

Multipurpose Cyclone/ Flood Shelters

During the Super Cyclone 1999, precious human lives were lost due to want of safe shelters. There was no pucca/ RCC roofed houses with disaster resistant capability of a Super Cyclone magnitude, either in private or public sector in the coastal villages of affected districts of Odisha. The vulnerable people in Erasama area of Jagatsinghpur district, where storm surge was the maximum, hardly found a safe place to take shelter to save their lives during the super cyclone, that ravaged the State for 72 hours.

Prior to super cyclone, Indian Red Cross Society (Odisha State Branch) had constructed 23 cyclone shelters in coastal districts of the State, which reportedly housed and saved 42,000 lives. This was an eye opener. In the immediate aftermath of this disaster, Government of Odisha promptly recognized the need for construction of disaster resistant shelter buildings, as a part of its long term disaster risk reduction initiatives.

Need Assessment of Cyclone Shelters

Actual needs for cyclone shelters basing on vulnerability of the population and socio-economic condition of the locality have been assessed by independent and impartial studies conducted through a reputed institution like IIT, Kharagpur.

With the objective to identify the villages within 10 Km belt of coastline and to suggest exact locations, IIT Kharagpur (Bhubaneswar Ext. Branch) was engaged in the year 2000 to conduct a study and submit its report. The team of experts of IIT, Kharagpur mapped the entire area and suggested 512 vulnerable locations keeping in view the storm surge, where the cyclone shelter could be setup.

Further Need Assessment Study by IIT Kharagpur

In the aftermath of the super cyclone, a number of school buildings and other public and private buildings have been constructed in the vulnerable areas. It was felt necessary to reassess the actual need of cyclone shelters and their exact locations. In view of massive constructions taken up after 1999. IIT, Kharagpur was re-engaged to conduct in depth field study in the 6 coastal districts namely Balasore, Bhadrak, Kendrapara, Jagatsinghpur, Puri and Ganjam and the areas around Chilika Lake.

The basic principle of the study was:

1. To ensure that every single individual would have access to a safe shelter either belonging to the community or a private person, without having to run for more than 2.25 KM and

- Without crossing any natural barrier during an emergency situation. IIT, Kharagpur has taken 10 square km grid (3.15km x 3.15km) for identification of location of the shelters. In this case most of the villages will have 1.57 km of traveling distance, except the villages located in the corners of the grid, which may go upto 2.25 km.

After detailed field study, IIT, Kharagpur had identified 286 locations (villages) within 10 KM zone of coastline in 6 coastal districts for construction of cyclone shelters. Besides people in 7 Blocks around Chilika lake are also vulnerable to cyclone and storm surge for which a separate study is being conducted through IIT, Kharagpur to assess the actual need of shelters there. IIT has also suggested additional 84 locations adjoining Chilika lagoon, thus taking the total upto 370 locations.

The sites for shelter buildings have been selected by the Collector of the district on the basis of following considerations:

- The site should be inside the existing school premises or adjacent to school.
- The site should be a piece of Government Land/ public land without any encumbrances and should be suitable for construction.
- The site should have sufficiently wide access, which can be developed to approach road.

Odisha State Disaster Management Authority (OSDMA) with financial support from government and other sources including World Bank has taken significant initiatives for providing multipurpose cyclone /flood shelters at strategic locations for the vulnerable communities. At present 503 numbers of Multipurpose Cyclone Shelters have been constructed under different projects/ schemes and project wise list is placed below:

Name of the Scheme	No. of Multipurpose Cyclone Shelter (MCS)
Chief Minister's Relief Fund (CMRF) (after Super Cyclone)	60
Prime Minister's National Relief Fund (PMNRF) (after Super Cyclone)	38
World Bank (Immediate Phase-after Super Cyclone)	37
CMRF/State Plan (Post Phailin, 2013)	36
National Cyclone Risk Mitigation Project (NCRMP) (World Bank funded, including 5 Godown-cum-MCS)	154
NCRMP(Additional Financing) (World Bank funded)	162
Integrated Coastal Zone Management Project (ICZMP) (World Bank funded)	14
Container Corporation of India Ltd. (CONCOR)	2
Total	503

Some MCS photographs:



Multipurpose Flood Shelters (MFS):

Odisha has 11 major rivers, which created floods. Mahanadi including its tributaries and distributaries, being the largest river system, causes severe threat of floods to most parts of the State. Other rivers like Budha Balanga, Suvarnarekha, Brahmani, Baitarani, Rusikulya and Bansadhara also swell for flooding. Floods are very frequent and result in severe damages to life and property in Odisha. Many valuable lives and livestock are lost due to want of safe shelters.

Hence, to address this gap, Government of Odisha has constructed 311 nos. of Multipurpose Flood Shelters in different flood vulnerable locations of Odisha under different projects and project wise list is placed below:.

Name of the Scheme	No. of Multipurpose Flood Shelter (MFS)
Chief Minister's Relief Fund (CMRF)	50
CMRF (surplus fund)	3
State Plan	23
CMRF (through RD Dept.)	15
CMRF/State Plan (Post Phailin, 2013)	220
Total	311

Some photographs of MFS:



The structural design and drawing of both the cyclone & flood shelter like have been developed by IIT, Kharagpur. The management and maintenance system is the same for both cyclone and flood shelters.

Till now, OSDMA has constructed 814 Multipurpose Cyclone & Flood Shelters (MCS/ MFS) in 25 districts of the State. Block/ ULB & District wise abstract of the MCS & MFS is placed at below:

Dist. Sl. No.	Name of the District	Block/ ULB Sl. No.	Name of Block	OSDMA MCS/MFS Total	
1.	Balasore	1	Sadar	30	
		2	Simulia	2	
		3	Bhograi	18	
		4	Jaleswar	3	
		5	Remuna	17	
		6	Baliapal	30	
		7	Basta	4	
		8	Bahanaga	19	
		9	Soro	4	
		10	Nilagiri	1	
			Sub Total	128	
2.	Baragarh	11	Bheden	1	
		12	Ambabhona	2	
			Sub Total	3	
3.	Bhadrak	13	Basudevpur	37	
		14	Basudevpur NAC	1	
		15	Bhandaripokhari	4	
		16	Bonth	1	
		17	Dhamnagar	5	
		18	Tihidi	6	
		19	Chandabali	29	
		20	Bhadrak	2	
				Sub Total	85
		4.	Boudh	21	Kantamal
22	Harabhanga			1	
23	Boudh			1	
	Sub Total			4	
5.	Cuttack	24	Niali	4	
		25	Sadar	1	
		26	Kantapada	1	
		27	Nischintkoili	3	
		28	Mahanga	1	
		29	Banki	4	
		30	Dampada	1	
		31	Aathagarh	2	
		32	Tigira	3	
		33	Tangi Choudwar	1	
		34	Badamba	3	
35	Narasinghpur	1			

Dist. Sl. No.	Name of the District	Block/ ULB Sl. No.	Name of Block	OSDMA MCS/MFS Total
			Sub Total	25
6.	Dhenkanal	36	Gondia	2
		37	Kamakhyanagar	1
		38	Bhuban	1
		39	Odapada	2
		40	Parjang	1
		41	Kankadahad	1
			Sub Total	8
7.	Gajapati	42	Kashinagar	3
			Sub Total	3
8.	Ganjam	43	Kabisurya Nagar	2
		44	Aska	2
		45	Chhatrapur	11
		46	Ganjam	28
		47	Khallikote	16
		48	Rangeilunda	9
		49	Gopalpur NAC	1
		50	Seragada	4
		51	Hinjilicut	6
		52	Belaguntha	1
		53	Sorada	1
		54	Purusottampur	6
		55	Chikiti	11
		56	Polasara	1
		57	Digapahadi	3
		58	Bhanjanagar	1
			Sub Total	103
9.	Jagatsinghpur	59	Kujanga	14
		60	Tirtol	6
		61	Balikuda	9
		62	Biridi	3
		63	Erasama	8
		64	Paradeep Municipality	1
		65	Nuagaon	1
			Sub Total	42
10.	Jajpur	66	Jajpur	5
		67	Bari	7
		68	Dasarathpur	1
		69	Dharmasala	1
		70	Korei	1
		71	Korei (Tahasil-Byasanagar) (Vyasanagar Municipality-1)	1
		72	Rasulpur	1
		73	Binjharpur	3
		74	Barachana	5
		75	Danagadi	1
			Sub Total	26
11.	Jharsuguda	76	Lakhanpur	2

Dist. Sl. No.	Name of the District	Block/ ULB Sl. No.	Name of Block	OSDMA MCS/MFS Total
			Sub Total	2
12.	Kalahandi	77	Kalampur	1
		78	Jaipatna	1
		79	Junagarh	1
		80	Kesinga	1
			Sub Total	4
13.	Kendrapara	81	Pattamundai	10
		82	Garadpur	4
		83	Marshaghai	8
		84	Aul	2
		85	Rajkanika	4
		86	Rajnagar	35
		87	Mahakalpada	35
			Sub Total	98
14.	Keonjhar	88	Hatadihi	3
		89	Ghasipura	1
			Sub Total	4
15.	Khurda	90	Balipatna	4
		91	Balianta	4
		92	Banpur	9
		93	Chilika	12
		94	Tangi	15
		95	Khurda	2
		96	Jatani Municipality	1
		97	Jatani	2
		98	Begunia	2
			Sub Total	51
16.	Koraput	99	Jeypore	1
		100	Borigumma	1
		101	Kotpad	1
			Sub Total	3
17.	Malkangiri	102	Kalimela	1
		103	Podia	1
		104	Korukonda	1
		105	Mathili	1
			Sub Total	4
18.	Mayurbhanj	106	Shamakhunta	1
		107	Badasahi	3
		108	Betonoti	1
		109	Baripada Municipality	3
		110	Kaptipada	1
		111	Udala	1
			Sub Total	10
19.	Nawarangpur	112	Umerkote	3
		113	Umerkote NAC	1
		114	Chandahandi	1
		115	Nabarangapur	3
		116	Nabarangapur Municipality	1

Dist. Sl. No.	Name of the District	Block/ ULB Sl. No.	Name of Block	OSDMA MCS/MFS Total
		117	Papadahandi	1
			Sub Total	10
20.	Nayagarh	118	Bhapur	4
		119	Khandapada	2
		120	Gania	2
		121	Nayagarh	2
		122	Odagaon	1
		123	Ranapur	6
			Sub Total	17
21.	Nuapara	124	Sinapali	1
			Sub Total	1
22.	Puri	125	Satyabadi	4
		126	Kanas	24
		127	Nimapara	3
		128	Gop	18
		129	Konark NAC	1
		130	Puri Sadar	16
		131	Puri Municipality	1
		132	Krushnaprasad	39
		133	Brahmagiri	31
		134	Delanga	4
		135	Pipili	4
		136	Astaranga	17
		137	Kakatpur	8
			Sub Total	170
23.	Rayagada	138	Gunupur NAC	1
		139	Rayagada	1
		140	Bissam Cuttack	1
			Sub Total	3
24.	Sambalpur	141	Maneswar	1
		142	Sambalpur Town (Municipality)	3
			Sub Total	4
25.	Subarnapur	143	Birmaharj Pur	1
		144	Dunguripali	1
		145	Binka NAC	1
		146	Sonepur Municipality	2
		147	Ulanda	1
			Sub Total	6
			Total	814

What is a safe shelter?

A safe shelter building, apart from being strategically located, should have the following features:

1. Structurally safe to survive the ensuing disaster. Not to be affected by the disaster itself. Should be above high flood level (HFL) and able to withstand speedy wind and earthquakes.
2. Should have free access. The approach road to be used for evacuation and relief should not be affected by the disaster. As far as practicable, the approach road should preferably be above HFL.
3. Should have basic amenities like water, light and sanitation.
4. Should be closer to the community and without any geographical barrier like rivers, creeks etc to cross over.
5. Should be prominently placed and visible against tree cover.

About our safe shelters

1. Locations of the cyclone shelters have been identified by IIT, Kharagpur, Locations of flood shelters have been identified by the Collectors on the basis of hazard experience.
2. Drawing and design of multipurpose cyclone/ flood shelter buildings has been developed by IIT, Kharagpur
3. “Proof Checks” are carried out at all critical stages to ensure that quality is of acceptable standard as per IS codes.
4. Structurally, these can withstand high speed wind and moderate earthquakes. The buildings have been constructed above high flood level (HFL) with raised platform and stilted floors, so that the flood water will not affect the shelter building. Even in case of very high floods, the water can pass through the stilted floors without affecting the shelter in the 1st floor.

Why the shelters are Multipurpose?

1. The shelter building will be primarily used for shelter purposes to save human lives during disasters. The ground floor of the building can also be used as shelter for livestock's during emergencies. Relief material and medicines can be stacked for emergency situation.
2. Almost all the shelter buildings have been constructed inside school premises or adjacent to it for convenient use for school purpose during normal times.

3. Additionally, these shelter buildings can be used as community halls and can be put to various other community uses like Anganwadi centers, training centers, and marriage mandaps and for other social gatherings etc.
4. Without affecting the primary purpose, the shelters can be put to economic uses on payment of nominal user fee and the fee so collected can be deposited in the joint account of the Committee for resource augmentation.

Features and facilities available in the Multipurpose Shelter:

1. Separate hall for men and women
2. Separate toilets for men and women
3. One extra room to be used for sick/ labour room
4. One store room
5. Ramp of 1:12 slope for persons with disability
6. Drinking water supply through submersible pump
7. Internal electrical wiring done. 5 KVA generator set supplied for backup power supply.
8. Black board for class room purpose
9. All weather road connectivity to the shelter

All future shelter buildings will have these changed features.

1. One unisex multiuse (accessible) toilet in the building



2. The steps in the ground floor are redesigned as per



universal design concept (tread-300mm and riser-150mm). A contrast colour band is used in the steps to make it visible during deemed light period.

3. Handrails at 0.75 & 0.9 mt height with GI pipes of 40 to 50 mm dia will be fixed at both sides of staircase and ramps (extension).
4. Pathway from gate to building, will be paved in PCC, both side curb will be constructed and painted with black & white (Contrast) Colours.
5. Tactile tiles will be fixed from entrance gate on pathway, in corridors etc by which a visually challenged person can easily access every facilities in the building.



Principles of shelter use:

1. Multipurpose shelter building constructed by OSDMA is the property of Government of Odisha in Revenue and Disaster Management Department. It is a public infrastructure for use of the community members.
2. To provide shelter to the vulnerable and affected people at the time of need is the main objective of the multipurpose shelter.
3. This shelter can be used by all affected person irrespective of caste, class, creed, gender and language. All should pay special attention to women, children, old and persons with disabilities.
4. The shelter buildings have been constructed within/ adjacent to the premises of the existing school. During normal times, these shelters will be used as schools. The provision of blackboard is inbuilt in the shelter hall. Wherever necessary, wooden partitions can be used to create separate halls for class room purposes.
5. It is the duty of the Headmaster of the school to keep the shelter clean at the time of its use as schools.
6. On receipt of early warning even through T.V. and radio, the shelter building should be vacated and kept ready for use as shelter by the evacuated persons.

7. Headmaster of the school is an ex-officio member of the shelter management and maintenance committee.
8. Day-to-day maintenance of the shelter is the responsibility of the local community. The Shelter Management and Maintenance Committee will cooperate in it.
9. With approval of the Committee, the shelter can be used for government programmes, social, cultural and economic purposes. But nobody will be allowed to use the shelter or its campus permanently.
10. The user fee collected will be kept in the joint account and can be spent for repair, maintenance and disaster preparedness activities. The rate of user fee will be decided by the Shelter Management Committee by adopting a resolution.
11. No illegal, illicit, criminal or divisive activities will be allowed inside the shelter.
12. Any dispute regarding the management and or use of the shelter will be brought to the notice of local BDO, Collector of the district and OSDMA.

Sustainability:

The multipurpose cyclone/ flood shelters, being provided at strategic locations along the coastline of Odisha under different scheme including NCRMP, have been identified as critical disaster resilient infrastructure to reduce the destructive impact of cyclone and related disaster on human being. Thus, they are precious assets for the community as the first responder to disasters. Besides, providing cyclone shelters in the cyclone prone areas emerges as a vital tool for taking the community based disaster response initiative forward.

The multipurpose cyclone shelters are constructed within 10 km of the coastline. By sheer location, these structures will be constantly exposed to aggressive marine climate. Similarly, the flood shelters constructed in flood prone areas are also exposed to hazardous climatic conditions. The structural safety concerns are being addressed by adopting disaster resilient design, use of construction materials and by carrying out “proof checks” at all critical stages of construction to ensure quality.

But structural safety of the buildings per se will not ensure sustainability of the buildings as shelter. Institutionalization of a sustainable management and maintenance system will be key and critical to ensure long term sustainability of the shelter buildings.

OSDMA has developed a model for management and maintenance of the shelter buildings with community participation and has initiated a proposal for the consideration of Government to support repair and maintenance including drinking water supply installations.

Institutionalization of maintenance system:

To ensure sustainable maintenance of these shelter buildings, community-based Cyclone/ Flood Shelter Management and Maintenance Committees (CSMMCs/ FSMMCs) are formed at each MCS/ MFS village taking 20-25 members from both male & female members from Govt., PRI, PWD, NGO, SC, ST, School/ College etc. representatives. All the members are imparted managerial training. Similarly, 50 Taskforce volunteers identified at each shelter village between age group of 18-35 years from both male & female and out of which 25 for Search & Rescue and 25 for First Aid. The CSMMC/ FSMMC members and Task Force volunteers and the community at large are oriented, trained and involved on management & maintenance of the shelter building as well as disaster preparedness activities on regular basis. This creates an atmosphere of Community ownership and involvement in the asset management.

Shelter Equipment:

A number of shelter equipments have been provided to each shelter, which will be used at shelter level during disaster. The equipment include generator sets, inflatable tower lights & telescopic tower lights for night time disaster management, power saws, search and rescue equipment, First-Aid kit, free kitchen utensils, totaling more than 50 items.

- The CSMMC/ FSMMC will be duty bound to receive, keep in custody in good condition and maintain the shelter equipment supplied to the cyclone shelter by OSDMA and any other agency for search and rescue, first aid, free kitchen or any other purpose.
- The equipment will be put to emergency uses when such situation arises.
- The equipment received will be duly entered in the stock register maintained by the CSMMC/ FSMMC. Copies of the list of the equipment will be supplied to the concerned BDO and Collector.
- The equipment will be used for mock drill and for the purpose for which it is supplied in emergency situation.

List of shelter level emergency equipment:

Sl. No.	Name of the Equipment	Qty.
1	Life Buoy(Ring Type)	5
2	Life Jacket (Adult)	5
3	Fluorescent Jacket-50 nos.	50
4	Safety Shoes	10
5	Hand Gloves	10
6	Safety Helmet (Industrial)	10
7	Rain Suit	10
8	Foldable Stretcher	2

Sl. No.	Name of the Equipment	Qty.
9	First-Aid Box with material	1
10	Handled Searching light	1
11	Fire Extinguisher 4.5 k.g. CO ₂	1
12	Wheel Chair	2
13	Steel Almirah	1
14	Steel Rack	1
15	G.I. Trunk	1
16	Plastic Molder chairs	10
17	Handheld Tools	12
18	Solar Lantern	2
19	Handheld Megaphone	1
20	Siren (Electrical)	1
21	Radio	1
22	Water Filter	4
23	Wall Supported Extension Ladder	1
24	Dari	2
25	Tarpaulin	2
26	Karnamental Rope	2 bundle
27	Nylon Rope (12 mm)	2 bundle
28	Notice Board with Kitchen net covering and locking wooden	1
29	Free Kitchen Utensils (22 Items)	(1 SET)
30	Chain Saw	2
31	Inflatable Tower Light	1
32	Telescopic Tower Light (LED type)	1
33	5 KVA Diesel Generator	1
34	Dustbin-120 ltr-4nos	1 set
	Dustbin-100 ltr-1set	
	Dustbin-110 ltr-1no.	

Secretary of the CSMMC/ FSMMC will maintain a stock register and enter the equipments in the said register. The format is annexed herewith. The record of use of the equipment for maintenance or during mock drill and / or disasters should be maintained in the log book in given format to know the history of use of the equipment.

For safe use and maintenance of the shelter equipment, OSDMA has developed a separate manual in Odia. The instructions contained in the manual should be followed while using the equipment.

Corpus Fund for Maintenance:

Multipurpose cyclone/ flood shelters are engineered buildings and issues of durability in aggressive saline climate are taken care of in the construction phase. Rectification, if required within one year of completion will be done by the contractor/ agency at his own cost under the defect liability clause. Major/ Special repair required at a later stage will not be within the coping capacity of shelter level Management and Maintenance Committee. Therefore,

alternative arrangement for major/ special repair is under consideration. However, minor repair/ replacement and maintenance will be the responsibility of the committee. To further incentivize the participatory model of management and maintenance, creation of a Corpus Fund has been proposed. When made available, the fund will be administered as per the following guidelines:

The Corpus fund will be kept in an attractive interest paying term deposit scheme with a lock in system for 2 (two) years in the nearest scheduled bank or post office in the joint account of shelter level management and maintenance committee.

2. The committee will not withdraw the amount or the interest accrued for first two years. After two years, the capital and the interest will form the capital for the next term of deposit.
3. The interest accrued from the said deposit only can be withdrawn by the committee in the 4th year and spent for maintenance of the building. The interest amount can be utilized for shelter level capacity building and mock drill activities.
4. The committee shall not withdraw the principal amount at any point of time and without prior permission of OSDMA.
