. (1996). An Analysis of Gender Considerations in Meeting Disaster Situations in Bangladesh in Proceedings and Workshop on Gender and Disasters, Multan, Pakistan, 6-8 March 1996, Duryog Nivaran, A South Asian Network for Disaster Mitigation.

[8] *Ibid*

[9] Personal interviews with women in Teknaf, Chakaria, and Matabari Island of Cox's Bazar District, Bangaldesh, August 1997.

[10] *Ibid* See footnote 7 (above).

[11] *Ibid.* See footnote 9 (above).

Women who reached cyclone shelters both in 1991 and in 1997 found them ill-designed and too insensitive to gender and culture specific needs. To begin with large numbers of men and women were huddled together – a rarity in a culture of sex-segregation – and women complained of molestation and rough-handling by men. Shelters lacked proper drainage facilities, toilets, water and toiletries such as cloth for menstruating women, emergency food stocks and medicines. Nor were there ledges to place their belongings, or high ground around the shelters on which to tie their animals. Many women complained of standing for about 12-18 hours in ankle deep water in shelters, while they carried their young children. This caused them backaches and cramps. The absence of toilets and reduced privacy levels for women, especially enhanced the discomfort of menstruating women, pregnant and lactating women. The inadequate storage of emergency food items, drinking water and first-aid increased stress levels for children and consequently for the women.[12]

Post-disaster

A generalized experience of women during disasters and post disasters has been an increase in workload. Not only are women engaged in providing for the physical needs of the family- food, clothing, shelter, fuel, water, health care- but they are also encumbered by emergency operations such as the construction of make-shift shelters to overcome the marooned situation in floods and cyclones, constructing rafts and scaffolds to remain above water levels, sheltering animals, protecting their children and animals from snake and insect bites, taking special care of infants and the aged, particularly if they are ill.[13]

Despite this workload increase and the creative contribution of women to the survival process, they were marginalized from access to the very items they were responsible for providing the family with during the relief, rehabilitation and recovery phase. A common experience of women was the disadvantage they faced in battling with physically stronger men, who edged them out during distribution of relief goods. Women were also hesitant to approach male distributors in a sex-segregated culture. Assuming that households are headed by males, and that there exists an intra family equality and harmony of interests, immediate relief and long-term recovery support for income generating and housing reconstruction activities and the like were distributed to males as household heads. Women, even those from women headed households were marginalized in the process. What is also pertinent to note is that land and housing allocations in the rehabilitation and recovery phase are often tied to previous patterns of land ownership. Women, even women headed households who are not generally landowners are once again marginalized from acquisition of such assets, these being instead given to sons (even minors) or brothers of the male victim instead of the wife. Moreover, women in all these contexts report that male heads of households often use relief items to suit their own needs and priorities, rather than those of the household (e.g. men spending money to buy cigarettes, pan, etc.)[14].

While organizations in Bangladesh have in the post-disaster phase of the May 1997 cyclone begun to address the issue of female-headed households, these efforts need to be strengthened, extended and effectively implemented.

Women have further complained of the inappropriateness of certain relief items, the absence of critical items and certain relief services or long delays in providing the latter. To exemplify the point women maintained that they were provided dry food grains in 1991. In the absence of dry wood for fuel, they had to eat half-cooked rice. Many sold the grain that they could not cook. Items such as cloth, an important need of menstruating women, was according to women absent from the relief package. Urgently needed first aid and emergency medicines were according to women received three to seven days after the disaster, and were provided by male doctors and health care workers. Also observed has been the inadequate provision for psychological rehabilitation for both men and women. Further, there were women headed households who had received building materials to reconstruct their homes, but were not imparted the technical skills to do so. This, once again, rendered them dependent on men for the same.[15]

Women as survivors: Special strengths and capacities

Even less visible than vulnerabilities are women's creative capacities, their coping mechanisms, survival strategies, the wealth of local knowledge, skills and resources that they in their socially constructed roles as nurturers, socializing agents and key consumers of environmental resources, promptly and spontaneously bring to bear on disaster preparedness, relief, management and mitigation-initiatives that may even be introduced or catalysed by community-based NGOs, existing local women's organizations or external organizations. This

[12] *Ibid*. See footnote 9 (above)

[13] Haidari, R.; Rahman, A.; Huq, S. (1991). Cyclone 1991. An Environmental and Perceptional Study. Bangladesh Center for Advanced Studies, Dhaka.

[14] Personal interviews with women in Teknaf, Chakaria, and Matabari Island of Cox's Bazar District, Bangaldesh, August 1997.

[15] *Ibid.* See footnote 14.

assumes special significance (a) in the context of the paradigm shift towards disaster resilient patterns of development, rather than a more short-sighted and short-term dependence on emergency disaster relief and (b) in contexts where formal, slow, top-down bureaucratic state supported emergency relief response may result in inequitable, unsustainable and irrelevant results; fail to address the felt needs of vulnerable communities, ignore local resources and capacities and may even increase people's vulnerabilities.

Fore-grounding gender concerns in disaster management: Some present initiatives and future directions

Disaster preparedness and management practice and theory consequently needs to actively foreground and build on women's strengths and capacities, leadership potential within the community, indigenous skills and knowledge base and technical capabilities.

Moreover disaster preparedness and management organizations need to consciously recruit more gender sensitive female disaster managers and field staff or recruit and provide their women staff (and male staff) with training in gender analysis. Likewise such organizations need to also engage women gender planning and development specialists. For an enlightened female (and male) staff that works closely with the community of local women and interacts with gender specialists, are bound to sensitively engender the culture and practice of disaster preparedness and management organizations.

Examples of like initiatives are the active recruitment of female volunteers and female field workers by the Cyclone Preparedness Programme of Bangladesh and the Bangladesh Red Crescent Society (BDRCS), respectively; the latter's formation of male and female micro-groups at the level of the village community engaged in disaster work-decision making on disaster issues; inputting women's concerns into disaster preparedness and management practice; addressing and training other women in the community on local initiatives on disaster preparedness and management.[16] Similar initiatives have been undertaken by Pattan an NGO in Pakistan. Pattan also initiated a joint housing ownership project (co-ownership of houses by husband and wife), in its housing reconstruction work after the 1989 floods.[17] Likewise the World Bank made it incumbent on the Indian Government to register new housing jointly in the names of husband and wife in the aftermath of Latur.

In highly sex-segregated societies as the above, the induction of female workers and organizational staff and enlightened notions of co-ownership and shared responsibility of men and women, at one level helps engender the culture and practice of disaster preparedness and management organizations. At another level, this unleashes a dynamic wherein such women now operating in the public sphere and crossing to whatever limited extent the traditional boundaries set for women, may become role models for other women in the community-a possible first step towards more equitable gender equations and women's long-term empowerment.

Disaster thus provides an opportunity for disaster preparedness and management organizations to build on and institutionalise creative non-traditional interventions by local women, community-based NGOs, existing women's organizations or even external agencies such as the World Bank. This could result in the re-negotiation of patriarchal power and authority within the family and society, towards greater mutuality. The engendering of the central theoretical paradigms of development and disasters that more comprehensively understand, explain and account for gender relations and women's experience at every stage of analysis and practice would contribute more completely to gender justice in disaster response, enhance women's capacity to cope with disasters; and ensure women's long-term empowerment and sustainable development.

*Jean D'Cunha is a Gender Consultant to ADPC and an Independent Researcher and Consultant on Gender and Development to international agencies, government and NGOs.

**Aloysius Rego is Sr. Manager Learning and Professional Development and International Consultancies/Acting Director, ADPC.

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[16] Personal interviews with the Director, Cyclone Preparedness Programme, Bangladesh. Delegate German Red Cross, Bangladesh and Programme Coordinator, BDRCS.

[17] Bari. F. (1996) Gender and Disaster: A Case Study, Pattan: Working with Riverine Communities in Proceedings on Gender and Disasters, Multan, Pakistan, 6-8 arch 1996, Duryog Nivaran: A South Asian Network for Disaster Mitigation.

TRAINING IN SEA SAFETY DEVELOPMENT PROGRAMME

P. Raghu Ram
National Consultant
Radio Communication

The use of radio transceivers at sea and on land for cyclone warnings

The Food and Agriculture Organization of the United Nations conceived the Project "Training in Sea Safety Development Programmes" as a result of high loss of life amongst fisherfolk in the November 1996 cyclone, in East Godavan District. The project is focussing its efforts on reducing the loss of life amongst fisherfolk, through a community developed contingency plan of' action in thirty villages and demonstrating the technology available, such as providing VHF Radio Communication systems. Lifefloats and Diesel Engines for Navas.

The radio transceivers are the telecommunications equipment with which voice messages can be transmitted and received without the conventional telecommunication wires, poles, exchange, equipment, etc. Thus the radio transceivers are more operationally suitable for land where there exists difficult terrain and accessibility and are also more suitable for sea applications. These transceivers are available in fixed and mobile versions.

The radio transceivers are available in different frequency bands and can be classified in three categories:

1. **Short range communication**: Wherever the range of communication is up to 50 km aerial distance where VHF and UHF radio transceivers are ideal and suitable. Here the communication is feasible wherever there is a line of site is available from the point of transmission to the reception and antennae. Generally the land and mobile versions the power out put of the transceivers will be up to 25 W. International marine frequency band allotted for the purpose is 156 to 163 MHz. The type of Antenna used for the land application is GP antennae up to to 3 dB gain. The mobile application, antenna is a whip type with 0 dB gain. The VHF radio transceiver transmission/reception will be in the frequency modulation mode, which is very less prone to external interferences, thereby the receptions will be clearer than other types of modulation.

2. **Medium Range Communication**: The range of communication is between 15 to 250 km aerial distance. The radio transceivers operating in-MF (300 KHz to 1.6 MHz). The power output will be up to 1000 W. This radio equipment is used on large ships and port stations for transmission of radio telegraphy. Also the low power high frequency radio transceivers operating in frequency 1.6 to 30 MHz are used. These radio transceivers are for capacities of power up to 50 W. This radio equipment transmission and reception will be in AM (SSB) and mostly used wherever there is no line of site but the communication is required up to a range of 50 – 150 km.

3. **Long range communication**: The range of communication is up to 3 000 km with high power (1 000 W) transmission. The receivers are very sensitive with double super heterodyne receivers. The quality of reception is generally good during the day as compared to night time. The radiated power with RF signal is reflected through the ionospheric layer reflection. This is also known as sky wave communication using AM (SS13). Most of the land based communication stations such as airports, defence, police-networks are equipped with this type of system. The FIF radio transceivers are linked with EF dipole antenna and wherever site limitations are there they are connected with log periodic antenna.

If we consider the wide area coverage such as that of a state in a country such as India for dissemination of cyclone warnings the combination of HF and VHF would be the ideal. This is in order to have a voice communication link between the capital of the state to the remote coastal regional headquarters level. The HF transceivers with 100 W power output and broadband antenna working in the frequency range 1.6 to 30 MHz should be used. A VHF radio link should be established from the coastal regional headquarters to the coastal villages and the shore stations. This can be further extended through these VHF shore stations to the mobile VHF sets installed on the mechanized fishing vessels. Thus a cyclone-warning message originated from the state capital is disseminated to the remotest village and even to the mechanized fishing vessel in the sea almost instantaneously.

Under the FAO project "Training in Sea Safety Development Programme" two VHF shore stations were established at Kakinada and Balusutippa in East Godavan District of Andbra Pradesh, and at the shore station two

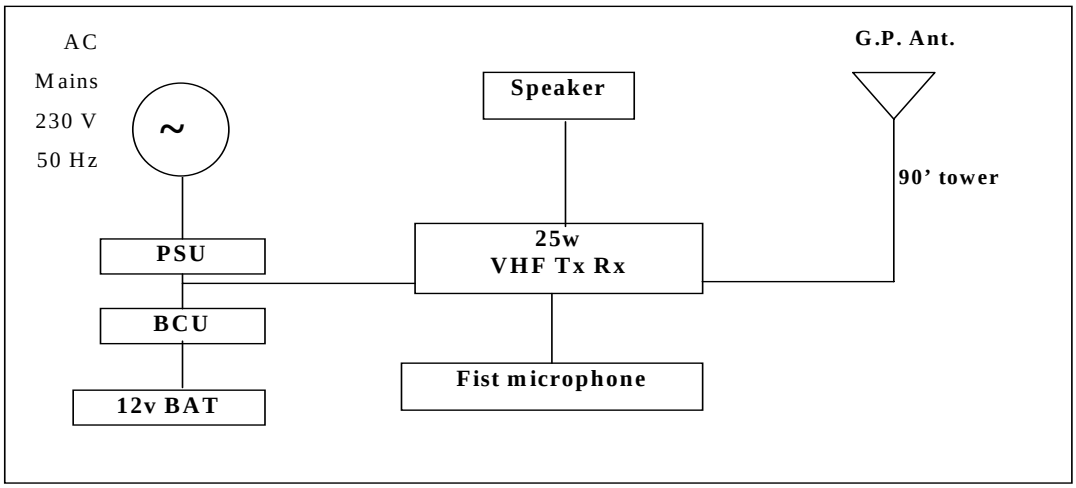
25W VHF transceivers were installed to operate on channel 15 and 16 (Internal maritime channel). The radio equipment is powered through a DC regulated power supply unit with stand by batteries. The shore stations are designed to operate and function 24 hours a day basis throughout the year. The shore stations are have trained shore operators who will be receiving and transmitting the messages for the following purpose:

1. Life safety of fishers when they are at sea;
2. Periodic broadcast of the weather forecast;
3. Transmittal of cyclone warning message well in advance for the fishing community (land and sea);
4. Coordination of search and rescue operation in case of any emergency at sea.

Channel 15 and 16 were allotted by the wireless planning and coordination cell of the Ministry of Communications, Government of India, for the two shore stations and to the boat operators in bulk. (150 boats)

Channel 15 is meant for broadcasting voice messages between the shore station and the fishing community and also among the fishing boats. Channel 16 is the international calling and distress channel.

The shore station radio equipment is as per the block diagram below.



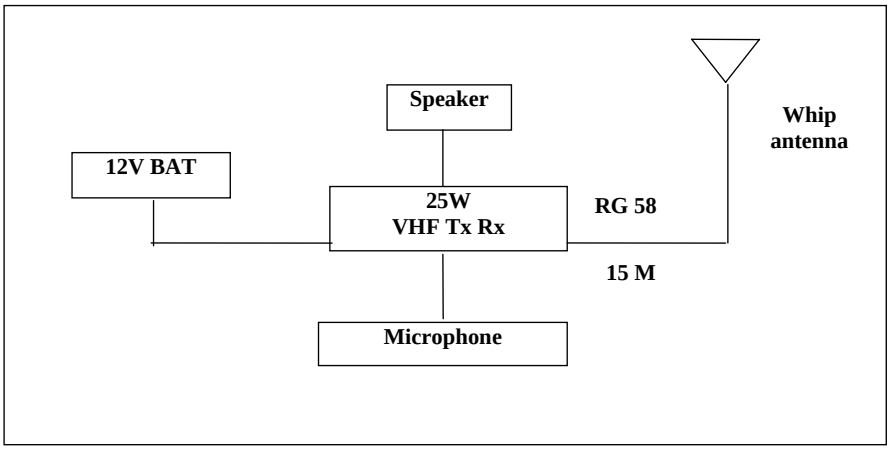
The System consists of:

1. Power supply unit PSU
   230 V AC to 12 V DC
2. Battery changing unit (BCU)
3. 12 V lead acid battery (120AH)
4. 25 W VHF transceiver
5. DC power and audio cable set
6. Speaker with mounting bracket
7. Fist microphone
8. 50 M RF coaxial radio tower
9. 90' lattice grid radio tower
10. 3 GP antenna

The transceivers are connected through a 50 metre. RF coaxial cable to a 3 DB gain GP antenna. The antenna is mounted on top of a 90' lattice radio tower. This is only in order to achieve the maximum range coverage. Since VHF range link functions on line of site basis. The range achieved by these shore stations exceeds 50 km radial distance.

The mechanised fishing vessel radio equipment installation is as per the block diagram below:

The mobile VHF radio system functional block diagram



Mobile radio system consists of:

1. 12V lead acid battery
2. 25W VHF radio set
3. Fist microphone
4. Speaker with mounting bracket
5. 15 MRF Coaxial cable RG 58
6. Whip antenna
7. User handbook for boat operators

The 25W VHF radio transceiver powered through the 12V battery available in the boat. The radio set is installed inside the cabin and behind the driver seat. VHF whip antenna is mounted on top of the master pole of the boat which is about 25 above sea level.

Remote village installations: Fixed VHF radio transceivers with 3 dB GP antenna mounted on 15 metre mast are considered for installation in the remote villages on the coastal islands to establish a voice communication link during the cyclone prone periods as a disaster preparedness measure. These radios are to be powered through 12V lead acid batteries as standby power supply. The VHF radio transceivers are frequency modulated and transmission is on simplex mode.

Typical transmission protocol:
The following is a typical communication between the shore station and a boat:

Shore station: Kakinada – "SSK"
Boat FKKD 909 – "909"

Message sequence

Ch 15	**SSK**	**FKKD 909 Please respond to SSK over**
	909	**909 Responding over**
	SSK	**909 please confirm your position over**
	909	**10 kilometres north of Pentakota over**
	SSK	**Please confirm ETA over**
	909	**Today evening at 1600 hours over**
	SSK	**Thank you and out**

Similar to the above the SSK can transmit weather forecasts on channel 15. All the boat operators use Ch 16 for calling the SSK and also for SOS/emergencies.

Precautions:

1. Do not open the set, unless fully trained.
2. Before switching on the system ensure the installation checks are completed by a trained operator.
3. Do not operate the radio at low voltage. (Keep batteries well charged).
4. Do not expose the radio set to direct sunlight, rain, sand, wind, etc.
5. Do not press the PTT switch of the first microphone without the antenna cable connected.
6. It is recommended that transmission of messages should be very brief as far as possible.
7. Listen first and speak only if the channel is free.

AWARENESS PROGRAMMES
FOR DISASTER PREPAREDNESS IN INDIA

Paul Calvert
(FAO Consultant - Team Leader)
(Training in Sea Safety Development Programmes TCP/IND/6712)

Awareness programmes for disaster preparedness in India

The traditional response of Governments and NGOs to disasters has been to mount relief operations. This stems from the days when prediction of a disaster, such as a cyclone with its associated storm surge, was virtually non-existent. Prediction was an entirely local affair based on locally observable weather phenomena. Communication systems and mass media were unheard of or at best limited and slow. It is understandable therefore that governments have worked to improve their ability to predict disasters and thereby reduce loss of life and also the cost and extent of relief operations. All these efforts have concentrated on improving the ability to predict the cyclones path and to then warn the Revenue Department to evacuate the threatened communities.

Today good communication systems are available and prediction of cyclones is better than ever before. The IMD is able to track cyclones and predict their landfall as well as any other agency in the world. The installation of new radars and use of better satellites ensures that this will continue to be so.

Relief work too has improved, helicopters swiftly carry key personnel to assess damage and drop relief supplies. The Police, Revenue Department and even NGOs use radios to communicate with their staff and coordinate relief efforts.

However, much less work has been done on enabling the communities themselves to be more prepared and able to receive, comprehend and respond to warnings. Probably the most significant and noticeable work in disaster preparedness has been the construction of cyclone shelters in many coastal villages. Whilst cyclone shelters are indeed important community-based approaches to disaster preparedness and management have been very much neglected. The intention of developing this approach is evident from chapter VI of the Government of Andhra Pradesh Cyclone Contingency Plan of Action, but sadly this chapter seems largely neglected. Instead the Revenue Department generally concentrates on the not inconsiderable task of preparation for relief rather than “disaster preparedness” that will minimise the disaster and thus the level of relief that will subsequently be required.

The devastating East Godaveri cyclone of 6 November 1996 focused attention on the need to take a fresh look at disasters and their management. In response to that cyclone disaster and at the request of the GOI the FAO undertook a pilot project in the affected area entitled Training in Sea Safety Development Programmes. Initially slated to improve safety of sea going fishers the project was soon to re-focus and add to its priority the needs of another highly vulnerable group of fisherfolk. The mission of the project became to reduce the vulnerability of fisherfolk to cyclones.

Five key points became clear during the early stages of the project

1. Fisherfolk did not receive timely warning of the 1996 cyclone through the designated channels as per the State Cyclone Contingency Plan of Action. That the CCPA system for delivering warnings is lengthy and prone to delays by its very nature.
2. Whilst cyclone warnings were available on All India Radio (AIR) the fishing communities did not understand them clearly as they are given in terminology inaccessible to them.
3. The fishing communities were not prepared to meet a cyclone either at sea or in their places of work or in their villages.
4. Loss of life within the villages themselves was minimal, many people survived by taking shelter in the few concrete houses in the village. Old cyclone shelters were considered dangerous and remained unused.
5. Most of the loss of life was in two categories: 830 shrimpseed collectors drowned by the storm surge inundating their places of work on the delta and 569 mechanised boat crew lost when their craft foundered in the stormy seas.
6. The erosion of natural barriers such as forests and mangroves increased the vulnerability of these communities.

The focus of this pilot project is thus on shrimpseed collectors and crews of mechanised fishing vessels. These two groups were identified in the baseline survey as being by far the most vulnerable. Out of approximately 1 435 fisherfolk dead, or missing and presumed dead, 569 were mechanised boat crews and 830 were shrimpseed collectors camping on the islets of the delta away from their villages. For the most part all these fisherfolk were from the villages and hamlets along the coast and delta within 40 km south of Kakinada. The worst hit villages were those of Balusuthippa, Masanithippa and Bhairavapalem.

The project is addressing the lack of preparedness of both these groups by the following means

Mechanised boat crews

1. Establishment of a Marine VHF network for communicating timely warnings and other relevant information. The network comprises two shore-based radio stations (Kakinada and Balusuthippa) with radios also installed in the District Collector's Office, Regional Deputy Director's Office, and three of the least accessible fishing villages along the coast.
2. VHF sets installed on mechanised boats (140).
3. Training given to two crewmembers of each boat and to the shore-based operators.
4. Manufacture and distribution of 100 lifefloats to mechanised boats.
5. Two safety workshops for boat owners, operators and inspectors.

This work is covered in two other papers at this workshop: *The Use of Radio Transceivers at Sea and on Land for Cyclone Warnings* and *Measures for Improving the Safety of Mechanised Fishing Vessels*.

Shrimpseed collectors

1. Establishing and training of 30 volunteer disaster preparedness groups called Storm Safety Action Groups (SSAGs) in thirty villages (A total of 750 volunteers).
2. Including in the plans of the SSAGs specific components to warn and rescue the shrimpseed collectors in times of cyclone threat.
3. Equipping the SSAGs with transistor radios to receive warnings megaphones to transmit the warning throughout the village, torches, first aid kits, coats hats and boots for the SSAG members, lifejackets for the shrimpseed collector rescue crew.
4. Making an educational video about Community Disaster Preparedness and Storm Safety Action Groups.
5. Training 20 Storm Safety Extension Officers two of whom were sent to observe Disaster Preparedness systems in Bangladesh and also attended a training course on Community Disaster Preparedness at the Asian Disaster Preparedness Centre AIT Bangkok.

The shrimpseed collectors comprise some of the poorest people in the region. They are women of all ages, children and men. The primary means of reducing the vulnerability of this group must be to ensure they receive a timely warning and return to their villages BEFORE conditions get too severe. There were very few deaths actually in villages in the 1996 cyclone in spite of the loss of much housing and property. The deaths occurred at the seed collection grounds.

However the reality is that many cyclone shelters are in grave disrepair. Communities fear to enter them during a cyclone and for the rest of the time have no sense of ownership of them. It is good to see this trend changing and that now community buildings and schools are being built that double as cyclone shelters in an emergency. In 1996 most people saved themselves by taking shelter in the few concrete-frame houses in their villages. Where these existed they were used in far greater preference to the old cyclone shelters. Temples too were generally used instead of the cyclone shelter.

Reduction in vulnerability is being achieved through a process of developing teams of disaster preparedness volunteers in each of the 30 villages, which were selected for demonstration by the project. The work of these groups benefits the whole village not only the shrimpseed collectors who are the most vulnerable group.

These groups are called Storm Safety Action Groups and each one comprises 25 volunteers. They have been mobilised by raising awareness about cyclones and disaster preparedness in their village and then trained in a range of disaster Preparedness skills by a team of Storm Safety Extension Officers.

One of the key roles of these village volunteer Storm Safety Action Groups is to know the whereabouts of the Shrimpseed Collectors from their village and to go to warn them and bring them back to the village should a cyclone threaten the area.

The Storm Safety Action Group will also manage the safety of all the community through their Community Cyclone Contingency Plan (see below). Ultimately everyone in the village should know where they have to go, with whom, who they have to help, etc. if a cyclone warning is given. The SSAG members have taken responsibility and pride in this work. They ensure that the village is prepared to meet a cyclone. Not in a last minute rush but by having taken a series of pre-planed and rehearsed actions made in advance of the cyclone prone periods.

Storm Safety Extension Officers

Twenty Storm Safety Extension Officers (SSEOs) were given three weeks training in Kakinada. The course was designed and run by FAO and OXFAM with such organisations as AFPRO, CASA, ACTION, ARTIC and the Department of Fisheries also contributing. Ten SSEOs are from the Department of Fisheries and ten are from local NGOs with the express intention of building stronger working relationships between the two. The villages selected were generally ones where the participating NGOs already had some developmental activity in progress. This is intended to ensure that there will be continuity after the pilot project ends. There is also the hope that as these extension officers rise through the department and the NGOs and become the planners and decision makers that they will retain the good partnerships with each other and with fishing communities for future development and disaster preparedness.

The Storm Safety Extension Officers Training included the following:

1. Introduction and background to FAO Project TCP/IND/6712;
2. Presentation of baseline survey by AFPRO, the report and its findings;
3. Cyclones, their nature, behaviour, effects, tracking, prediction of surge height, wind strength, rain and the effect of tides etc.
4. The State Cyclone Contingency Plan of Action (CCPA). How it works and its strengths and weaknesses;
5. AIR and Doordarshan cyclone warnings and information bulletins. Strengths and weaknesses and interpretation for local use;
6. Indigenous knowledge about cyclones and storm indicators;
7. Communication skills and participative training methods;
8. Radio Communications: use, capabilities limitations and maintenance including power supplies and weather effects;
9. Alerting of shrimp seed collectors, small fishing craft, e.g. by flares, fireworks, lights, smoke, sound, etc. focus on what is affordable and reliable;
10. Rescue of shrimp seed collectors and others from outlying areas;
11. Disaster preparedness in the community.The formation of Storm Safety Action Groups; maintenance of cyclone shelters/safe houses, storage of food grains, drinking water, cooking fuel, assistance to aged/infirm/pregnant women and unattended children, first aid, etc.;
12. What is a community cyclone contingency plan and how to make one;
13. Cyclone Shelters; design and construction, the good and the bad and the ugly. Multiple uses and a sense of pride and ownership;
14. Particular issues affecting women: Gender and Disaster;
15. Safety equipment use and care, e.g. life jackets and life buoys, radios and telephones, TV's and their aerials, etc.;
16. Craft Safety and Stability, essential equipment e.g. bailers, ropes, paddles, life jackets and improvised buoyancy aids, tarpaulins to keep out heavy spray, additional buoyancy, etc.
17. Insurance of life and property;
18. Land use patterns and environmental degradation as factors in increased vulnerability;
19. Government's responsibilities and government schemes for development, aid, assistance, loans, insurance, etc. and how to access them.

Gender balance

We wished to have an equal gender balance amongst the SSEOs but this was not achieved.
Only four out of 20 are women (Which reflects the gender imbalance in the Department and the NGOs). However it is evident in the work with the communities (the SSEOs are working in pairs) those SSEO pairs, which are male/female, have an advantage.

Phases of work in development of storm safety action groups and village contingency plans
The SSEOs initially met with village elders and had meetings with them and the community about the project and concepts of community disaster preparedness. Once this opening was made they began with volunteers to learn more about the village, its layout, resources and occupations of the families, seasonality factors, local history of earlier disasters, etc. Through this situation analysis work with the volunteers in the village and use of RRA and PRA techniques they were able to build a rapport with the people. This was also useful in identifying potential volunteers for the Storm Safety Action Groups.

Once this work was well advanced and the SSAG volunteers members identified (able-bodied women and men and generally available in the village) specific training camps were organized in the following subjects: Emergency Medical Care, Emergency Rescue, Evacuation Methods within the Village and of Shrimpseed Collectors from outlying areas, Relief Camp Management. These camps taught basic first aid and improvised and practical methods of carrying patients. The volunteers (men and women) also learnt how to improvise floats from coconuts, bottles and water vessels to save themselves in floods and storm surge. Organization of safe houses and shelters and their preparation with water, food grains, fuel and lamps were also taught.

Throughout this work the concept of community disaster preparedness was built on and the SSEOs began facilitating the process of the SSAGs developing their detailed Contingency Plan and the associated map for their village. This process was aided and facilitated by the SSEOs encouraging imaginative serious role-play in various disaster scenarios and initiating detailed discussions on how various situations would be handled, by whom, when, what they would do and why.

The SSAGs are currently at the stage of completing their Contingency Plans and Maps. They will then move to the final stage of the training process, which is to demonstrate a simulated, a response to cyclone. They should be able to show that their plan works, they believe in it and it is realistic.

After this the plans will be shared with the District Collector and through him to the Mandal Revenue Officers, Department of Fisheries and other relevant bodies. Sustaining the interest and commitment of the SSAGs in the longer term requires commitment form the NGOs and Departments of Fisheries and Revenue and also to ensure that the members of the SSAGs are involved in other developmental activities in their villages. They can help to ensure that an essential thread of Disaster Preparedness runs through such work too.

Storm safety action groups
The 20 Extension Officers worked in pairs, each covering three villages and visiting them at least once a week over a period of seven months. From this work the 30 volunteer SSAGs emerged. Each SSAG comprises 25 members and has generally divided into five sub-groups: warning, shelter, rescue, first aid and relief.

Here too an equal gender balance was sought. Initially there was considerable resistance from the men in many villages but this has been overcome to the extent that women represent 20 to 40 percent of each Storm Safety Action Group.

Community contingency plan
The Community Contingency Plan is expected to be able to answer all the following questions. It is also to be developed entirely by the community so that they have full ownership of it and they decide their own actions and responsibilities in detail. This work is currently in progress and there is a very high level of participation. An important part of the plan is a map of the village. The map shows all the houses, safe places, and location of more vulnerable persons such as pregnant or lactating mothers, elderly and infirm, handicapped and so on.

The plan will document the actions and responsibilities that each of the SSAG members and members of the community have to take to ensure that:

- There is a sound liaison with the Sarpanch, VAO and MRO;
- All available sources of cyclone warnings and weather bulletins are monitored;
- Everyone will get timely warning messages;
- Everyone in the community has a safe place to go and knows where it is;
- Everyone knows what to do in the event of a cyclone occurring when they are at home, at their work, in the village or away from it, day or night;
- Everyone will have food, water, fuel and light during and after the cyclone;
- Every vulnerable person gets special help and attention;

- Special needs of women and children are met;
- Disaster drills are rehearsed in the pre-cyclone month;
- The community contingency plan is maintained and updated as situations change. (*This is a very important point, the plan is dynamic*) (New births, deaths, migrations, new craft, new buildings, etc.) Also improvements in procedures are also made in the light of experience and fully shared and rehearsed with the community;
- All safety equipment is taken care of, maintained and understood by responsible persons;
- Safety navas are alert and correctly equipped by their crew;
- Shrimpseed collectors and other outlying groups are brought back to the village;
- Security of abandoned homes and possessions is ensured;
- First aid is given where required;
- The news and weather developments are monitored on radio, TV, etc. as available after the cyclone.

CONCLUSIONS AND OBSERVATIONS

Cyclone warnings, confidence and comprehension building

There is an urgent need for AIR warnings to become understood and trusted by the fishing communities. For this work needs to be done on both sides. From AIR there needs to be a simpler more direct message tuned to the needs of the communities. At the community there needs to be a considerable amount of awareness and educational work done to find out how to best adapt the forecasts and also improve the communities' ability to comprehend and trust them. Such work should build on the communities' indigenous knowledge about cyclones and cyclone prediction. This is extremely important work as it enables fishers at sea and communities ashore to take their own decisions about when and how to take shelter.

Community disaster preparedness

Fishing communities in East Godaveri are highly receptive to the concept of community based disaster preparedness. The Department of Fisheries and local NGOs have demonstrated their commitment and ability to do such work. The Revenue department has shown that it fully supports this initiative and welcomes its complimentarity to its own work and responsibilities. The SSAGs are still very young and untested by real disasters but there is great promise that they can do much to mitigate the effects of future cyclones on their communities.

Comparison with Bangladesh

In Bangladesh there are 33 000 volunteers doing similar work. This figure puts the figure of 750 volunteers in this pilot project into perspective and indicates how much more work there is to be done by the Revenue Department, Fisheries Department and the NGOs not only in Andhra Pradesh but in all the vulnerable coastal districts on the east and west coasts. The Department of Fisheries have already run a short awareness programme at the State Institute for Fisheries Technology for its Fishery Development Officers from nearby coastal districts and plan more. OXFAM is supporting a number of local NGOs to develop community-based disaster preparedness and development work.

Development and disaster preparedness tied to each other

This project is a fairly intensive burst of community disaster preparedness training and demonstration. For it to be sustainable there needs to be long-term follow up by the Government and NGOs. Also to assure sustainability the work needs to be interwoven with other livelihood and development activities in the community which again points to the advantage of dialogue and cooperation between Government departments and NGOs. Sanitation, water supply, education, housing and their development all are vulnerable to disasters. Their development must be done with close regard to this vulnerability and all those in the community and those working with them need to weave an active sense of disaster preparedness and vulnerability reduction. The means of sustaining livelihoods needs to be consciously used, maintained and developed in ways that reduce their vulnerability and thus the vulnerability of the community. Disaster Preparedness can be a thread that permeates all aspects of community life. Not as an ominous threat but more as a subtle flavour that provides an underlying reassurance to all activities.

Gender issues, not an annex

It must also be said that an equal gender balance is essential at all levels of this work as women are so frequently the caretakers of much that provides for basic survival. They also have a number of particular problems and perspectives that are different to those experienced by men in a disaster. Generally being the domain of the woman who invariably has a greater sense of nurture, the total loss of the family house for example can have a

much greater impact on the woman than the man. Only a woman extension officer/facilitator can ensure that the needs of women are effectively heard and incorporated in community disaster preparedness.

Creative approach to cyclone shelters
It is tragic to see so many cyclone shelters in a state of total disrepair and that people feared to even enter them during the cyclone. Multipurpose community buildings and schools, providing shelter from cyclones in an emergency, are already being recognised by the Government as a more appropriate option. However they should be constructed and managed with full participation and transparency with the local. Choices and balance between subsidies for cyclone resistant housing and community buildings that are cyclone resistant and act as shelters need to be explored by Government and NGOs.

Learn from what is already being done
Exposure of Government Officials, NGOs and community organisers to the Disaster Preparedness work at national, state and community level both to this project and to work in other countries should be advocated. There is much to learn from the experiences in neighbouring Bangladesh.

Awareness raising and audiovisual material
There is a widespread lack of awareness of disaster preparedness (vs. relief) at all levels of the community and many in Government. Much greater use of media, especially television, in raising awareness could be beneficially pursued. (The FAO Project Video on Storm Safety Action Groups is a start in this regard). The State CCPA may also be explained through such programmes.

Disaster preparedness, teach the children
Awareness raising about cyclones and their nature and disaster preparedness, especially at community and household level, should be taught in all schools and children's camps, especially in the pre-cyclone months.

Protected environment protects communities
Strict enforcement of the Coastal Zone Regulation Act and re-establishment of forest and mangroves in the coastal areas need to be considered. Such work should be aimed at reducing storm surge penetration, soil loss and flooding, sustaining the marine and brackish water fisheries and other ecosystems, and providing fuel, fodder, building materials and livelihoods to the coastal communities.

MEASURES FOR IMPROVING THE SAFETY OF MECHANISED FISHING VESSELS

Jeremy M. Turner
Senior Fishery Industry Officer, FAO

Introduction

As a result of the high concentration of fishing effort close to shore, inshore resources in most parts of the world are generally overfished or highly stressed. The many remedial proposals put forward have largely failed to check the decline, still less to restore the depleted resources. The need to diversify fishing is acute, but due to the poor safety record and known limitations of the fleets in many developing countries, governments are understandably reluctant to legislate to send fishers offshore. Notwithstanding this, many fishermen are left with little alternative but to seek new fishing grounds, and take the risk of operating further offshore in craft which are often unsuitable for the chosen area of operation, from the points of view of design, construction and equipment. In this situation, it is inevitable that the number of casualties is increasing, and this sad fact is confirmed by sporadic reporting on casualties back to FAO.

In November 1996, following a severe cyclone, approximately 1 435 fisherfolk were reported as dead or missing (assumed dead) in the State of Andhra Pradesh on the east coast of India. Of these, 569 were reported to have been lost while fishing in mechanised boats at sea, while 830 fisherfolk were lost while carrying out shrimp seed collection and other shore-based activities in areas remote from the villages. The causes of death in these two activities are of a totally distinct nature, wherein the former were lost at sea in conditions of high winds and heavy seas, and the latter, on land, largely as a result of the storm surge.

The 569 fishermen who were reported lost, were working on 110 fishing vessels that capsized or foundered when struck by the cyclone. These craft were mechanised trawlers, primarily of the popular Sona type being typically 11 to 13 metres in length, and carrying out fishing trips of 10 – 15 days duration; such vessels are still being constructed in significant numbers. They had departed from Kakinada port several days before the cyclone struck, and were fishing in an area southeast of Kakinada along the coast of the Godaveri delta. Few if any of the vessels were equipped with even simple transistor radios, and thus, despite transmissions of cyclone warnings by the media, the fishermen were unaware of the intensity of the approaching cyclone, or of its speed of advance.

In response to the disaster, FAO undertook a pilot project (TCP/IND/6712) entitled “Training in Sea Safety Development Programmes” which focussed on disaster preparedness and the improved safety of shrimpseed collectors and crews of mechanised fishing vessels in East Godaveri District of the State of Andhra Pradesh. One of the activities of the project was to make recommendations on improved safety of mechanised fishing vessels, and this paper draws heavily on that study[2].

THE LOSS OF 110 FISHING VESSELS IN NOVEMBER 1996

Fleet composition

The “Hand Book on Fisheries Statistics - 1996” (Ref. 1) gives the following number of fishing craft in Andhra Pradesh as of 1994-1995:

Total number of craft:	66 180
Unmotorised traditional craft:	54 000
Motorised traditional craft:	3 269
Mechanised[3] boats:	8 911

The following are the main types of craft used in the fishery in the East Godaveri District:

- Mechanised trawlers of 10 - 15 metres

[2] TCP/IND/6712 Field Document No 4 by FAO Consultant Oyvind Gulbrandsen.

[3] In India, a motorised boat is a traditional design to which a motor has been added, whereas a mechanised boat is an introduced or new design which included mechanical means of propulsion from the outset. FRP boats are included in the “mechanised boats” for statistical purposes since these are the only “non traditional craft” together with the trawlers. The total number of trawlers in Andhra Pradesh is estimated at 1 500, but the resulting total number of FRP craft of 7 400 is probably an exaggeration.

- Wooden Nava of 5-12 m length. Planked boat without keel, originally a river boat used in the Godaveri delta powered by sail and oar. The larger Nava of 9-12 m length are now increasingly motorised with 16-20 hp diesel engines and used for sea fishing.
- FRP teppa of 9-10 m length, fitted mainly with a 6 hp aircooled diesel engine and a "longtail" shaft.
- FRP Beachlanding craft (BLC) of 8.5 m length with deck, fitted with a 9 hp watercooled engine and a liftable propulsion system.
- FRP open "Nava" of 9.1 m length fitted with 16 hp diesel engine and fixed propeller.
- FRP decked boat of 9.8-10.4 m length fitted with mainly 20 hp diesel engine and direct drive to propeller.

It was from the first category, the mechanised trawler, that significant loss of life occurred. The approximate number of trawlers based in the various ports of Andhra Pradesh are as follows:

Visakhapatnam:	500
Kakinada:	600
Machilipatnam:	200
Nizampatnam:	200
Krishnapatnam:	40
Total number:	1 540

There are still some trawlers of the original 10 m "Royya" type, built for one day fishing, but the majority are of the so-called "Sona" type of 11- 13 m length, with considerably more beam and depth than the "Royya" type and fitted with insulated fishboxes below deck to make them suitable for trips of 10-15 days. These boats operate as far as the northern Orissa coast and the "sandheads" off the Bengal coast and have proven profitable because of low investment in contrast to the 23-25 m Mexican-type trawlers based in Visakhapatnam.

There are approximately 15 wooden "Sona" type trawlers now under construction in Kakinada. The most popular Sona type has the following main particular:

Length over all:	LOA	=	11.6 m
Beam moulded:	BMD	=	3.75 m
Depth moulded:	DMD	=	1.81 m
CUNO		=	79 m^3
Engine:	Ashok Leyland 6 cyl, 100-110 hp		
Fish hold volume:	5.2 m^3		
Fish box on deck:	1.0 m^3		
Fuel tanks:	4 000 litre		
Fresh water tanks:	800 litre		
Crew:	8 men		

Where CUNO = Cubic Number = LOA x BMD x DMD

Photo 1 12 m "Sona" type shrimp trawler with 100 hp diesel engine

Photo 2 Sea conditions during hurricane

Weather conditions

Cyclone is the name given to a tropical revolving storm occurring in the Indian Ocean, Arabian Sea or Bay of Bengal. A hurricane is the name given to the same storm in the West Indies or off the American seaboard; typhoon is the name given to the same storm in the Western Pacific.

The Beaufort Scale (BS) was developed by the British Navy and is a scale from 0 to 12 indicating the force of the wind and describing corresponding sea states. O is a flat calm with a mirror smooth sea, while 12 is hurricane force with winds exceeding 65 knots.

Under the definitions for varying weather conditions contained within the Beaufort scale, a **violent storm** (BS11) is described as “exceptionally high waves; sea completely covered with long white patches of foam along the

direction of the wind; visibility affected; sea state may be described as phenomenal". Wind strength under this category is 53 - 63 knots. The next definition for worsening weather conditions describes a **hurricane** (BS12): "air filled with foam and spray; sea white with driving spray; visibility very seriously affected; sea state may be described as phenomenal". Wind speed exceeds 64 knots, and wave height is typically 46 feet (14 metres). Maximum wave height would exceed 20 metres. Their crests would be long, overhanging and tumbling. (*see photo 2*)

The cyclone started as a low pressure area on 5 November 1996 off the coast of central Andhra Pradesh, intensified into a depression and further intensified into a cyclone of hurricane proportions through 6 November, and finally ended on 7 November. It crossed the coast of Andhra Pradesh near the village of Bhairavapalem around 2030 hours on 6 November leaving entire fishing villages, coconut and banana plantations denuded in its wake. Wind speeds reached 150-180 kph and the storm surge about 2.2 metres in height devastated the coastal fishing villages south of Kakinada.

During the day prior to the cyclone, the smaller boats going for day or overnight fishing were not out at sea because of the deteriorating weather. Many of these boats were damaged when the villages were struck by the storm surge, but it seems that few fishermen drowned in this connection.

The 567 fishermen who were reported lost, worked on 110 trawlers that capsized or foundered when struck by the cyclone. These boats had left Kakinada port several days before the cyclone and were fishing in an area south-east of Kakinada along the coast of the Godaveri delta. September to December is considered the peak fishing season in this area and the good catches had lured many trawlers to go fishing.

Analysis

Causes of loss of life and vessels

Through interview with survivors from capsized or foundered trawlers it was possible to get a clearer picture of the course of events that led to the disaster. The main conclusions are as follows:

- Most of the trawlers did not carry a transistor radio and the crew did not regularly listen to the weather forecast. The crew members did not want to take their radio with them on the boat because of the risk of spoiling it and the boatowner did not feel obliged to provide one.
- When the trawlers were hit by the cyclone during the afternoon of 6 November, many skippers attempted to head back to Kakinada. When the wind and wave direction[4] made progress very slow, they decided to change course, heading north or south in an attempt to make an alternative port. Breaking waves from astern or the side filled the decks, washed away unsecured hatch covers, filled up the engine room and stopped the engine. The boat could not be manoeuvred and either foundered or capsized.
- Capsize without the engine stopping was also reported. The boat went over very quickly due to the weight of water trapped between the bulwark and iceboxes on deck.
- One of the survivors reported that they had decided to anchor, but that the boat capsized shortly afterwards.
- In one case it was reported that the chain-rope connection to the rudder broke and with loss of steering the boat capsized when hit by a wave from the side, and
- inanother it was reported that the top of the roof of the wheelhouse blew off prior to the capsize.

[4] Prior to the "eye" of the cyclone passing over the area, the winds, being cyclonic, were offshore.

Flotation devices

The loss of the fishermen cannot in all cases be attributed directly to the loss of the vessel, since following loss of the vessel, the majority of survivors, though shocked and frightened, would have still been in possession of their physical and mental capabilities. Many could have been saved had they been provided with some means of flotation.

Survivors reported the value of the hatch covers as flotation devices, which floated free following capsize of the vessel, seemingly unaware of the fact that had the hatch cover been securely fastened over the hatch, the boat may not have capsized in the first place.

Safety regulations for fishing boats

Safety regulations for fishing boats are the responsibility of the Merchant Marine Department. The requirements are formulated in “The Merchant Shipping Act”. The following paragraphs give the main points related to the size of fishing vessels based in Kakinada (below 25 Gross ton and fitted with an engine of 50 hp or more):

- **Definition**: “Fishing vessel” means a ship fitted with mechanical means of propulsion which is exclusively engaged in sea fishing for profit.
- **Certificates of crew**: One engineer duly certificated, designated “Engineer of fishing vessel”. This means in practice that the person has gone through a 12 month course at the Fisheries Training Institute dealing with navigation, service of engines and the use of fishing gear. Since the vessels are below 25 Gross ton there is no requirement for a certified skipper. The Certificate of the Fisheries Training Institute is accepted as sufficient qualification for being a skipper on board the trawler as well as an engineer.
- **Registration**: Every new boat must be registered and undergo an inspection. The certificate of inspection shall among other things specify the safety equipment and appliances required to be carried on board and contain a statement to the effect that her hull, rigging, equipment and machinery are in good condition. A stability inclining test is done by a Naval Architect who issues a Stability Certificate[5].
- **Renewal of certificate of inspection**: Each year after issue of previous certificate.
- **Safety equipment**: One lifejacket for every crew member, two life buoys, two fire extinguishers, four fire buckets, one sand box, two anchors with rope, navigation lights, red/green sidelights and white masthead light.

[5] Stability expressed in metacentric height (GM) is calculated by a Naval Architect based on an inclining test on a new boat. A ”Stability Certificate” is then issued. From a number of these certificates for the "Sona" type of boat, it can be seen that, the GM varies between 0.78 m and 0.91 m which indicates a very good initial stability since the minimum required is GM = 0.35 m.

Observations on safety regulations

A regulation is of little value if it is not enforced. Following survey of several fishing boats in Kakinada and interviews with boatowners and crew, the following conclusions can be deduced:

- The safety equipment is present during the inspection but removed afterwards and given to the next boat to be inspected. None of the boats therefore carry this equipment when going fishing. Navigation lights are in most cases wrongly mounted and in many cases the bulb is missing.
- Crews have little confidence in the type of lifejackets that are commonly available. The lifejackets are of a model that were discarded 30 years ago in other countries with cotton cloth cover and cotton straps that will rot after a few years in a humid environment aboard a fishing boat and with the buoyancy material of kapok, which according to the crew will become waterlogged after a short time. A lifejacket of this type that had been utilised by the Fisheries Training Institute was demonstrated at the training course and the criticism proved justified: the cotton cover and the straps could easily be ripped apart. Since there exist modern life jackets with synthetic foam that will not become waterlogged and cover and straps made of a synthetic material that will not rot, the old type of life jacket should be banned. However, regardless of the quality of the safety equipment, it serves no purpose if the crew is not trained in the use of this equipment. The lifejacket has a number of straps that have to be tied in a certain way if it is to function well as a buoyancy aid, since it is especially important to avoid it sliding up into the face of the person. Even the instructors of the Fisheries Training Institute had difficulties in tying on the life jacket in the correct manner. Doing this on a dark night with a cyclone approaching makes it even more improbable that the life jacket will be of any use unless the crew are properly drilled in tying the jacket on even blind-folded. This points to the main weakness of a life jacket compared with a buoyancy aid such as a lifefloat, the use of which is immediately understood by the crew.
- The need for four firebuckets and a sand box seems outdated, one firebucket with lanyard or two firebuckets if no firepump (deckwash) is fitted, should be adequate.
- Although the Stability Certificates of new "Sona" boats indicate a high initial stability it is not stated in which condition the vessel is tested, how much fuel and freshwater there is in the tanks and whether the ice boxes on deck are in position. When the iceboxes on deck are full they have a significant effect on the stability, especially on the smaller "Royya" type which does not carry iceboxes under deck. The minimum GM = 0.35 m is an international criteria for fishing boats above 24 m in length that undergo a complete stability investigation including calculation of righting levers at various angles of heel. This criteria is certainly too low for the boats of the size we are dealing with since a complete stability check is not made. The criteria for minimum GM given in **Ref. 3** under 4.2.3 should be used. A complete stability calculation should be made for a typical "Sona" trawler to judge the effect of water on deck following the recommendation in **Attachment 3 of Ref. 4.** The high depth moulded in relation to the waterline beam on this type of boat, make it vulnerable to weights on deck.

Observations on vessel construction

There are no rules or regulations in India regarding the construction of the size of fishing vessels based in Kakinada. The following observations were made of Sona type trawlers pf around 12 metres length under construction in Kakinada:

- The scantlings are below what is normally prescribed in scantling rules. The planking thickness is 25-26 mm while minimum plank thickness for this size of boat (CUNO = 80) would normally be 30 mm. The frame distance, centre to centre, is 400 mm while normal distance should be 320 mm. The larger frame-spacing together with the thinner planking lead to a considerable weaker construction. It seems that the plank thickness and the frame spacing have not been modified from the earlier 10 m "Royya" type of boat with a CUNO = 36 m^3 even though the trawlers now are double the size with a CUNO = 80 m^3.
- The planking is fastened to the frames with ungalvanized steel screws of 6 mm diameter. It is extremely rare for this type of fastening is used in the construction of a wooden fishing boat. A screw is more expensive than a nail and takes more time to fasten. This practice seems to be limited to Kakinada. North of Visakhapatnam a trawler was observed under construction using hot dip galvanised round nails of 6.7 mm diameter were used.
- The frames are of adequate size but the fastenings of the frames to the floors are considerably below accepted standards with only two 10 mm bolts on each side where four bolts would normally be required.
- Big gaps between the planks occur after a few years service and this requires massive caulking to stop the leak. Although it is not possible to directly link the weak construction of the trawlers to the sinkings during the cyclone, it is clear that the present scantlings present a safety hazard.

- In many cases the hatch covers to the fish hold and to the rudder compartment cannot be fastened down in such a way that they will not be washed away by a wave breaking on the deck. The height of the hatch coaming, which is recommended to be minimum 300 mm, is in most cases half this height or less. This also applies to the coaming height for doors into the wheelhouse where water will enter easily into the engine room.
- The scuppers in the bulwark should be sufficiently large to prevent large quantities of water being trapped on deck. A notable feature of these boats are the high bulwarks with very small scuppers (holes at deck level to permit water to drain off the deck). The main purpose of a bulwark is to provide protection to the crew, and prevent too much water coming on deck when a sea is running. However, both these purposes can be achieved with alternative designs of bulwark which are of almost identical cost to the existing type. The concern expressed by fishermen is that of losing fish through the scuppers. This can be easily circumvented through the use of grids, mesh, hinging or opening panels in the bulwark, the last of which could be removed in bad weather. Crew protection can also be provided by a pipe rail, permitting the solid bulwark to be half the usual height.

MEASURES FOR IMPROVING THE SAFETY OF MECHANISED FISHING VESSELS

The cost of improved safety

Provision of or attendance to the following items would add significantly to the safety of "Sona" trawlers;

	Rupees
Adequate bulwarks and scuppers	10 000
Complete VHF installation	20 000
Raised hatch coamings	10 000
Means of securing hatch covers over hatches	5 000
Means of securing doors and windows	10 000
Improving watertight integrity (exhaust, winch system)	10 000
Lifefloats	7 000
Total	**Rs 72 000**

The costs are rough estimates based on local costings, and the total additional cost is only a small percentage of the completed cost of a Sona trawler. If owners of these vessels will not willingly undertake to pay these additional costs to improve the safety of their vessels, then it is clear that the provision of these additional safety features must ensured by the enactment of appropriate legislation.

Regulations are of no value unless they are enforced. If such legislation is enacted, then there will exist also a need for certification and enforcement to ensure that new vessels meet these standards, and thus there exists in addition the need to train the competent authorities to inspect vessels and to issue such certification.

Training of fishing vessel builders and operators

It is sometimes suggested that Indian fishermen do not require technical advice or assistance with regard to the design or operation of their vessels, because they have generations of experience on which they can draw. With regard to artisanal fishing operations in non-motorised craft, this may well be the case. However, it should be noted that mechanised trawlers were introduced to India only 40 years ago, that their use became widespread only 25 years ago, and furthermore, that the duration of fishing trips has been extended considerably over the last 15 years from single day trips to 15 day trips, with the size of the original design gradually increasing from 10 to 14 metres. It is therefore considered that the fishing boat building industry are in many areas not aware of what constitutes adequate design, construction and maintenance of vessels and equipment, nor are the skippers and crews of these vessels in possession of the appropriate levels of seamanship and skills.

It is clear that the authorities can ensure improved safety on board fishing vessels through the setting of design and construction regulations. But they cannot ensure that the crew ill listen to their radios, or that the vessel heads for port on receipt of the cyclone warning. They cannot ensure that the hatches are battened down, that the nets and other fishing equipment are stowed below decks, that drums and fish boxes carried on deck are securely fastened or even emptied. They cannot ensure that a sea anchor is deployed or that the skipper steams slowly into the seas. But education and training of skippers and crews can ensure that they at least have an idea of what they should do.

The safety at sea of mechanised, motorised and non-motorised fishing craft and their crews should be improved through local level awareness campaigns and training by the Department of Fisheries and other competent groups. Suitable training materials should be developed advising of minimum standards. It is likely that the staff of the Fisheries Department would themselves require appropriate training prior to providing extension. Training Video for crews and skippers covering the nature and forecasting of cyclones, appropriate design, construction and equipment for trawlers, maintenance and operation of vessel and equipment, survival strategies would be useful. They do not require literacy, and they can be dubbed into different languages. They can be shown on TV, in training institutes, and even on videos in the harbours and villages.

Amendment and enforcement of regulations

Certain measures however, can only be ensured through enacting appropriate legislation, and secondly, through enforcing that legislation. Where rules and regulations for the design and construction of fishing vessels and safety equipment to be carried on board fishing vessels already exist, there is a need to keep those rules and regulations under review, to reflect the latest technology, materials of construction and equipment development, as well as changes in the fishing operations. With regard to improving the seaworthiness and safety of "Sona" trawlers, regulations are required to ensure that:

- the vessel provides adequate intact stability for the worst anticipated service conditions;
- the strength and construction of the vessel and its equipment shall be sufficient to withstand all foreseeable conditions of the intended service and shall be to the satisfaction of the competent authority;
- the vessel has appropriate arrangements to allow water on deck to escape over the side;
- hatch coamings are of suitable height and strength, and that hatches can be securely battened down;
- the vessel has an easily accessible space below deck for the storage of the nets;
- water and fuel required for a fishing trip can be kept in designated tanks below deck, unless it can be shown that fuel and water containers stored on deck are not detrimental to the stability of the vessel;
- the hull and deck have watertight integrity, and for example that there are no openings through the deck through which water can enter the boat (e.g. around the engine exhaust and trawl winch drive gear);
- the steering arrangements are of adequate strength;
- vessels carry appropriate life saving equipment;
- vessels carry appropriate communication equipment;
- skippers and crews are trained in the use of life saving appliances and communication equipment, in undertaking regular inspections, maintenance and reporting of the vessel condition and equipment;
- skippers and crews are trained in heavy weather seamanship and survival.

Lifefloats

The alternative to expensive automatically inflating liferafts is either a fixed liferaft which will support all its occupants out of the water or a lifefloat where the occupants are in the water but hang on to the lifefloat for support especially for the ones who are not good swimmers. An eight person liferaft with the surface area and buoyancy required by the 1995 Torremolinos International Convention for the Safety of Fishing Vessels will need to be about 1.4 x 2.2 m in area and have a net buoyancy of 0.77 m^3. There will be some problems in positioning this liferaft on the top of the wheelhouse. The second alternative, a lifefloat of 0.95 x 1.6 m would require a buoyancy of only 0.2 m^3. It was considered that this was the most practical minimum alternative. A lifefloat has the following advantages:

- keeps the survivors together which will boost the spirit;
- the orange colour makes it easier to spot from a search boat or an aeroplane;
- two persons who might be weaker than the other can be supported inside the lifefloat;
- can be fitted on the top of the wheelhouse in such a way that it will float free in case of a capsize;
- the visible position on top of the wheelhouse makes it easy to control whether or not the boat is carrying it;
- can be produced locally in India in Fibreglass Reinforced Plastic (FRP) requiring no maintenance, at a price of Rs 7 000 (as demonstrated by the TCP project TCP/IND/6712).

Conclusions

In summary, it can be seen that there exists a need for

1. the introduction, or review and amendment, of standards and regulations to improve the quality of design and construction of fishing vessels and their equipment. These regulations should reflect the latest technology, materials of construction and equipment development, as well as changes in the fishing operations;
2. the training of crews in the operation of vessels in bad weather at sea;
3. certification and enforcement to ensure that crews and vessels meet these standards;
4. institutional strengthening of the administration having these responsibilities.

Activities are required therefore which will develop standards that will be prescribed by law, for the construction of new fishing vessels and where appropriate, for the modification of old vessels. The objective of such activities should be the enforcement of prescribed standards for the construction of small fishing vessels through (i) amendments to Fisheries Regulations, and (ii) an authorized system for the inspection of fishing vessels that would:

- enhance the operational safety of fishers and their fishing vessels;
- provide a positive aid to fisheries management; and
- give confidence to lending institutions and insurance companies with regard to the risk of underwriting loan applications and fishing operations.

To achieve these objectives would usually require the setting up of a unit dedicated to the implementation of the activities described above. Before embarking on such a course of action, it would be essential to consider the responsibility of an Administration to implement rules and regulations, and to maintain a survey system. This would involve setting up a survey office to cover the approval of drawings, site inspections, testing, vessel measurement (for registration and licencing), annual and special surveys of vessels and equipment. Finally, but by no means least, it would require qualified staff and the funds to operate such a service.

Annex 4

LIST OF PARTICIPANTS		
Name	**Organization**	**Designation**
Mr Lucrecio O. About Jr	c/o Pagasa (Weather Bureau), 1424 Quezon City, 1104, Philippines Tel: 9221992 Fax: 9221992	Weather Specialist
Dr R. Ahikrishna	Head of the Dept. of Ophthalmology, 11-2-10/1, Daspalla Hills, Visakhapatnam - 530 003. Tel.: 566712/566774	Principal, Professor
Mr P.C. Appa Rao	A.P. Boat Owners' Association Fishing Harbour, Visakhapatnam	President
Mr Rajan Bargotra	Commanding Officer, Coastguard Ship, Bhikhaiji Cama, Tel: 559810	Commandant Officer
Mr Roger Bellars	Disaster Management Unit, Department of Geological Sciences, University College London, Gower St. London, WC1E 6BT (c/o OXFAM, Hyderabad) Fax: +44 171 419 3449	
Mr P. Brahmaji Rao	Dept. of Fisheries ELURU Tel.: 30532	Asst Director of Fisheries
Mr Paul Calvert	79 Oxford St., Rugby, UK, c/o. FAO, New Delhi. Email: paulc@md2.vsnl.net.in	FAO Consultant (Team Leader TSSDP)
Mr A. Chandra Sekhar	GOAP	Minister of Fisheries
Mr M. Chandra Sekhara Rao	Mercantile Marine Dept., Harbour Approach Road, Visakhapatnam-530 035. Tel: 502148, Fax: 568342	Engineer and Ship Surveyor
Ms Jean D'Cunha	ADPC, AIT, POBOL 4, Klongluang, Pathum, Thani-12120, Thailand, Tel: 662-5245391, Fax: 6625245360 c/o. ajrego@ait.ac.th	Consultant ADPC (Gender)
Mr G. Deisu	A.P. Mechanised Boat Owners', Fishing Harbour, Visakhapatnam.	Vice President
Mr M.K. Devaraj	CIFNET, Govt. of India, Visakhapatnam. Tel: 566787, Tel: (Res.) 558128	Dy. Director
Ms Vanamadi Dhanalakshmi	c/o Regional Deputy Director, Kaikada	Shrimpseed Collector Survivors
Mr J.V.H. Dixitulu	Fishing Chimes Journal	Editor
Mr T. Gopal Rao, IAS	Dept of Animal Husbandry and Fisheries	Principal Secretary

Mr M. Gurudutt Prasad	ACTION, Krishna Sadan, Dr Mela Ranga, Prasada Rao Gujar, Hukumpet P.O., Rajahmundry - 533 103. Tel: 461442/ Fax: 468449	SSEO Field Coordinator
Mr C. Haridas	Ministry of Agriculture, Dept. of Animal Husbandry & Dairying, Govt. of India, New Delhi. Tel.:011-3389019, Fax:011-3384030	Asst Commissioner (Fisheries)
Mr C. I. Illaiah	c/o. D.F.A.P., Hyderabad Tel.: 040-4619263	Dy. Director of Fisheries
Mr Huelgas, Juan Blenn I.	c/o. ADPC, Malacaning, Philippines Tel: (063) 9292597/09188569944, Fax: (063) 9292597)	Sectoral Representative
Dr R.R. Kelkar	India Meteorological Dept., Lodi Road, New Delhi-110 003. Tel: 011-4611842, Fax: 011-4611792 Email: rrkelkar@imd.ernet.in	Director General
Mrs. Poona Malakondaiah	IAS, District Collector and Magistrate, Vizianagaram	
Mr P. Malusvakar	APM Boats Assn., Fishing Harbour, Visakhapatnam. Tel: 531103, 566117	General Secretary
Mr C. Mohana	ARISE, D.No. 58-29-4/12, P&T Colony, Sriram Nagar Post, Rajahmundry 533 105.	
Ms G. Mohana	OXFAM (India), 3/19, Shiva Arun Colony, West Maredpalle. Tel.: 040-7800940	Program Coordinator
Mr C.M. Muralidharan	AFPRO, 12-13-483/39, St.No.1, Tarnulea,'Secunderabad-17, Tel: 7150413, Fax: 7176021 Email:afprosix@hotmail.com	Sr Specialist (Fisheries)
Mr D.S. Murthy	Director of Fisheries, 11th Floor, Gaganvihar, M.J. Road, Hyderabad-1 Tel.: 040-4619263	Director
Mr Pantari NageswaraRao	c/o Regional Deputy Director, Kakinada	Mech. Boat Survivors
Mr Pantari Naguru	c/o Regional Deputy Director, Kakinada	Mech. Boat Survivors
Dr J.V.M Naidu	Cyclone Warning Centre, Visakhapatnam. Tel: 555214 Fax: 555163	Director
Mr S. Narasingarao	D.C. Visag Prakashem	District Revenue Officer
Mr Kripa Nautiyal	Commanding Officer, CG Ship “VARAD”, c/o FMO, Visakhapatnam, Tel.:558879 Fax: 558879.	Commandant
Mr Himanshu Nautiyal	Cos Priyadarshini, c/o. Fleet Mail Office, Visakhapatnam, Tel: 568879 Fax: 568875.	Dy. Comdt.
Mr A.P. Nukaiah	A.P. Mechanised Boat Owners' Assn Fishing Harbour, Visakhapatnam.	Vice President
Mr K. Om Prakash	CICEF, MOA, 64 Palace Road, Bangalore - 560052 Tel.:080-2258945 Fax:080-2258945	Director
Ms Pinapothu Subhadra	c/o. Regional Deputy Director, Kakinada	Shrimpseed Collector - Survivors
Mr P. Prakasa Rao	Prakasam Dist, Ongole	Dist. Revenue Officer
Mr P.R. Prasad	AFCOF, Visakhapatnam. Tel.: 823512	Project Manager

Mr U. Pydi Raju	D.F.C.S. Vada, Narsapuram Tel: 34239	President
Dr K. Radhakrishna	118, Samachar Apartments, Mayur Vihar, Phase-I Extn, Delhi - 110 093 Tel.: (011) 2715181.	National Consultant TSSDP/F.A.O.
Ms C. Radhika	c/o Mr P.R.K. Raju, Fisheries Development Officer, Mummadivaram, East Godavari District.	NGO (SSEO)
Mr P. Raghu Ram	MIG-12, Green Park, Visakhapatnam - 530 013.Tel: (891) 549600 Email: praghuram@yahoo.com	National Consultant TSSDP/F.A.O.
Mr B.V. Raghuvulu	Dept. of Fisheries, Kakinada	Regional Dy. Director of Fisheries
Commandant Raj	Coastguard Head Qtrs. Natand Stadium complex New Delhi - 110 001	Jt Director (Operations)
Mr M. Ram Gopal Rao	c/o Director of Fisheries, 11th Floor, Gaganvihar, Hyderabad-1 Tel: 040-4619263	Dy. Director of Fisheries (Marine)
Mr V.Rama Hohana Rao	c/o Regnl. Dy. Director Fisheries Kakinada Tel: 374621	Fisheries Development Officer/ Sea Safety Extension Officer
Mr P. Rama Krishna Raju	Fisheries Development Officer, Mummadivaram, East Godavari District.	SSEO
Mr D.V. Rama Raju	Dolphin Boat Operators Assn., Fishing Harbour, Visakhapatnam. Tel: 502482	President
Mr Bade Rama Rao	Fisheries Co-op. Society Ltd., Visakhapatnam Dist.	Vice President
Mr L Ramalingam	F.S.I., Visakhapatnam Tel: 562884	Sr Fisheries Scientist
Mr M. Ramudu	A.P. Boat Owners' Association, Fishing Harbour, Visakhapatnam. Tel.: 566117, Fax: 566117	
Mr B. Rangarao	District Fisherman Cooperation Society East Godavari	President
Mr Narsimha Rao	Dept of Fisheries, Rajahmundry	Asst Director of Fisheries
Mr N.V Rao	N.S.D.R.C., Gandhigram, Visakhapatnam - 530 005. Tel: 578360, Fax: 577754	Chief Manager (Design)
Mr B. Rasheed	Fin. Plg. (Fin. PMU) Dept. Secretariat, Hyderabad. Tel.: 040-212410 Email: brasheed98@Hotmail.com	Communication Expert
Mr C.S. Reddy	CARE, Pradesh6-3-608/1, Khairatabad, Hyderabad-4, Tel: 040-3313998/3396379, Fax:040-3323441, Email: creddy@careindia.org	Director
Mr Peter Rosenegger	FAO Representative in India and Bhutan, New Delhi. Tel: 4628877, Fax: 4620115 Email: FAO-IND@field.fao.org	FAOR
Mr Gandham Saikumar	SSEO, Sravanti, Sravanti Welfare Organisation, Yedurlanka, Via Yanam. Tel: 461139 or 23631	Coordinator
Mr Abdul Salam	CE'S Dept., Visakhapatnam Port Trust, Port Area, Visakhapatnam Tel: 559807	Asst Engineer
Mr K.Satyam	Dept. of Fisheries, Visakhapatnam Tel: 502953	Regional Dy. Director of Fisheries
Ms E. Seeta Ratna Kumari	ARISE - Rajahmundry	Women Coordinator/SSEO
Mr Sharad Sharma	CGS Chandbibi, C/o. FMO Naval Base, Visakhapatnam, Tel: 568879, Fax:568875	Dy. Comdt.
Mr P. Sree Ramulu	Fisheries Development Officer, c/o RDDF, Yetimoga, Jagannaickpur, Kakinada.	SSEO

Mr K. Srikanth	NH-5, Akkayyapalem, Visakhapatnam.	Reporter
Prof. A.R. Subrahmanyam	Emenses in Meteorology, Saradamba, Gajipeta Jn., Visakhapatnam - 530 002 Tel: 564404, Fax:560099 Email:ram @ sai.xlweb.com Local Contact No.564404/566995	Professor and Chairman of Indian Meteorological Society, Visakhapatnam.
Commodore Subramaniyam	Fort St. George, Chennai, Tel.:044-561508, FAX: 044565437 EMail: Cgpoorau(a)md2.vsnl.net.in	Commander Coast, Guard Region (East)
Dr D.Sudarsan	Forum of Fisheries Professionals, 9-20-2, CBM Compound, Visakhapatnam-3 Tel.: 559893	President
Mr Y. Sundarayya	Dept. of Fisheries, 11th Floor, Gaganvihar, M.J. Road, Hyderabad - 500 001 Tel: 4619262.	Jt. Director of Fisheries
Ms Renuka Taimni	c/o FAO of the United Nations, New Delhi. Tel: 4628877 Fax: 4620115	Programme Officer
Mr J.M.Turner	FAO, HQ, ROME, Email: Jeremy.Turner@fao.org.	Senior Fishery Industry Officer (Vessels)
Mr N. Vasudevan	Beach Road, Visakhapatnam. Tel: 502105 Local Contact Ph.No. 562884	Service Engineer
Mr Vanmadi Venkateswara Rao	(Kondababu), Swarnaandhra Boat Owners Welfare Association, Jagannaickpur, East Godavari District, Andhra Pradesh.	
Mr M. Voowa Rap	Fishing Harbour, Visakhapatnam. Tel: 566117	Executive Member
Mr B.S.Yadav	Coastguard District Head Qtrs.6 Tel: 568875, Fax:568875 Local Contract Phone No.565505	Commandant
Dr Y.S. Yadava	Fisheries Development Commissioner, Ministry of Agriculture, Krishi Bhawan, New Delhi.	Fisheries Development Commissioner
Mr Bade Yella Rao	Sri Ramakrishna Veda Balija, Fisheries Co-op. Society, Pedanagamayyapalem, Bheemuni- patnam Mandal, Visakhapatnam Dist.	President