Table of Contents

Tables

Figures

Acronyms, Abbreviations, and Units

AC	Assistance Commissioner
ADB	Asian Development Bank
AIR	All India Radio
ATI	Administrative Training Institute
BMTPC	Building Materials and Technology Promotion Council
BPL	Below Poverty Land
CBO	Community Based Organization
CHC	Community Health Centers
CMP	Crisis Management Plan
DC	Deputy Commissioner
DDMP	District Disaster Management Plan
DM	Disaster Management
DPR	Detailed Project Report
DRR	Disaster Risk Reduction
EE	Executive Engineer
EOC	Emergency Operation Center
GHPS	Govt. Higher Primary School
GP	Gram Panchayat
HRVC	Hazard Risk Vulnerability and Capacity Analysis
IDA	International Development Association
IMD	India Meterological Department
INCOIS	Indian National Centre for Ocean Information Services
IP	Investment Proposal
KSDMA	Karnataka State Disaster Management Authority
KSNDMC	Karnataka State Natural Disaster Monitoring Centre
NCRMP	National Cyclone Risk Mitigation Project
NDMA	National Disaster Management Authority
MCC	Mangaluru City Cooperation
MPCS	Multi-Purpose Cyclone Shelter
Mts	Meters
NCRMP	National Cyclone Risk Mitigation Project
NH	National Highway
NIDM	National Institute of Disaster Management
NIMHANS	National Institute of Mental Health and Neuro Sciences
PHC	Primary Health Centre
PRED	Panchayat Raj Engineering Department
PWD	Public Works Department
PSC	Project Steering Committee
SDMP	State Disaster Management Plan
SEC	State Executive Committee
SEOC	State Emergency Operation Center
TMC	Taluk Municipal Council
TP	Taluk Panchayat
UNDP	United Nations Development Programme
WB	World Bank

Executive Summary

The National Cyclone Risk Mitigation Project has been drawn up with a view to address the cyclone risks in the country, with World Bank assistance. The main objectives of the project are to minimize risk and vulnerabilities to cyclones, to strengthen the structural and non-structural cyclone mitigation efforts and to build capabilities and capacities of people for cyclone risk mitigation in harmony with the conservation of coastal ecosystems in coastal cyclone hazard prone States and Union Territories.

The three districts of Karnataka- Uttara Kannada, Udupi and Dakshina Kannada have been identified as most vulnerable to cyclones owing to their coastal nature. These three districts have a total population of about 5 million and account for approximately 7.69% of the total population of the state. The three districts have a total of 23 urban areas which comprise of one municipal corporation, four city municipal councils, eight town municipal councils and ten town panchayats, housing about 35% urban population of these districts. Uttara Kannada and Udupi district have 70% of their population living in the rural areas. Dakshina Kannada on the other hand has almost equal division of populace in its rural v/s urban areas.

Apart from two major infrastructure facilities in these districts namely the Mangaluru Port and Kaiga Power plant in Uttara Kanada, the region also has smaller settlements which sustain agricultural and fishing communities who largely live closer to nature and are vulnerable to hazards from cyclone. The region has small coastal towns and cities with councils which reflect the rich and diverse heritage of coastal Karnataka-Udupi, Bhatkal, Karwar, Gokarn to name a few. The region is also developing as a well-recognized educational hub with educational institutes of national repute, such as National Institute of Technology (NIT) in Dakshina Kannada district and Manipal group in Udupi district. In absence of any natural hazard mitigation measures presently, the large population on the coastal districts is exposed to credible threat to life, property and its livelihoods. In absence of critical life-saving infrastructure in these districts, a cyclone event can affect the life and livelihood of population not only residing in these areas but would also have an impact on the whole state. The people living in the rural areas will be impacted adversely along with this numerous fishing communities which may get even wiped out.

In addition to the threat of cyclones and winds, the State and its coastal regions are also susceptible to secondary hazards of flooding, coastal erosion and landslides. The region requires a disaster mitigation intervention that would encompass the risk within its developmental perspective. The State Government of Karnataka has also been looking at raising funds for additional infrastructure provisioning and improvement through other projects, for instance Asian Development Bank loans and other grants, to spur growth in this coastal region.

The mitigation efforts in these three districts will aim towards the following risk reduction approach to the relevant target groups:

- Reduction of risk to life and injuries to half a million people residing in the three coastal districts.
- Improve preparedness and response capacities at all levels of the community, Government and all stake holders.
- Prevents ingress of saline water into agriculture fields, thus saving crops.
- Structural mitigation taken up in the project will have a positive impact on local economy.

NCRMP is a centrally sponsored scheme. The Central scheme is being funded by the World Bank as an adaptable programme loan with an IDA credit.

The project has a total financial outlay of Rs.126.6 crores with earmarked fund for component B and D. Components B (Rs.120.6 crores) is being funded by the Central and the State Governments on the ratio of 75:25(IDA will fund Rs. 90.5 crores and Govt. of Karnataka 30.1 crores). The component E (project implementation support) of Rs. 6.0 crores is 100% financed by the IDA credit.

Components	Sector (for 3 coastal districts)	Probable Estimate (Rs. in Crores)
Component-B, Cyclone Risk Mitigation Infrastructure	Construction of MPCS	19.90
	Evacuation/Link roads and bridges/Culvert	85.74
	Saline Embankment	15.36
Component-E	Implementation Assistance	6.00
	Total	127.00

Table 1: Component wise break-up of NCRMP

Abstract of NCRMP Estimation for three Coastal Districts.

Sectoral Activities	Amount in Lakhs			
	Udupi	Dakshina Kannada	Uttara Kannada	Total
Construction of Multipurpose Cyclone Shelter	400.00	240.00	1350.00	1990.00
Construction/improvement of evacuation/link roads and small bridges	3600.00	3015.00	1959.00	8574.00
Construction of saline embankments		245.00	1291.00	1536.00
Total	4000.00	3500.00	4600.00	**12100.00**

Table 2: District wise sectoral estimation of NCRMP

Keeping in view the existing cyclonic hazard in the state as well as the need of a sustainable mitigation infrastructure expected from this proposed project, it is of paramount importance that there is seamless communication and coordination between all stakeholders to make this project a success.

District wise detailed sectoral estimation abstract

Location		Multipurpose Cyclone Shelter		Roads(Evacuation and Link)			Bridges/Culverts		Saline Embankment/Salt Water Exclusion Dam/Check Dam			Total Cost in Lakhs
District	Taluk	No.	Cost in Lakhs	No. of Roads	Length in Km	Cost in Lakhs	No. of Structures	Cost in Lakhs	No. of Structures	Length of embankment in Km	Cost in Lakhs	
Managaluru	Mangaluru	2	240	24	21.62	3015	-	-	3	0.97	245	3500
Udupi	Udupi	1	200	9	10.1	731	2	1035	-	-	-	1966
	Kundapura	1	200	20	28.3	1574	1	260	-	-	-	2034
Uttara Kannada	Karwar	2	400	9	5.27	409	-	-	5	1.4	271	1080
	Ankola	2	350	8	4.03	313	-	-	11	0.895	315	978
	Kumta	1	200	3	10.15	333.4	-	-	2	4	300	833.4
	Honnavar	1	200	12	17.54	458.6	-	-	2	2.2	220	878.6
	Bhatkal	1	200	12	12.99	445	-	-	2	1	185	830
	Total	**11**	**1990.00**	**97**	**110**	**7279.00**	**3**	**1295.00**	**25**	**10.46**	**1536.00**	**12100.00**

Table 3: Detailed Sectoral estimation (district-wise)

1. Karnataka Profile

The State of Karnataka is located within 11.5 degree North and 18.5 degree North latitudes and 74 degree East and 78.5 degree east longitude. It is situated on a tableland where the Western and Eastern Ghat ranges converge into the Nilgiri hill complex, in the Western part of the Deccan Peninsular region of India. The State is bounded by Maharashtra and Goa States in the North and North-West; by the Arabian Sea in the West; by Kerala and Tamil Nadu States in the South and by the States of Andhra Pradesh and Telangana in the East and North-East.

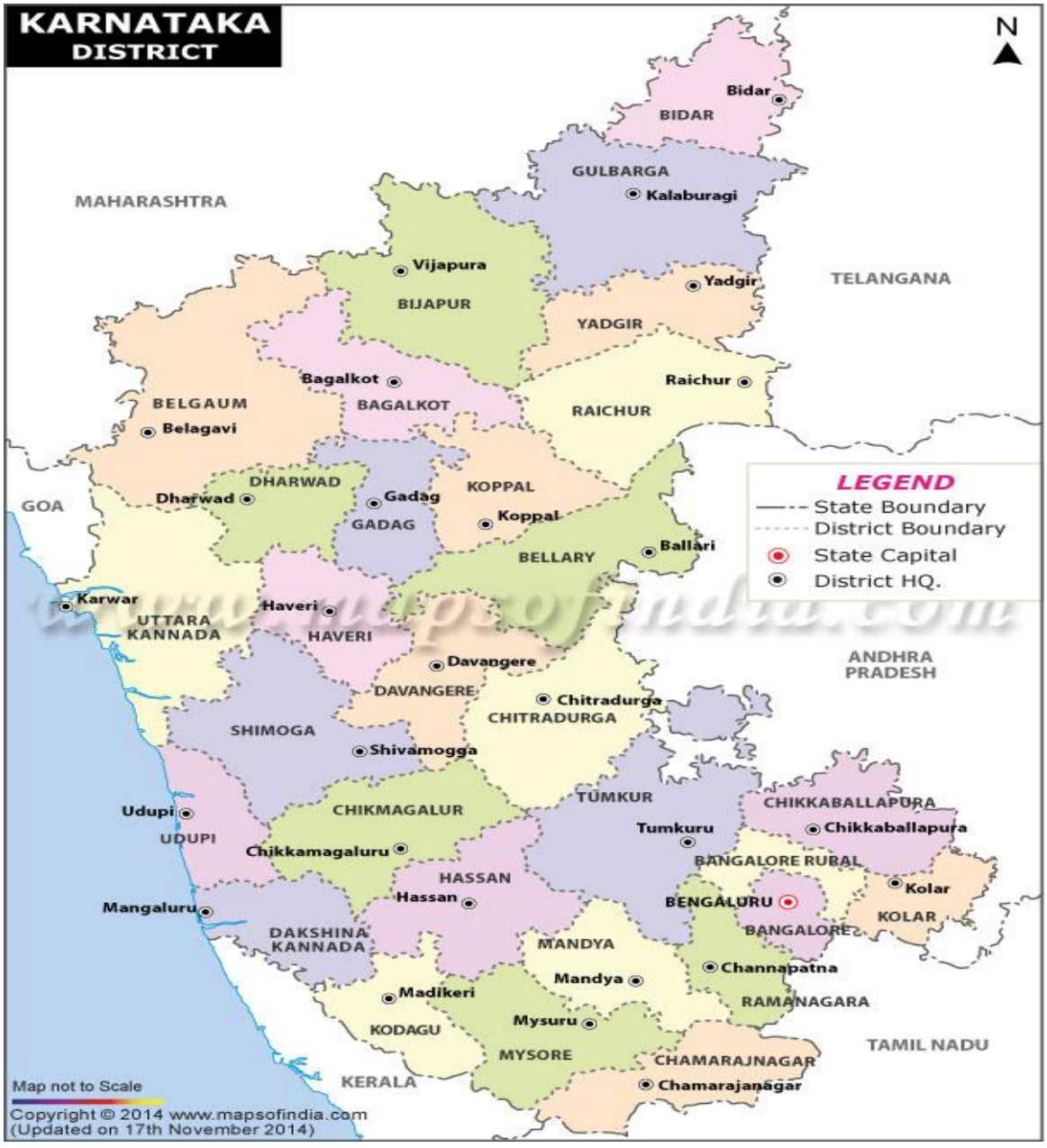

Figure 1: Karnataka State Map

Karnataka extends to about 750 km from North to South and about 400 km from East to West.

1.1 Overview of Karnataka

Indicators	Karnataka	Comparison with the Country
Area	191,791 Km2	5.82%
Total Forest Cover	38,284 Km2	4.91%
Gross Cropped Area	12,893,000 hectares	6.55%
Net Sown Area	10,419,000 hectares	7.38%
Livestock	32.8 million	6.20%
Food grain production	12,500,000 tones	6 %
Rainfall (annual average)	1151 mm	
Literacy Rate	75.1%	

Table 4: General Profile

Socio-Economic Profile per 2011 Census:

Description	2011
Population	6.1 Crores
Population Growth	15.67
Population Density/sq. km	319
Male	31,057,742
Female	30,072,962
Sex Ratio	968
Percentage of total population compared to whole country	5.05%
Literacy	75.60 %
Male Literacy	82.85%
Female Literacy	68.03%

Table 5: Demographic Details

Land Use Pattern in Karnataka:

Classification of Land	Area in lakh hectares
Total geographical area	190.50
Forest	30.72
Fallow Land	17.67
Land put to non-agricultural uses	13.70
Barren and uncultivable land	7.88
Cultivable waste Land	4.15
Uncultivated land	12.20
Net area under sown	104.19
Total cropped area	128.93

Table 6: Land Use Pattern

1.2 Geology of Karnataka

Landforms of Karnataka: The state has three principal physical zones.

- The coastal strip, called Karavalli, between the Western Ghats and the Arabian Sea, which is lowland, with moderate to high rainfall levels. This strip is around 320 km in length and 48–64 km wide. Sometimes it starts raining in the month of May.
- The Western Ghats, called Malenadu, a mountain range inland from the Arabian Sea, rising to about 900 m average height, and with moderate to high rainfall levels.
- The Deccan Plateau, called Bayalu Seeme, comprising the main inland region of the state, which is drier and verging on the semi-arid. The humidity in these plains or maidans never exceeds 50%.

There are four main types of geological formations in Karnataka:

- The Archean complex made up of Dharwad schists and granitic gneisses: These cover around 60% of the area of the state and consist of gneisses, granites and charnockite rocks.
- The Proterozoic non-fossiliferous sedimentary formations of the Kaladgi and Bhima series: The Kaladgi series has horizontal rocks that run for 160 km in the districts of Belgaum, Raichur, Dharwad and Bijapur districts. The Bhima series that is present on either side of the Bhima River consists of rocks containing sandstone, limestone and shale and this is present in the Gulbarga and Bijapur districts.

- The Deccan trappean and intertrappean deposits: This is a part of the Deccan traps which were formed by the accumulation of basaltic lava. This is made up of greyish to black augite-basalt.
- The tertiary and recent laterites and alluvial deposits: Laterite capping is found over the Deccan Traps and was formed after the cessation of volcanic activity in the early tertiary period. These are found in many districts in the Deccan plateau and also in the coast.

The common types of soil groups found in Karnataka are:

- Red soils: Red gravelly loam soil, Red loam soil, Red gravelly clay soil, Red clay soil.
- Lateritic soil: Lateritic gravelly soil, Lateritic soil.
- Black soils: Deep black soil, Medium deep black soil, Shallow black soil.
- Alluvio-Colluvial Soils: Non-saline, saline and sodic.
- Forest soils: Brown forest soil.
- Coastal soils: Coastal laterite soil, Coastal alluvial soil.

1.3 Climate:

The varying geographic and physiographic conditions of the State is responsible for the climatic variation in the State from arid to semi-arid in the plateau region, subhumid to humid tropical in the Ghats and humid tropical monsoon type in the west coast plains. Karnataka experiences a typical tropical climate comprising of four distinct annual seasons: Winter (December to February), summer (March to May), monsoon (June to September), and post-monsoon (October to December).

As per Koppen's classification, the State witnesses three climatic types. The tropical monsoon covers the entire coastal belt and the adjoining areas. The southern half of the State, outside the coastal belt experiences hot, seasonally dry tropical savana climate. The remaining regions of the Southern half of the State experiences hot, semi-arid, tropical steppe type of climate.

1.4 Rainfall Pattern

The State receives 80% of the annual rainfall in the southwest monsoon period, 12% in the post-monsoon period, 7% in the summer and only 1% in winter. The coastal region, on the windward side of the Ghats, receives 3350 mm of rainfall during the southwest monsoon. On

the leeward side of the Ghats the rainfall drops to as low as 600-700 mm. The northeastern monsoon currents affect the eastern part of south interior Karnataka, accounting for 30% of annual rainfall in this region, during October to December. The rainfall increases over and near the Ghats but decreases towards the West Coast.

1.5 Administrative Division

Karnataka State has been divided into four Revenue divisions headed by Regional Commissioners which comprises 30 districts headed by Deputy Commissioners; 49 sub-divisions headed by Asst. Commissioners; and 176 talukas headed by Tahsildars. The jurisdictions of the Revenue Divisions are as follows:

Name of the Revenue Division	Jurisdictional Districts	Headquarter of Revenue Division
Kalaburagi	Kalaburagi, Ballari, Bidar, Koppal, Raichur, and Yadgiri	Kalaburagi
Belagavi	Belagavi, Bagalkot, Vijayapura, Dharwad, Gadag, Haveri, Uttara Kannada	Belagavi
Mysuru	Mysuru, Udupi, Chamarajanagar, Chikkamagaluru, Dakshina Kannada, Hassan, Kodagu, Mandya,	Mysuru
Bengaluru	Bengaluru Urban, Bengaluru Rural, Bengaluru Urban, Chikkaballapura, Kolar, Ramanagara, Tumakuru, Shivamogga, Chitradurga, Davanagere	Bengaluru Urban

Table 7: Revenue Divisions

Local Bodies	No. of bodies
Zilla Panchayats (ZP)	30
Taluk Panchayats (TP)	176
Municipalities and Corporation	219
Gram Panchayats	5627

Table 8: Local bodies break-up

1.5.1 Administrative Setup in the State

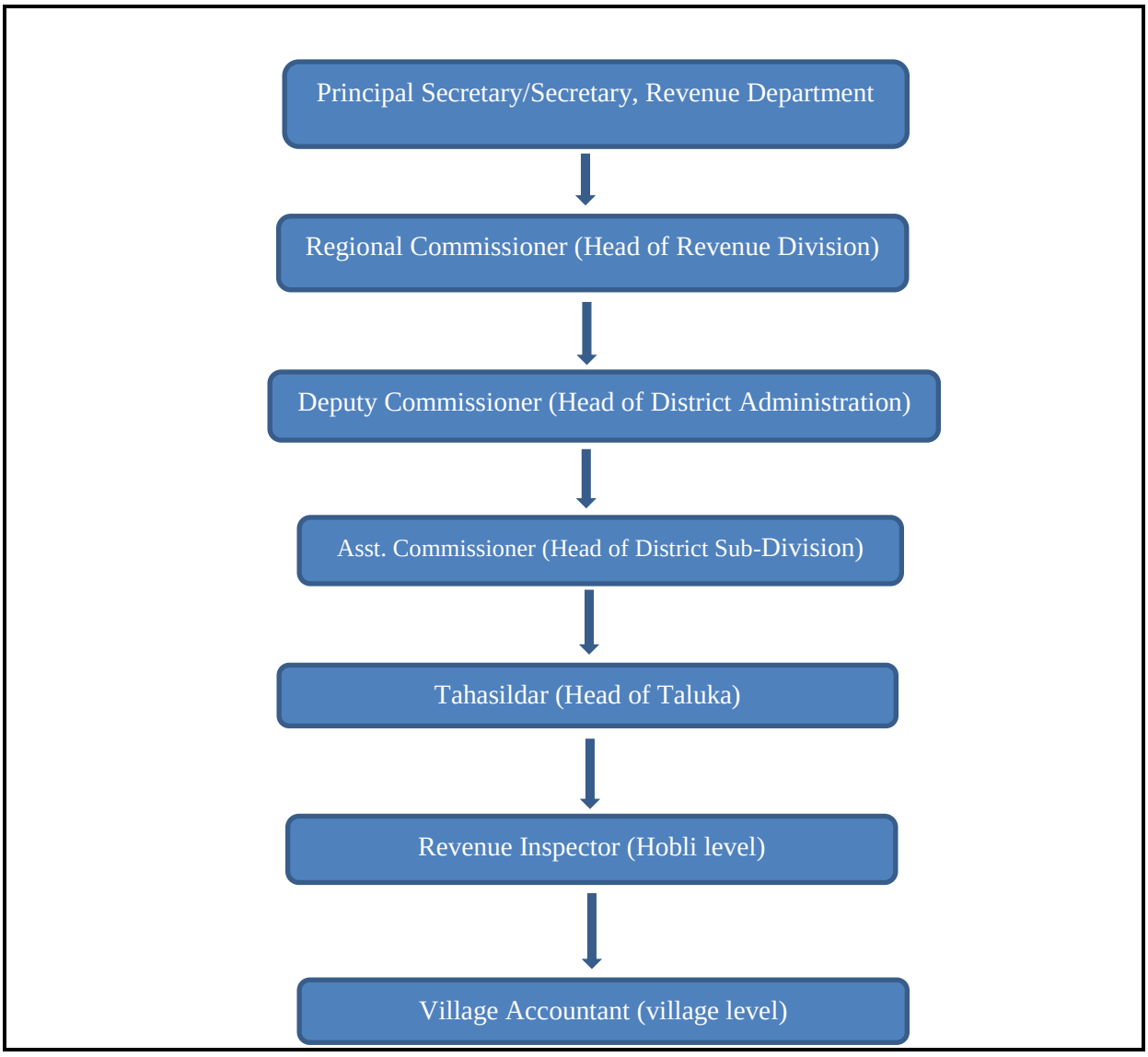

Figure 2: Administrative Setup

1.6 Macro-Economic Profile

Karnataka's Gross State Domestic Product (GSDP) at constant (2004-05) prices is expected to grow at 5.0% and reach Rs. 311628 crore in 2013-14. Karnataka has made notable progress in all sectors during the course of the 11th five year plan. As far as overall growth is concerned, the increase in State Income has been satisfactory inspite of the global slowdown in recent years. The increase in State Gross Domestic Product was 6.9% during the 11th Plan. The agriculture sector has particularly performed well by achieving a growth of 5.1% during the 11th Plan period. While the growth in the services sector was satisfactory at 8.7%, the industrial sector was able to record a growth of 4.8% during the 11th Plan. The major factor for the slow growth in the industrial sector was the global slowdown witnessed since the

beginning of 2008. Due to an uncertain and challenging macro-economic situation globally and nationally, and the widespread drought situation in the State, the economy could not grow at the pace as planned during the 11th five year plan.

Karnataka Human Development Index (consumption based) is 0.519 and is ranked 12th in the country.

1.7 Agriculture, Horticulture, and Animal Husbandry

Agriculture: Farmers and agricultural labourers account for nearly 57% of the Karnataka's workforce. The state has ten agro-climatic zones and observes three growing seasons.

Kharif: April to September; Accounting for 70% of the annual food grain and oilseed production; Major crops are millets, paddy, maize, pulses, groundnut, red chillies, cotton, Ragi, Soybean, sugarcane and turmeric; Cultivated area about 70 lakh hectares;

Rabi: October to December; Accounting for 22% of the annual food grain and 15% of the oilseed production; Major crops are wheat, barley, mustard, sesame, and peas; Cultivated area about 30 lakh hectares;

Summer: January to March; Accounting for 8% of the annual food grain and 15% of the oilseed production; Cultivated area about 6 lakh hectares.

Horticulture covers a sowing area of 18.9 lakh ha with a production of 136.6 lakh tonnes. Fruits (mango, banana, papaya, grapes, sapota etc.) contribute 41.9%; vegetables (potato, tomato, onion, brinjal etc.) contribute 45.3%; spices (ginger, dry chillies etc.) contribute 6.1%; while the rest is shared by plantation crops (coconut, areca nut etc.) and flowers (marigold, jasmine, rose etc.).

Animal Husbandry: Karnataka has a livestock population of 30.7 million and a poultry population of 42.4 million. Livestock plays a significant role in the Indian economy and contributes between 15% and 40% of the total income of farm households. Karnataka is ranked at 10th and 3rd in the country in milk and egg production respectively. About 38% of the rural households have livestock and or poultry contributing significantly to their livelihood.

1.8 Effect of Natural Disasters on Economy

Disaster is a development issue: Natural disasters will dampen growth, by destroying capital and diverting resources (planned expenditure) towards relief and reconstruction. Natural disasters will deplete the household savings and possessions thus rendering community financially vulnerable. State is chronically drought prone and also prone to flooding and landslides due to heavy rain. Drought and Flooding have caused huge losses to farmers and infrastructure. Natural disasters have had a deleterious effect on Karnataka's economy.

2. Ecology

Forest and Bio-Diversity: About 20% of Karnataka's geographical area is under forest cover. The Western Ghats are among the 25 global biodiversity hotspots. Likewise the coastal area has a rich and diverse biodiversity. A large number of species are identified as rare, endemic or threatened in both biota. Reserve forest constitutes 74.9% of the state's forests, protected forest 10.3% and unclassified forest 14.8%. Very dense forest covers 1,777 km2, accounting for 0.93% of Karnataka's geographical area. Moderately dense forest covers 20,181 km2 (10.5%), open forest 14,232 km2 (7.4%) and scrubs 3,167 km2 (1.7%).

2.1 Coastal Biodiversity

The state has a rich biodiversity supporting a number of ecological functions in the coastal eco-systems including livelihood opportunities to millions of people. Karnataka's coastline has numerous river mouths, lagoons, bays, creeks, cliffs, sand dunes and long beaches. The shelf off Karnataka has an average width of 80 kilometres and the depth of the shelf break is between 90 and 120 meters. There are 26 estuaries with more than 70,000 ha water spread area and 8,000 ha of brackish water area, making the coastal line of Karnataka very rich in marine, estuarine and riverine biodiversity. The Western Ghats, which run parallel to the coastline, are indeed an integral part of the coast. Fourteen rivers which originate in here run westward and join the Arabian Sea. These rivers carry silt and organic debris from the forested hinterland into the estuarine areas and the coastal sea and contribute greatly to the productivity and diversity of the coastal ecosystems. The tides travel long distances, even 20-30 km interior, through many of these rivers, making the saline aquatic habitat suitable for several marine and estuarine organisms. Important estuaries include Netravati, Gurpur,

Mulki, Hangarkatta, Gangolli, Sharavathi, Aghanashini, Gangavali and Kalinadi. The forests of the hinterlands, almost 20 to 30 km interior, were considered during the British period as 'inner coastal zone'. The commercial exploitation of coastal resources is causing irreparable damage to regeneration of coastal vulnerable resources. These are subjected to severe threats due to anthropogenic pressures in the coastal areas over the years. Many anthropogenic activities have led to the loss of biodiversity. There are few islands of the coast such as St. Mary's Island four kilometres off Malpe.

Coastal areas are among the most productive and important habitats of the biosphere, including estuaries, backwaters and coastal wetlands. There are 14 coral species and 4 sponge species found in this region such as *Dendrophyllion* sp. *Turbinana* sp, Goniastrea pectinatu che. Small gaint clams *(Tridacna maxiona)* are protected under the Indian Wildlife Protection Act. There are about 62 phytoplanktons and 78 species of sea weeds *(sangassam ilicifolium),* two species of sea grass, 115 zooplankton such as *Acartia clausii,Acrocalanus gibber, Euphausia diomedeae, Stylocheiron armatum* are found along the Karnataka coasts apart from 234 species of *Mollusce* out of which three are threatened *(Tridacna maxima, Lambis chiragra* and *placenta).* 33 species of shrimps were first recorded on Karnataka coasts recently. 103 species of crabs, five species of starfish, two species of sea urchins, one species of sea cucumber have been observed along the coasts. 390 marine fish species, three sea turtle species, four whale species and four dolphin species are commonly seen along the coasts.

Figure 3: Coastal Biodiversity

2.2 Coastal Zone

Karnataka's coast comprises of 3 districts with 320 kilometres coastline along the Arabian Sea; Dakshin Kannada (62 km of coastline), Udupi (98 km) and Uttara Kannada (160 km). There are three distinct agro-climatic zones ranging from coastal flatlands in the west with undulating hills and valleys in the middle and high hills in the east. There is a narrow strip of coastal plains with varying width between the hills and the Arabian Sea, the average width being 50 to 80 km. The average height of the hinterland is 70 to 75 metres but in some places it is as high as 150 metres. The abrupt rises at the eastern flanks form the Western Ghats. The northern parts of the Ghats are of lower elevation (450-600 metres) as compared to the southern parts (900 to 1,500 metres). The exploitation of natural resources (fisheries, sand mining etc.) and proliferation of industries (petrochemical, fertilizers etc.) have put extreme pressures on the coast of the state.

Coastal zone consisting of 14 coral species, four sponge species, 62 phytoplankton, 78 species of seaweeds, two species of sea grass and 115 zooplanktons. Also, 234 species of molluscs are present out of which three are threatened. About 33 species of shrimps, 103 species of crabs, 5 species of star fish, two species of sea urchins, one species of sea cucumber, 390 marine fish species, three species of sea turtles, four species of whales and four species of dolphins are commonly seen along the coasts. There is a rich coral reef ecosystem surrounding Netrani Island. The coast has 14 species of mangroves belonging to eight families including Rhizophora mucronata, Avicennia marina, Avicennia officinalis, Bruguiera cylindrica, Rhizophora apiculata, Sonneratia alba among others.

Karnataka's coastline extends over a length of 320 kilometers. It is one of the most indented shoreline with numerous river mouths, lagoons, bays, creeks, promontories, cliffs, spits, sand dunes and long beaches. Unlike the east coast of India the coastal stretch of Karnataka has no major delta formations. The shelf off Karnataka has an average width of 80 kilometers and the depth of shelf break is between 90 and 120 meters. There are a few islands off the coast, the major group being St. Mary's Island, 4 kilometers off the coast near Malpe.

Fourteen rivers drain their waters into the shore waters of Karnataka. The important estuaries include the Netravati-Gurpur, Gangolli, Hangarkatta, Sharavthi, Aganashini, Gangavali and Kalinadi. Sand bars have developed in most of the estuaries. There are a number of barrier spits at Tannirbavi, Sasithitlu, Udyavara, Hoode, Hangarkatta and

Kirimanjeswara formed due to migration of coastal rivers. There are also 90 beaches with varying aesthetic potential. Among these, the beaches at Someshwar-Ullal, Malpe, St. Mary's Island, Belekeri and Karwar are excellent with a potential for international tourism. Twenty-two beaches are classified as unfit for use due to coastal erosion, human settlements and activities linked to ports/harbors, industries and fisheries.

2.3 Socioeconomics of the coastal zone

Coastal Karnataka has eight maritime taluks: one in Dakshina Kannada district (Mangaluru), two in Udupi district (Udupi and Kundapur) and five in Uttara Kannada district (Bhatkal, Honnavar, Kumta, Ankola and Karwar). The coast has 22 urban agglomerations and 1,044 villages. The area's average population density is 253 persons/km2 (337 in Dakshina Kannada, 290 in Udupi and 132 in Uttara Kannada). The area is predominantly agrarian involving about 60% of the workforce. More than 70% of cultivated land is under cereals with rice as the principle crop. Fishing is one of the major sources of livelihood with about one lakh people directly engaged in it and another two lakh in associated work. In addition, industrial activities have also recorded a rapid growth providing direct employment to nearly two lakh people. Similar to problems across the globe, the situation is no different in Karnataka – industrialization, improper land use, unsustainable economic activities and overexploitation of natural resources have adversely affected the coastal environment. Effluents and emissions discharged by large industries and power plants, unregulated tourism and intensive aquaculture have negatively affected the coastal environment. Decline in mangroves and coastal wetlands have eroded its pollutant-filtering capacity.

Fishing is a major source of livelihood with about three lakh people directly or indirectly engaged. Within the agriculture sector, the share of fisheries is increasing albeit marine fish production has witnessed considerable variation. Though the coastal hinterland has an average height of 70 to 75 meters, studies have estimated that, if the present trend continues sea levels could rise by 25 cm in 100 years, inundating around 461 km2 of coastal wetlands. Exacerbated by sand mining, erosion has been found to be significant. Likewise, encroachments and coastal pollution are notable.

3 Cyclone Hazard, Vulnerability and Risk Assessment

3.1 Cyclone Hazard and Vulnerability

The coastal districts namely Dakshina Kannada, Udupi, Uttara Kannada with a coastal line of 320 kms and coastal population of 43.64 Lakhs are under the direct threat of cyclones and severe cyclones originating in Arabian Sea and indirect attack of cyclones originating along the Eastern coastline. The high density of population along the coastline of Karnataka has made the population highly vulnerable to the storm surge and high speed wind accompanied with cyclone. Any severe cyclone along the eastern coastline causes heavy rainfall in the interior Karnataka region resulting in damages to crops, buildings, and infrastructure services such as roads and often the impact would be severe disruption in the socio-economic life in these regions. Infrastructure such as rail and road networks which are adjacent to the sea coast are constantly threatened by the erosion caused by giant sea waves particularly during storm surges and cyclones The state is incurring huge expenditure almost every year on prevention of coastal erosion for the 320 Kms of coastal line. The State has been placed under Category P3 (moderate) in terms of proneness to cyclone along with states of Maharashtra and Kerala. Generally, cyclones affect these areas during October to November.

Apart from coastal erosion, the coastal areas are facing disasters such as boat capsizing due to extreme weather conditions in the sea. Impact of cyclone is severe on people under below poverty line, women, elderly people, disabled and children.

Vulnerability of Cyclone in Coastal Karnataka

Cyclone	Potential Impact	Vulnerability	Vulnerable Taluks
	Loss of human and animals	Vulnerable groups: Handicapped, women, elderly people, sick people, lower income group and children.	Mangaluru, Kundapura, Udupi, Karwar, Ankola, Kumta, Honnavar, Bhatkal
	Damage to crop and infrastructure	Farmers and vital infrastructure like schools, hospitals,	

		roads, bridges, houses, etc	
	Damage to houses, livelihood systems	People living within the vicinity of the coast.	
	Severe stress and psychological disorders	Affected People	

Additionally, both the areas along coastline and interior regions can be affected by gusty winds which can cause damage to property, damage to crops, collapse of trees and in turn threatening lives of people including fishermen, livestock, ships and barges, boats, fishing trawlers at ports. If cyclonic winds are accompanied by heavy rainfall then there is possibility of flooding in low lying areas.

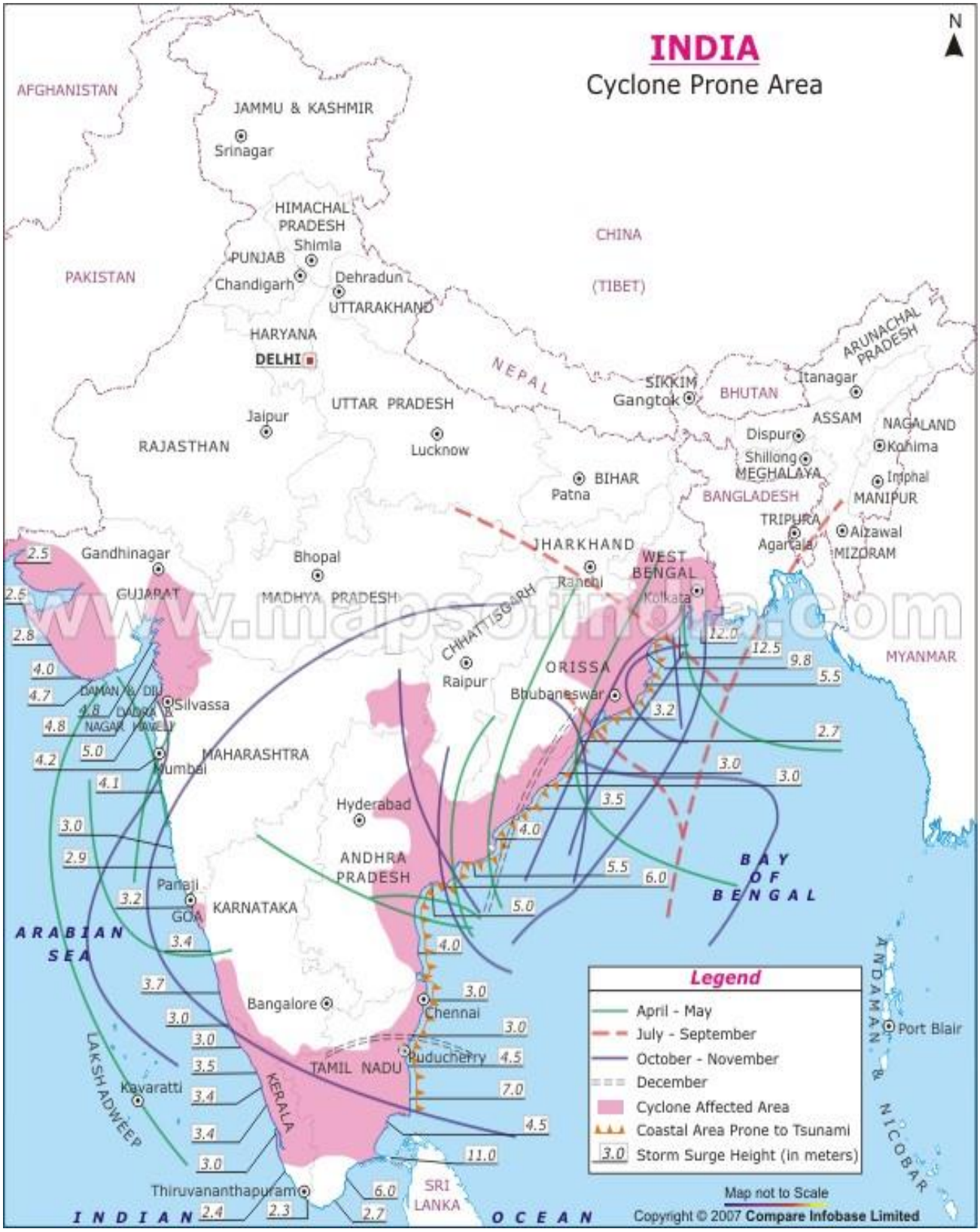

Figure 4: Cyclone Prone Map of India

3.2 Cyclone Proneness of Karnataka

As per " Cyclone Hazard Prone Districts of India: A report" prepared by NDMA and IMD, the coastal district of Karnataka are in Moderate proneness category. Data regarding to the same is as follows:

List of vulnerable districts of Karnataka for Cyclone wind and coastal/inland floodings

District	Wind and Cyclone	Coastal/Inland Flooding
Udupi	M	-
Uttara Kannada	M	-
Dakshina Kannada	M	-

M: Moderate

Cyclone Prone Districts of Karnataka

District	No. of Severe Cyclone	Total No. of Cyclone (Rating)	Wind Speed(Rating)	PMSS (Rating)	PMP (Rating)	Mean Rating	Category of Proneness
Udupi	0	3	5	7	-	3.7	P3
Uttara Kannada	0	3	5	7	-	3.7	P3
Dakshina Kannada	0	3	5	7	-	3.7	P3

PMSS: Probable Maximum Strom Surge, PMP: Probable Maximum Precipitation

Rating Criteria

Category of Proneness	Rating		Total No. of Cyclone	Rating		Wind Speed Kmph	Rating
Low (P4)	≤ 3.0		1 – 5	3		62 – 87	3
Moderate(P3)	3.1 – 5.0		6 – 10	5		88 – 117	5
High (P2)	5.1 – 7.0		11 - 15	7		118 – 167	7
Very High (P1)	7.1 – 10.0		> 6	10		168 - 221	10

PMSS (meter)	Rating
0 - 2.0	3
2.1 – 4.0	5
4.1 – 6.0	7
>6	10

3.3 Coastal Erosion

The primary causes of coastal erosion in any given region are generally wave action, the interception of littoral drift, sea level and river mouth changes and sand mining. About 30% of the area of the coastal zone is subjected to moderate soil erosion and 16% of the area to severe soil erosion. The annual rates of soil erosion vary from 5-15 tons per hectare (t/ha) to 15-40 t/ha in moderate to severe soil erosion areas. The problem is relatively more severe in Dakshina Kannada and Udupi coasts. The erosion becomes severe due to the synchronization of high floods in rivers with strong wave activity during the southwest monsoon. The most affected locations are Kundapur, Kodi, Hangarkatta, and Bengere. Erosion and bank collapse in the tidal reaches of rivers is also severe and extends at least to about 12 km. This has also been noticed in the Haladi river, Sitanadi near Mabukal and Ullal of Netravathi riverbank.

The problem is more severe in Dakshina Kannada and Udupi coasts where about 28% of the stretch is critical. In Uttara Kannada region about 8% of the coast is subjected to severe erosion.

3.4 Coastal Pollution

Fish and fish oil industries at present discharging effluents directly into the sea or backwaters. The solid waste dumping yard of Mangaluru has an area of 28.3 hectares. It is estimated that about 300 tons per day solid waste is generated in Mangaluru of which 200 t/d are collected and landfilled. At Udupi, the solid waste generation is of the order of 8 t/d of which 5 t/d are disposed at unsecured landfills with an area of 6 acres. The near shore and estuarine waters are subjected to pollution due to several reasons such as inadequate sanitary measures in adjacent areas, port activities, effluent discharge from industries, dumping of fish wastes etc. Marine pollution here generally extends up to 5 km.

3.5 Salinity

Instances of saline water intrusion have been recorded on the coast due to sea erosion and tidal influx in the estuary. Coastal alluvial aquifers are highly permeable and are in hydraulic continuity with sea/estuarine water. The intrusion of saline water into groundwater aquifers and the ingression of seawater to rivers/estuaries are adversely affecting the availability of intrusion is the poor quality of bund constructions causing breaches. To address this problem,

Government of Karnataka initiated the construction of sea walls to prevent saltwater entry into the paddy fields. However, walls are in dilapidated state and the problem persists.

4. Institutional Mechanism for Disaster Management in Karnataka

4.1 Institutional Structure

The institutional structure for disaster management in India is in a state of transition after enactment of GOI's Disaster Management (DM) Act 2005. The National Disaster Management Authority has been established at the GoI level, and the SDMA at state and DDMA at district level are formalized. In addition to this, the National Crisis Management Committee, part of the earlier setup, also functions at the Centre. The nodal ministries, as identified for different disaster types of function under the overall guidance of the Ministry of Home Affairs (nodal ministry for disaster management). This makes the stakeholders interact at different levels within the disaster management framework.

There are two distinct features of the institutional structure for Disaster Management in India. Firstly, the structure is hierarchical and functions at four levels – Centre, State, District and Local. Secondly, it is a multi-stakeholder setup, i.e., the structure draws involvement of various ministries, government departments and administrative bodies.

Disaster Management Act, 2005

DM Act provides for the effective management of disasters and for matters connected therewith or incidental thereto. It provides institutional mechanisms for drawing up and monitoring the implementation of the disaster management. The Act also ensures measures by the various wings of the Government for prevention and mitigation of disasters and prompt response to any disaster situation.

The Act provides for setting up of a National Disaster Management Authority (NDMA) under the Chairmanship of the Prime Minister; State Disaster Management Authorities (SDMAs) under the Chairmanship of the Chief Minister of the respective states; District Disaster Management Authorities (DDMAs) under the Chairmanship of Deputy Commissioners at the district level. The Act further provides for the constitution of different Executive Committee at national and state levels. Under its aegis, the National Institute of

Disaster Management (NIDM) for capacity building and National Disaster Response Force (NDRF) for response/rescue purpose have been set up. It also mandates the concerned Ministries and Departments to draw up their own plans in accordance with the National Plan. The Act further contains the provisions for financial mechanisms such as creation of funds for response, **National Disaster Mitigation Fund and similar funds** at the state and district levels for the purpose of disaster management. The Act also provides specific roles to local bodies in disaster management.

State Disaster Management Authority (SDMA) has been constituted by the State Govt. under the chairmanship of Hon'ble Chief Minister and Hon'ble Revenue Minister as Vice chairperson. Composition of Karnataka SDMA is given in table 5.

State Executive Committee (SEC): has been constituted under the chairmanship of Chief Secretary. The composition of SEC is given in table 6. SEC has the responsibility for coordinating and monitoring the implementation of the National Policy, the National Plan and the State Plan as provided under section 22 of the Act.

State Disaster Response Force (SDRF): Karnataka is raising 4 companies of SDRF. SDRF is a hybrid force which consists of personnel from state police, reserve police, and fire and emergency personnel. This force is raised exclusively for rescue and relief operations in times of disasters.

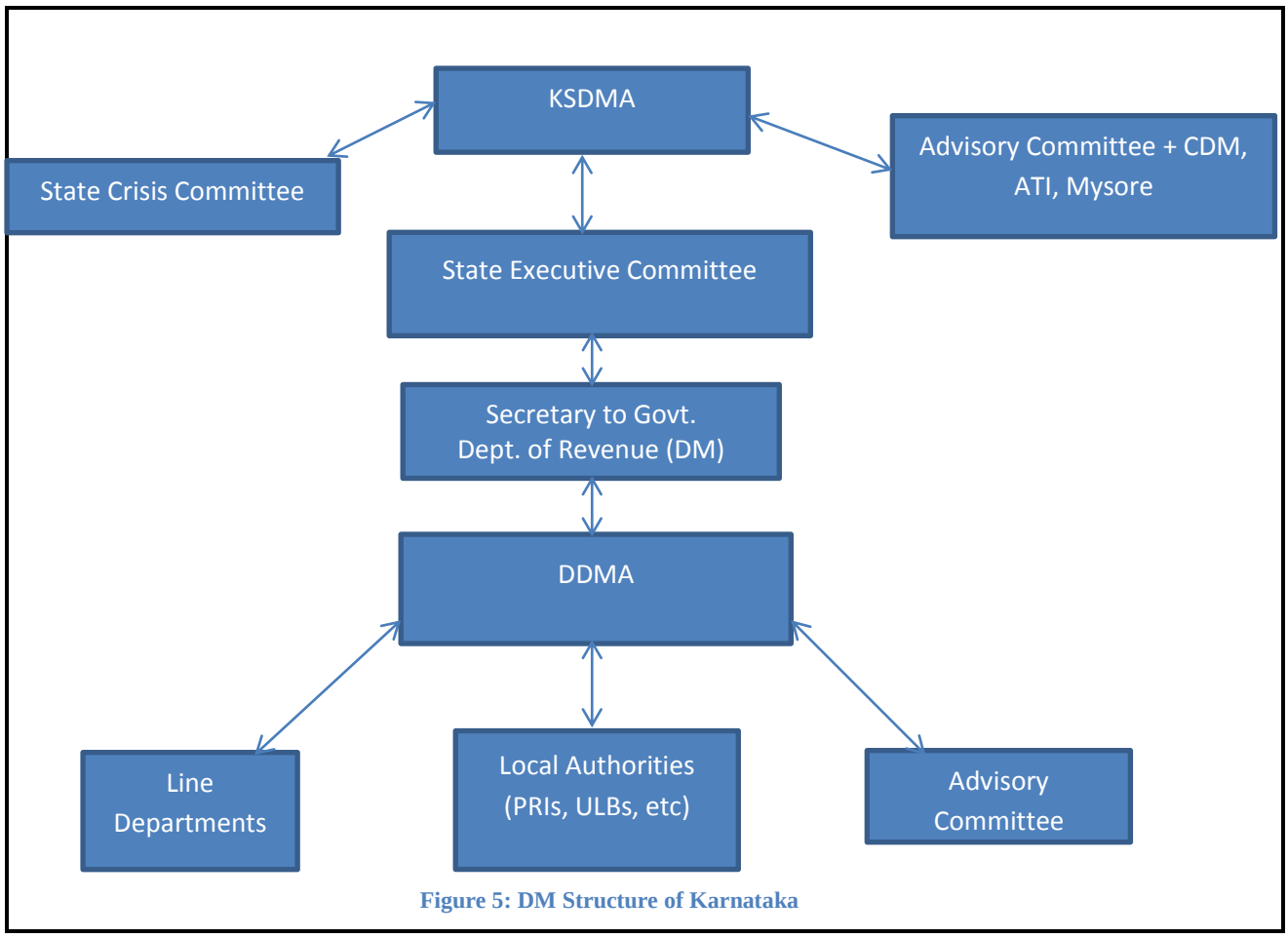

Figure 5: DM Structure of Karnataka

Karnataka State Disaster Management Authority (KSDMA)

Sl. No.	SDMA Members	Designation
1.	Chief Minister of Karnataka	Chairman, Ex-officio
2.	Minister for Revenue	Vice-Chairman
3.	Minister for Home	Member
4.	Minister for Agriculture	Member
5.	Minister for Health and Family Welfare	Member
6.	Minister for Rural Development and Panchayat Raj	Member
7.	Minister for Public Works	Member
8.	Minister for Animal Husbandry	Member
9.	Minister for Housing	Member
10.	Minister for Energy	Member
11.	Chief Secretary (Chairman of SEC)	Chief Executive Officer
12	Secretary, Dept. of Revenue(Disaster Management)	Member Secretary

Table 9: Composition of SDMA

State Executive Committee Composition:

Sl. No	SEC Members	Designation
1	Chief Secretary to Government of Karnataka	Chairperson, Ex-officio
2	Principal Secretary/Secretary to the Government, Rural Development and Panchayat Raj Department	Member
3	Principal Secretary/Secretary to the Government, Agriculture Department	Member
4	Principal Secretary/Secretary to the Government, Home Department	Member
5	Director General of ATI	Member
6	Director KSNDMC	Member
7	Secretary to the Government, Revenue Department (Disaster Management)	Member Secretary
8	Director General of Police and Director General of Fire and Emergency Services, Home Guards, and Civil Defence	Permanent Invitee

Table 10: SEC Composition

4.2 District level Institutions

District Disaster Management Authority (DDMA): Section 25 of the DM Act provides for constitution of DDMA for every district of a state. The District Magistrate/ District Collector/Deputy Commissioner heads the Authority as Chairperson besides an elected representative of the local authority as Co-Chairperson except in the tribal areas where the Chief Executive Member of the District Council of Autonomous District is designated as Co-chairperson. Further in district, where Zila Parishad exist, its Chairperson shall be the Co-Chairperson of DDMA. Other members of this authority include the CEO of the District Authority, Superintendent of Police, Chief Medical Officer of the District and other two district level officers are designated by the state Government.

DISTRICT DISASTER MANAGEMENT AUTHORITY (DDMA).

1. Deputy Commissioner. **Chairman**
2. President Zilla Panchayath Co-Chairman
3. Chief Executive Officer, ZP Member
4. Superintendent Of Police Member
5. District Health Officer Member
6. Executive Engineer, ZP Member
7. Joint Director, Agriculture Dept. Member
8. Addl. Deputy Commissioner Chief Executive Officer of DDMA

4.3 Early Warning System

Nodal agencies monitor the causes of disasters and issue warning bulletins.

Type of Disaster	Nodal Agencies
Earthquake	IMD, KSNDMC (in Karnataka)
Floods	IMD, CWC, KSNDMC (in Karnataka)
Cyclone	IMD and KSNDMC (in Karnataka)
Drought	IMD and KSNDMC (in Karnataka)
Tsunami	INCOIS, IMD
Major Landslides	Geological Survey of India
Epidemics	Ministry of Health and Family Welfare
Chemical Disasters	Ministry of Environment and Forests, Department of Factories, Boilers, Industrial Safety and Health(State Government)
Industrial Accidents	Ministry of Labour, Ministry of Environment and Forests, Department of Factories, Boilers, Industrial Safety and Health(State Government)
Rail Accidents	Ministry of Railways
Air Accidents	Ministry of Civil Aviation
Mining Disasters	Department of Mines
Nuclear Accidents	Department of Atomic Energy
Fire	Ministry of Home Affairs(Fire and Emergency)
Avalanches	Snow and Avalanche Study Establishment
Heat and Cold Waves	IMD and KSNDMC(in Karnataka)

These agencies keep track of developments in respect of specific hazards assigned to them and inform the designated authorities/agencies at National, State and District levels about the impending disasters. All these agencies have guidelines for early warning of disasters.

The warning or occurrence of disaster will be communicated to:

- Chief Secretary, Relief Commissioner, Emergency Operation Center.

- Office of Regional Commissioners.
- The Deputy Commissioner and all district level officials, Municipal Councils.
- The Officials of central government located within the district.
- Minister in charge of the district, MP, Mayor/ZP President, MPs, Local units of the Defence Services.

Information Dissemination flow chart where early warning signals are available

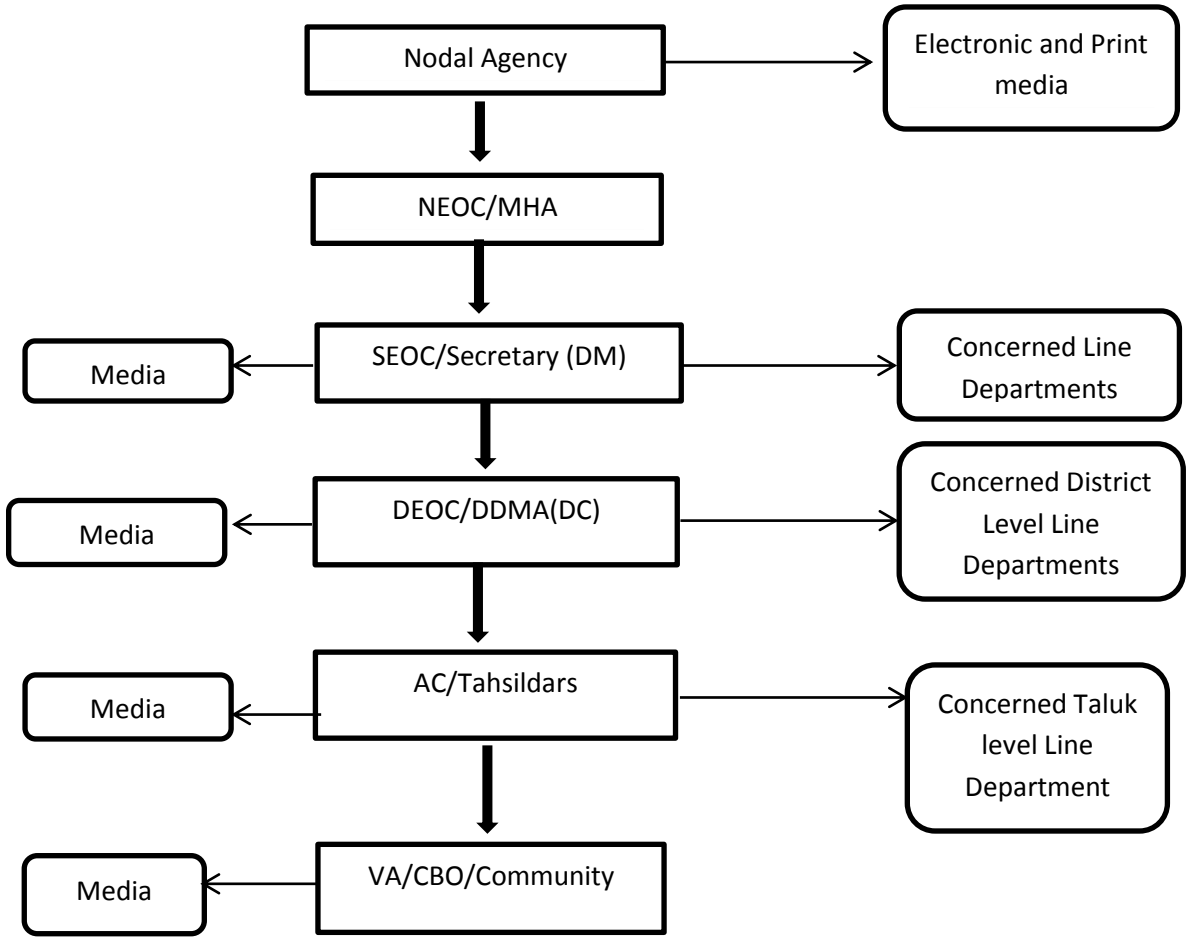

Figure 6: Information Dissemination Flowchart-1

Information dissemination flow chart in absence of early warning system

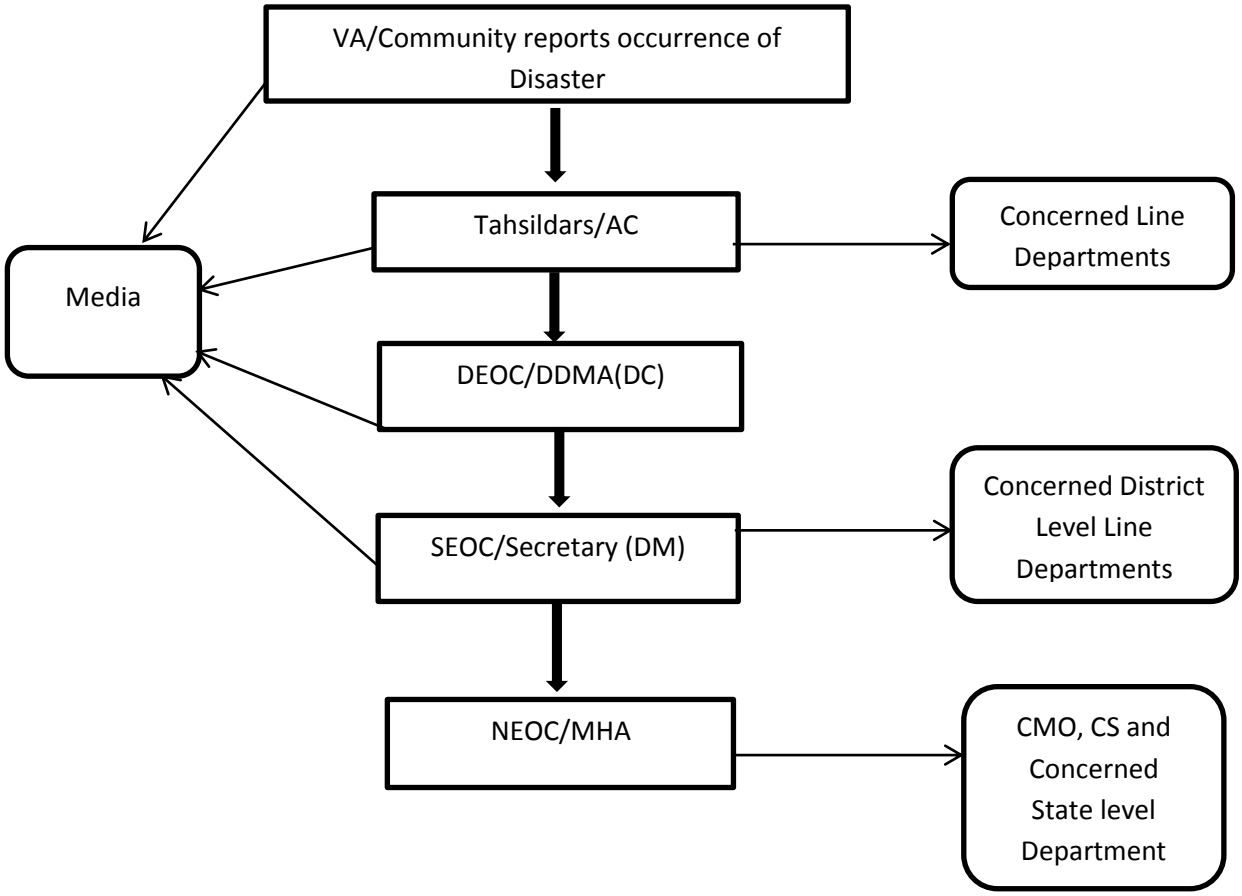

Figure 7: Information Dissemination Flowchart - 2

4.4 Karnataka State Natural Disaster Monitoring Center (KSNDMC)

KSNDMC is a state-of-art center natural disaster monitoring which is a registered society of Government of Karnataka with a mandate to achieve following objectives.

- Hazard mapping and vulnerability studies.
- Strengthening of information technology for Natural Disasters Management.
- Monitoring and impact assessment of natural hazards.
- **Natural Disaster early warning system**.

Information, reports, advisories are being disseminate through mobile phones, e-mail and web portal to DC's, CEO's. HQA's, AC's, Tahsildars, JD's (Agri), AD's (Agri), Agri Officers, SP's, Raitha Samparka Kendras, farmers facilitators under Bhoochethana Program,

Krishi Vigyana Kendras (KVKs), Universities, Civil Defense, Homeguards, Print and Electronic Media.

Figure 8: KSNDMC Master Control Centre, Bengaluru

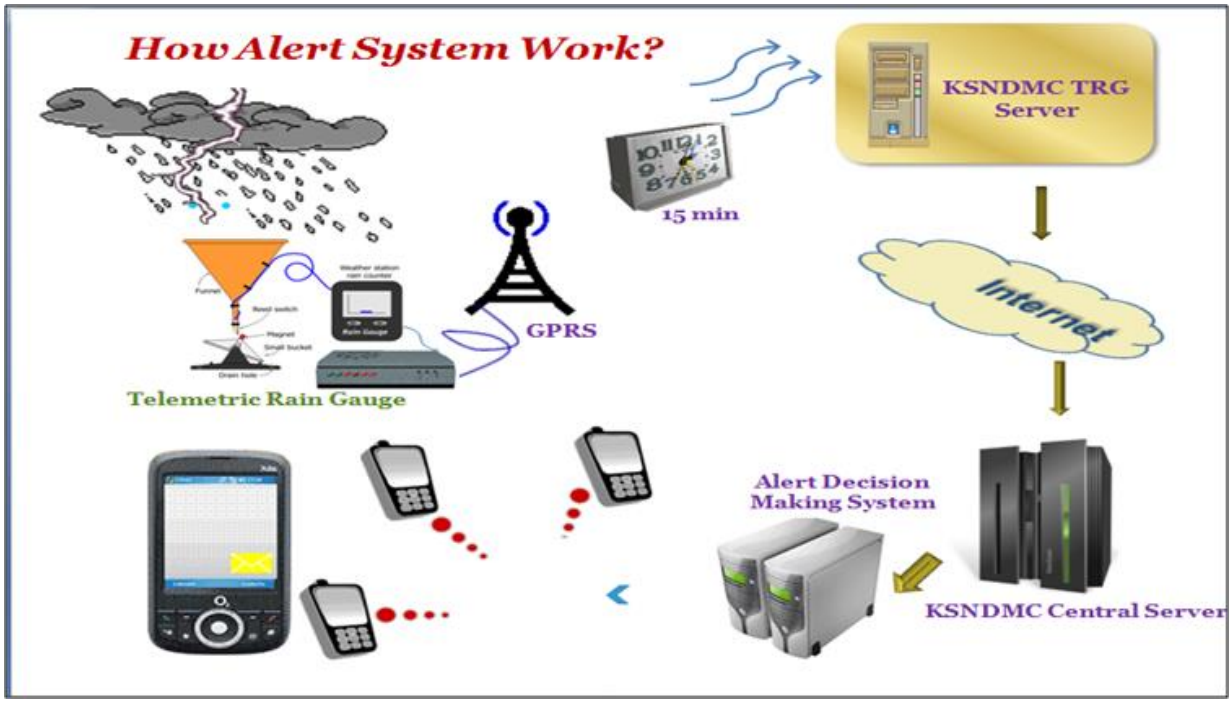

Figure 9: Alert System

Permanent Seismic Monitoring Stations (PSMS) Network of Karnataka

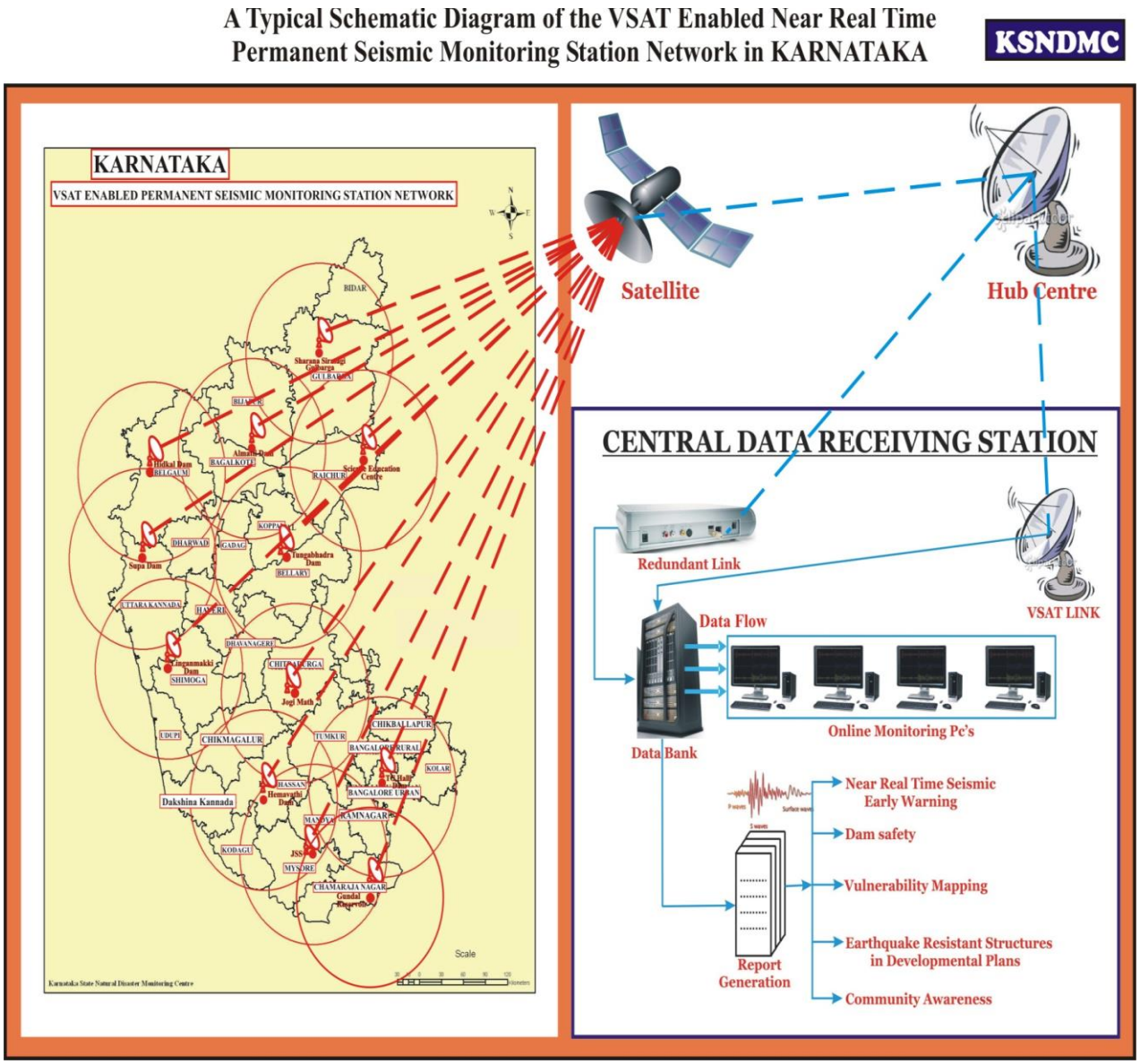

Figure 10: Seismic Monitoring Station

5. Disaster Risk Reduction Initiatives Taken by Karnataka

State Government has establishment of full fledge Control rooms in all the districts working 24X7. The control rooms are provided with staff, landline, wireless connectivity and IP connectivity (Console Technology).

Trainings are being imparted to Government Officers, NGOs and other stake holders through CDM-ATI Mysore for capacity building. NIHMANS, Red Cross Society, KSNMDC, Fire and Emergency, Education Department have also been involved in the training programs at various level.

District disaster management plan (DDMP) is prepared for all district based on hazards, risk, vulnerability, and capacity analysis as per Section 31 of DM Act 2005 and same is updated annually.

Agriculture, Horticulture, and Animal Husbandry departments have implemented many schemes exclusively to mitigate drought.

State Govt. is raising 4 companies of Sate Disaster Response Force (SDRF) in lines of NDRF to effectively deal with any eventuality. The force comprises of police personnel from drawn from Fire and Emergency, State Police, and State Reserve Police.

Govt. of Karnataka and NIC are jointly developing GIS based Emergency Planning and Response System(GEPRS) which will map major accident hazard (MAH) industries and resources. GEPRS will enable all stake holders to make informed decisions in case of eventuality.

5.1 Disaster Risk Reduction for Cyclone

Seawall

Department of Ports & Inland Water Transport (under PWD) has been engaged in the construction of seawall since 1979. Between 2006 and 2008 department constructed seawalls of 111 km length. PWD has proposed INR 140 core master plan for permanent sea erosion work to the Central Water Commission. Between 2008 and 2010 the Western Ghats Task Force joined hands by launching a project for construction of “green walls” to combat erosion through vegetation barriers grown beyond the high tide line in Honnavara, Kundapura and Mangaluru Forest Divisions.

Early warning system has been strengthened to disseminate information to the last person. District EOC and KSNDMC and other stakeholders work in tandem to disseminate warning/ information pertaining to natural disaster.

6. Need and Rationale for Construction of MPCS, Approach Roads, and Saline Embankments.

The long coastline of India is vulnerable to various other kinds of natural hazards. Worldwide, construction of cyclone shelters has been a proven means of preparedness as the vulnerable populations can be evacuated to these structures immediately after receiving the cyclone warning. India too has a 40 year history of construction and maintenance of cyclone shelters, notably from states such as Andhra Pradesh, Orissa and Tamil Nadu. Cyclone shelters constructed in these states proved effective in case Phailin and Hudhud in saving number of lives and mitigating the hardship caused due to the cyclone.

Karnataka lies along the Arabian Sea and as per the vulnerability atlas prepared by the BMTPC; it is at moderate risk to cyclone and storms. During the period 1890 to 1995, 210 cyclonic depressions have been recorded in the Arabian Sea. Most of these cyclonic depressions moved away from Karnataka coast. Only few of them have had direct or indirect effect on Karnataka.

It is essential to provide safe residential accommodation to the vulnerable population during any eventuality or disaster due to natural calamities such as cyclones and associated tidal waves and storm surges. Further, an uninterrupted road network to facilitate continuous supply of relief materials and equipments as well as provide a means of evacuation to safer places for the affected people will need to be deployed.

Therefore, the above structures are proposed for construction under Component B of the National Cyclone Risk Mitigation Project (NCRMP) -II:

Construction of Cyclone Shelters including approach roads to the nearest road network to provide a safe sanctuary for the vulnerable population during emergencies such as cyclones and accompanying storm surges and high velocity winds.

Construction of Saline Embankments: Salinity has percolated in the underground resources of drinking water making it brackish. These conditions have made the life of the

costal dwellers difficult due to absence of resources to fulfill their natural needs. Thus the coastal rural people have been deprived of their minimum needs of livelihood.

In order to protect the coastal dwellers, to some extent, from the cyclone disasters, it is necessary to construct the saline embankment in the identified locations as a part of the National Cyclone Risk Mitigation Program and implement the same so as to protect the coastal people and to ensure sustainable agricultural production of the vulnerable population and restore self-confidence among them. In view of improving the coastal saline lands by protecting them from the saline tidal waters, protective earthen bunds have been constructed by Karnataka Public Works, Ports, and Inland Water Transport Department.

Saline embankments serve as a barrier against the salinity ingress in the agricultural fields and village localities. However only those Saline embankments having potential of protecting predominantly the village population and having vicinity to the major creeks and sea are considered to be taken up under this project.

Saline embankments also serve as a barrier against the floods passing through the creeks from entering it into the villages on banks, thus helping the coastal dwellers in protecting them from the heavy damages during floods.

Saline embankments also serve as a means of communication for the people to move to safer places during flood conditions. Thus saline embankments are very much essential as a lifeline for the coastal people. Hence this sector needs to be taken up as essential measures in order to achieve overall development of the coastal people.

The project area comprises three coastal districts of Karnatka that are cyclone prone viz., Dakshin Kannada, Udupi, and Uttara Kannada. The proposed project is to be executed by the KSDMA through Public Works Department (PWD) and Department of Ports & Inland Water Transport and Zilla Panchayats.

The project is formulated based on experiences of Government of Karnataka in mitigating such disasters during the past and also keeping in view the existing facilities available in the project area in three coastal districts. For this purpose, the PWD staff has performed a detailed analysis of the existing infrastructure in each of the coastal districts. The existing public buildings such as Schools, Health Care Centers, Community buildings and other pucca buildings will be utilized as Cyclone Shelters in an emergency.

6.2 Proposed Cyclone shelters under NCRMP

The existing number of cyclone shelters and space available in public buildings such as Schools, Health Care Centers and other pucca buildings for use as shelters in an emergency in above mentioned three coastal districts in Karnataka is not sufficient to accommodate the vulnerable population in coastal areas. The number of cyclone shelters to be built largely depends on the number of vulnerable populations to be sheltered during cyclones that do not have access to existing safe accommodation during such times.

Under this project, priority is accorded to all habitations within 0-2.5 km from the sea coast and habitations where inundation could be for a height of 2.5 – 5 meters or more. A total of 11 MPCS are proposed to be constructed in this region.

Number of proposed MPCS district-wise is given below.

District Name	No. of MPCS	Cost (in lakhs)
Udupi	2	400
Dakshin Kannada	2	240
Uttara Kannada	7	1350
Total	**11**	**1990**

Table 11: Proposed MPCS District-wise

6.3 Benefits and outcomes of Multipurpose Cyclone Shelter and approach Roads

The Cyclone Shelters in the project area are proposed as risk mitigation investment with the following objectives:

- To build adequate cyclone shelters so as to ensure physical safety of people who have no access to safe shelters;
- To save human lives and livestock and to ensure their sustenance during a disaster;
- To safeguard basic assets needed by people to survive after disaster; and
- To provide a facility for basic medical relief during and after disaster.
- To provide space for community centre school during normal time.
- Evacuation will facilitate faster evacuation and transportation and also will improve the local economy.

6.4 Social and Economic Benefits of Cyclone Shelters

While the cyclone shelters are proposed to mitigate the risk of cyclones and associated disaster situations, it is vital that these shelters are used by the community during normal periods as well, so as to ensure that the constructed shelters do not dilapidate over time due to non-use.

The following social uses are therefore proposed during normal times for these cyclone shelters:

- Schools;
- Community Centers for functions on a rental basis;
- Anganwadi centres;
- Artisan Complexes;
- An integrated service delivery center for the activities like training programmes, group meetings of youth, men and women;
- Health Camps;
- Veterinary Camps; and
- Welfare hostels.

The secondary utility of the cyclone shelter will be decided in consultation with the community through means of Gram Sabhas and based on the need and location of the shelter.

Benefits of Saline Embankment and bunds

- To avoid flooding and ingress of saline water into habitation, roads, and bridges.
- To ensure speedy evacuation of vulnerable population to safer areas.
- Effective road connectivity ensures faster transportation of men, materials, and machinery to the affected areas.

7. District-Wise Proposals

7.1 UDUPI District NCRMP Proposal

Location for Cyclone shelters, evacuation roads and connecting bridges, and Coastal embankments are selected keeping in mind regulatory requirement of CRZ, land acquisition, and impact on livelihoods etc.,	1. **Construction of Multi-Purpose Cyclone Shelter:** Construction of two cyclone shelters are identified in Udupi district, one in Kundapura taluk and another one in Udupi taluk at the cost of Rs.400.00 Lakhs. 2. **Construction of Connecting Bridges**: Three connecting bridges are identified total estimate cost of Rs.1295.00 Lakhs. 3. **Construction of Missing Roads and Links Roads:** Evacuation roads are identified, Total 29 roads are identified of length 38.40k.m and total estimate cost of Rs.2305.00 Lakhs.
Nodal Officers are as follows • EE-PRED and Executive Engineer, Port and Fisheries department Udupi for implementing of Construction of links roads. • Executive Engineer PWD division Udupi for construction of connecting bridges and construction of cyclone shelters.	
Detailed estimates are given below.	
Bidding documents will be prepared after the approval of the action plan.	

Work	No of Works	Estimate Amount (Rs.in Lakhs)
Multi-Purpose Cyclone Shelter	2	400.00
Connecting Bridges	3	1295.00
Missing Roads and Links Roads	29	2305.00
Total		**4000.00**

Table 12: Udupi NCRMP Estimation Abstract

The works as detailed above have been finalized after due diligence keeping in mind durable connectivity and robust safety requirements. These works will be implemented as per prescribed guidelines issued.

Multi-Purpose Cyclone Shelters

SI No	Name of Work	Est. Cost in Lakhs
1	Construction of Cyclone Centre at Govt. Higher Primary Kuvempu School, Thekkatte (of Kundapura Constituency) of Kundapura Taluk. S.No.230/1 Extant 1.33Acres And S.No.231 Extant 0.74 Acres	200.00
2	Construction of Multi Purpose Cyclone Mitigation Center Near Govt. Higher Primary School & Govt. Pre University College in Padu – Kapu Village in Kapu Constituency in Udupi Taluk. S.No.113/18 Extant 1.50Acres And S.No.113/3 Extant 0.93 Acres	200.00
	Total	**400.00**

Connecting Bridges

SI No	Name of Work	Est. Cost in Lakhs
1	Construction of Bridge and Approach Road at Mudarmakki in Shirur Village of Kundapur Taluk, Udupi District (50 m length and 10 meter width)	260.00
2	Construction of Bridge & Approach Road at Kelageri To Kodi Kanyana Temple in Udupi Taluk & District (171 m length and 7.5 m width)	810.00
3	Construction of Bridge & Approach Road Manooru to Nadubettu and Boodangundi River in Udupi Taluk and District (20 m length and 7.5 m width)	225.00
	Total	**1295.00**

Improvement of Fisheries Link Road

Sl No	Name of road	Name of GP	Taluk	Length in Km	Est. cost Rs. in Lakhs
1	Road from Gangolli lighthouse to Trasi Gangolli Main road	Gangolli	Kundapur	1.40	85.00
2	Road from Benageri Naga temple to Trasi Gangolli Main road	Gujjadi	Kundapur	0.70	45.00

3	Road from Yadthere Paduvari Someshwara ROAD	Yadthere	Kundapur	2.80	160.00
4	Road from Yadthere Market Road	Yadthere	Kundapur	2.00	110.00
5	Road from yadthere Paduvari custums road toNH 66	Yadthere	Kundapur	2.00	110.00
6	Road from NH 66 to Shiroor under bridge approach road	Yadthere	Kundapur	1.70	95.00
7	Road from Yadadi to Kome Fisheries road	Thekkatte	Kundapur	1.00	55.00
8	Road from Masthimanebettu to Kome JHC to Kome Fisheries road	Thekkatte	Kundapur	1.00	55.00
9	Road from KamastharaKudru to NH	Angalli	Kundapur	1.00	55.00
10	Road from Herikudru Templeto NH	Angalli	Kundapur	1.00	55.00
11	Road from Herikudru school road to NH	Angalli	Kundapur	1.00	50.00
12.	Hejmadi Kodi Fisheries Road	Hejmadi	Udupi	1.10	65.00
13.	Sea Parallel Road Hejmadi Kodi	Hejmadi	Udupi	1.50	90.00
14.	From Tenka Yermal to Main Road	Tenka Yermal	Udupi	0.50	30.00
15.	Fisheries Road Tenka Yermal South	Tenka Yermal	Udupi	1.50	90.00
16.	Tehnka Yermal – Bada Yermal Fisheries road	Tenka Yermal	Udupi	1.50	90.00
17	Road from Kaup Light House to Mulur	Kaup	Udupi	0.80	50.00
18	Malpe Tottam Road	Tenkanidiyur	Udupi	0.95	111.00
19	Malpe Thottam Guujarabettu Fisheries Road	Badanidiyur	Udupi	1.25	95.00
20	Dhoopadakatte Salikeri Uppinakote Road	Haradi	Udupi	1.00	110.00
21.	Thekkatte to Kome Fisheries Road (Subramanya Temple Road)	Thekkatte	Kundapur	1.40	70.00
22.	Beejadi Fisheries Road	Beejadi	Kundapur	1.50	90.00
23.	Mahalingeshwara Fisheries Road	Kumbhashi	Kundapur	1.00	50.00

24.	Hadroli Amasekadi Fishries Road	Beejadi	Kundapur	1.40	70.00
25.	Thekkatte Devadigarabettu Road	Thekkatte	Kundapur	1.00	65.00
26.	Maravanthe Fisheries Road	Maravanthe	Kundapur	1.00	55.00
27.	Koderi Fisheries Road	Koderi	Kundapur	1.50	83.00
28.	Uppunda Madical Alvekodi Fisheries Road	Paduvary	Kundapur	2.20	122.00
29.	Shiroor Alvegadde Fisheries Road	Shiroor	Kundapur	1.70	94.00
				Total	**2305.00**

Port and fisheries roads segregated from the above table

1	Hejmadi Kodi Fisheries Road	Hejmadi	Udupi	1.10	65.00
2	Sea Parallel Road Hejmadi Kodi	Hejmadi	Udupi	1.50	90.00
3	From Tenka Yermal to Main Road	Tenka Yermal	Udupi	0.50	30.00
4	Fisheries Road Tenka Yermal South	Tenka Yermal	Udupi	1.50	90.00
5	Tehnka Yermal – Bada Yermal Fisheries road	Tenka Yermal	Udupi	1.50	90.00
6	Road from Kaup Light House to Mulur	Kaup	Udupi	0.80	50.00
7	Malpe Tottam Road	Tenkanidiyur	Udupi	0.95	111.00
8	Malpe Thottam Guujarabettu Fisheries Road	Badanidiyur	Udupi	1.25	95.00
9	Dhoopadakatte Salikeri Uppinakote Road	Haradi	Udupi	1.00	110.00
10	Thekkatte to Kome Fisheries Road (Subramanya Temple Road)	Thekkatte	Kundapur	1.40	70.00
11	Beejadi Fisheries Road	Beejadi	Kundapur	1.50	90.00

12	Mahalingeshwara Fisheries Road	Kumbhashi	Kundapur	1.00	50.00
13	Hadroli Amasekadi Fishries Road	Beejadi	Kundapur	1.40	70.00
14	Thekkatte Devadigarabettu Road	Thekkatte	Kundapur	1.00	65.00
15	Maravanthe Fisheries Road	Maravanthe	Kundapur	1.00	55.00
16	Koderi Fisheries Road	Koderi	Kundapur	1.50	83.00
17	Uppunda Madical Alvekodi Fisheries Road	Paduvary	Kundapur	2.20	122.00
18	Shiroor Alvegadde Fisheries Road	Shiroor	Kundapur	1.70	94.00
				Total	1430.00

7.2 Dakshina Kannada NCRMP Proposal

Abstract

Sl.no	Particulars	Nos	Length	Estimated Cost
1.	Cyclone Shelters	2	-	240.00
2.	Construction/improvement of evacuation/link roads.	24	21.62 Km	3015.00
3.	Saline Embankments	3	0.97 Km	245.00
			TOTAL	**3500.00**

Table 13: Dakshina Kannada NCRMP Estimation Abstract

1. CYCLONE SHELTERS

Name of the location identified	Description of proposed Multipurpose Cyclone Shelter	Estimate Cost of the Unit (in lakhs)
Hosabettu (Mangaluru North)	Construction of Multi-Purpose Cyclone Shelters with RCC framed structure columns with RCC roof having sufficient area for the activity proposed. The location is adjacent to National Highway, thus making access to the structure easy.	120.00
Thokkottu (Ullala)	Construction of Multi-Purpose Cyclone Shelters with RCC framed structure columns with RCC roof having sufficient area for the activity proposed. The location is adjacent to National Highway, thus making access to the structure easy.	120.00
	Total	**240.00**

2. Improvement /Construction of Evacuation/Link roads:

Sl. no	Name of work	Location	Length of road in Km	Estimated Amount (Rs.in Lakhs)	Remarks
1	Construction and improvements to road from chitrapu river side towards east up to highway(NH)in Mulky Town Panchyath	Mulky	0.873	165.00	The proposed road will ensure speedy evacuation of people from vulnerable places to safer areas in the face of an impending disaster.
2	Construction and improvements to road from Bandage hilt and Banda sale along the river towards east up to Bappanadu temple near highway(NH)in Mulky Town Panchyath	Mulky	0.620	120.00	
3	Construction and improvements to road from Badagu hitlu and Bandasale along the river towards east up to highway(NH)in Mulky Town Panchyath	Mulky	0.900	190.00	
4	Construction and improvements to Mukka -sashihithlu road in Mangalore North Constituency	Mukka	3.250	300.00	
5	Construction and improvements to road from chandra shnubogara kudru to main (NH)in Mulky Town Panchyath	Mulky	0.583	125.00	
6	Construction and improvements to Guddekoppala Road in Mangalore North Constituency	Surathkal Junction	0.90	110.00	
7	Construction and improvements to Mukka -sashihithlu road in Mangalore North Constituency	Mukka Junction	0.895	140.00	

8	Construction and improvements to Chitrapura Beach cross road in Mangalore North Constituency	Bykampady	0.30	30.00	The proposed road will ensure speedy evacuation of people from vulnerable places to safer areas in the face of an impending disaster.
9	Construction and improvements to Near Thannirbavi Fathima Church road in Mangalore North Constituency	Thannirbavi	0.50	70.00	
10	Construction and improvements to Baikampady Meenakaliya Road in Mangalore North Constituency	Bykampady	0.40	60.00	
11	Construction and improvements to Near Thota Bengre primary school road in Mangalore North Constituency	Bengre	0.40	60.00	
12	Construction and improvements to Zilla baye road in Mangalore North Constituency	Surathkal	0.45	50.00	
13	Construction and improvements to Sadashiva Temple road in Mangalore North Constituency	Surathkal	0.45	75.00	
14	Construction and improvements to Sadashiva Nagara 3rd cross road in Mangalore North Constituency	Surathkal	0.35	55.00	
15	Construction and improvements to Near kasaba bengre High school Road in Mangalore North Constituency	Kasba Bengre	0.6	70.00	
16	Construction and improvements to road from Kudroli main road Jamiya maszid to Kandathpalli in Mangalore city South Constituency	Kudroli	0.90	150.00	

17	Construction and improvements to Neereswalya Junction to Rosario School in Mangalore City South Constituency	Hampankatta	0.36	120.00	The proposed road will ensure speedy evacuation of people from vulnerable places to safer areas in the face of an impending disaster.
18	Construction and improvements to road from KFDC Hoigebazar 3rd stage to Fishries Jetty in Mangalore city South Constituency	Hoigebazar	0.50	120.00	
19	Construction and improvements to road from Hoigebazar Railway gate to Marigudi temple in Mangalore City South Constituency	Hoigebazar	0.8	105.00	
20	Construction and improvements to road from Bolar levely to Ferry road in Mangalore city South Constituency	Bolar	0.44	45.00	
21	Construction and improvements to road from NH, Near Netravathi River to Thardollya in Mangalore City South Constituency	Thardollya	1.25	150.00	
22	Construction and improvements to road from Near Adamkudru School to Adamkudru Church in Mangalore city South Constituency	Adamkudru	0.5	75.00	
23	Construction and Improvements to road from Someshwara temple sea shore to Thokkattu in	Ullala	3.00	300.00	
24	Construction and improvements to road from Ullala beach ,Ullala Dargha via,to Thokkottu in Mangalore North Constituency	Ullala	2.40	330.00	
Total			**21.62**	**3015.00**	

3.Coastal Embankments

Name of the location	Description of the Coastal Embankments proposed.	Estimate Cost of the Unit (Rs.in lakh)	Length proposed (in meters)
MCC	Construction of protection wall at Amblamugaru, Hrekala, Munnuru, Uliya to Nethravathi River in Thokkottu Junction.	150.00	600
	Construction of protection wall at Boluruparapu behind Amrita Vidyalayam School to Gurupura River(Sulthan Batteri Junction).	80.00	320
	Construction of protection wall at Kudroli Karnal garden to Gurupura River.	15.00	50
	TOTAL	**245.00**	**970**

7.3 Uttara Kannada NCRMP Proposal

ABSTRACT

Sl.No	Particulars	Nos	Length (in KMs)	Estimated Cost (Rs.in lakhs)
1	CYCLONE SHELTERS	7	-	1350.00
2	EVACUATION ROADS AND CONNECTING BRIDGES	44	49.98	1959.00
3	COASTAL EMBANKMENTS	22	9.49	1291.00
	TOTAL	**72**	**59.47**	**4600.00**

Table 14: Uttara Kannada NCRMP Estimation Abstract

1. Multi-Purpose Cyclone Shelters

Sl. No.	Taluk	Location	Description of the Building proposed for Construction	Est. Cost of the Unit (Rs.in lakh)
1	Karwar	Govt. HPS Chittakula RC (GP limits)	Construction of Multi-Purpose Cyclone Shelters with RCC framed structure including the amenities like bath room and toilets, furniture to inmates, Water allied works, Electrification work. and providing Generator etc. complete with all external development work of in premises of Govt. HPS Chittakula RC	200.00
2		Govt. HPS Gram Panchyath Amadalli	Construction of Multi-Purpose Cyclone Shelters with RCC framed structure including the amenities like bath room and toilets, furniture to inmates, Water allied works, Electrification work. and providing Generator etc. complete with all external development work of size in premises of Govt. HPS Amadalli	200.00
3	Ankola	Govt. HPS Wadibogri, Belamber (GP limits)	Construction of Multi-Purpose Cyclone Shelters with RCC framed structure including the amenities like bath room and toilets, furniture to inmates, Water allied works, Electrification work and providing Generator etc. complete with all external development work of Govt. HPS Wadibogri, Belamber	175.00
4		Govt. HPS Kharviwada Belekeri(GP limits)	Construction of Multi-Purpose Cyclone Shelters with RCC framed structure including the amenities like bath room and toilets, furniture to inmates, Water allied works, Electrification work and providing Generator etc. complete with all external development work of Govt. HPS Kharviwada Belekeri	175.00

Sl. No.	Taluk	Location	Description of the Building proposed for Construction	Est. Cost of the Unit (Rs.in lakh)
5	Kumta	Manaki (GP Divagi)	Construction of Multi-Purpose Cyclone Shelters with RCC framed structure including the amenities like bath room and toilets, furniture to inmates, Water allied works, Electrification work and providing Generator etc. complete with all external development work of Manaki Cyclone Shelter	200.00
6	Honnavar	Manki near High School, Manki	Construction of Multi-Purpose Cyclone Shelters with RCC framed structure including the amenities like bath room and toilets, furniture to inmates, Water allied works, Electrification work and providing Generator etc. complete with all external development work of manki near High School.	200.00
7	Bhatkal	Durga Parameshwari High School, Alvekodi	Construction of Multi-Purpose Cyclone Shelters with RCC framed structure including the amenities like bath room and toilets, furniture to inmates, Water allied works, Electrification work and providing Generator etc. complete with all external development work of size 30x30 meters in premises of Durga Parameshwari High School Alvekodi	200.00
			TOTAL	**1200.00**

2.EVACUATION ROADS AND CONNECTING BRIDGES

Taluk	Location	Description of the Road proposed for Construction	Estimate Cost (Rs.in lakh)	Length of the Road (KM)
		Improvements of Baval Fisheries Link Road	55.00	0.75
		Improvements of Ippali-Nachakanbag Fisheries Link Road	70.00	0.900
		Improvements of Dandebag Fisheries Link Road	63.00	0.84

Karwar	Govt. HPS Chittakula RC	Improvements of Nachakanbag -Dandebag Fisheries Link Road	54.00	0.72
		Improvements of Devbag North Road	65.00	0.86
		Construction of Devbag Beach South Road and Colony Road	27.00	0.27
		Construction of Alvewada River Bank Road	10.00	0.13
		Improvements of Mudga Fisheries Link Road	45.00	0.60
		Construction of Mudga Colony Fisheries Link Road	20.00	0.20
Ankola	Govt H P S Kharviwada Belekeri	Construction of Tarangmat Fisheries Link Road.	15.00	0.15
		Improvement s of Keni Gabithwada Fisheries Link Road	61.00	0.810
		Improvements of Keni Harikantrawada Fisheries Link Road.	85.00	1.13
	Govt H P S wadibogri Belambar	Improvements of Belambar Fisheries Link Road.	127.00	1.69
Ankola	Govt H P S wadibogri Belambar	Raising the formation level and Metalling, Concreting to Hichkad Dandebag Fisheries Link Road.	25.00	0.25
	Manaki (Divagi GP)	Construction & Improvements to Aghanashi Ferry Jetty - Mosalesalu - Gudkagal Fisheries link Road (Selected Reach)	75.00	5.30
		Construction & Improvements to Bavikodla Dubbanashashi Fisheries Link Road	75.00	2.55
		Construction and Improvements of Road in Alvedande at Kalbhag panchayat arebin sea side towards NH 17 in Kumta Taluk Uttarakannada District	31.30	0.500

Kumta		Construction and Improvements of Road in Hini from Aghanshini river side towards Main road at Kagal Village in Kumta Taluk Uttarakannada District	34.00	0.500
		Construction of Cement Concrete Road at km 3.60 to 4.60 on Kumta Hegde Mirjan road in Kumta Taluka	84.60	0.80
		Construction and Improvements of Road in Horbhag Harikantrakeri from Badagani river side towards NH 17 road in Devagiri panchayat at Kumta Taluk Uttarakannada District	33.50	0.500

Honnavar	Manki, Near High	Repairs and Maintenance of Timmu mane Fisheries link road	16.00	1.20
		Belakond Fisheries link road	14.90	1.10
		Kasarkod Beach Road	14.90	1.10
		Apsarkonda Fisheries Link Road	17.50	1.30
		Manki Halemath Fisheries Link Road	70.00	1.00
		Manki Banasale Hosahitlu Fisheries Link Road	60.00	1.00
		Jefree Kavane Nakuda Mohalla Fisheries Link Road	15.50	1.15

	School	Apsarakonda Manki Road	37.10	2.75
		Koppadamakki Moolekeri Fisheries Link Road	80.00	2.76
		From N.H.17 Kasarkod Bunder Road	80.00	2.00
		Kasarkod Tonka Fisheries Link Road	22.70	1.26
	MankiNear High School	Honnavar Port Road	30.00	0.920
Bhatkal	Parameshwari High School Alvekodi	Murudeshwar –Tudalli Fisheries Link Road	30.00	2.50
		Basti Mavalli Port Road	20.00	1.60
		Sannabhavi-Malekodlu Fisheries Link Road	20.00	1.00
		Ranginakatta –Jali Fisheries Link Road	30.00	0.40
		Hebale Venkatapur Fisheries Link Road	50.00	0.40
	Parameshwari	Belake Sarpanakatta Fisheries Link Road	30.00	2.40
		Belale Bappi Hittalu Fisheries Link Road	25.00	0.50
		Anantwadi-Bailuru Fisheries Link Road	30.00	3.50
		Bailuru Karimoole Fisheries Link Road	20.00	0.30

Bhatkal	High School Alvekodi	Mundalli Port Road Fisheries Link Road	20.00	0.30
		Construction of Bridge at Gorte Kulsangadde Nala in Belke G.P. of Bhatkal Taluk	70.00	0.04
		Construction of Bridge at Bihalli Nala in Yalwadikavur G.P. of Bhatkal Taluk	100.00	0.05
		TOTAL	**1959.00**	**49.98**

3. COASTAL EMBANKMENTS

Taluk	Location	Description of the Coastal Embankments proposed	Est. Cost of the Unit (Rs.in lakh)	Length (in K.M)
Karwar	Gram Panchayat	Construction of Kharland Scheme at Hotegali to Honkon Karwar Taluk. (U.K. Dist.)	50.00	0.30
		Construction of Kharland Scheme at Chendia Idur in Karwar Taluk. (U.K. Dist.)	50.00	0.25
		Construction of Kharland Scheme at Sadashivgad to Devbagh in Karwar Taluk. (U.K. Dist.)	71.00	0.30
		Construction of Kharland Scheme at Mavinhalla to Halebag in Karwar Taluk. (U.K. Dist.)	50.00	0.25
		Construction of Kharland Scheme at Kothar in Karwar Taluk. (U.K. Dist.)0	50.00	0.30
		Construction of Salt Water exclusion dam (SWED) near Mudrani village in Ankola Taluka. (U.K. Dist.)	150.00	0.064
		Construction of Salt Water exclusion dam (SWED) near Gabithkenivillage in Ankola Taluka. (U.K. Dist.)	50.00	0.30

Ankola	Gram Panchayat	Construction of Salt Water exclusion dam (SWED) near Belekeri Kodisaluvillage in Ankola Taluka. (U.K. Dist.)	25.00	0.30
		Construction of Check dam at Bogrigadde Hirekatta in Belekeri GP	25.00	0.018
Ankol	Gram Panchayat	Construction of Check dam at Bogrigadde Haskibailin Belekeri GP	5.00	0.012
		Construction of Check dam at Harwada Jantradi in Harwada GP	25.00	0.016
		Construction of Check dam at Kelgin Manjuguni bridge in Belamber GP	10.00	0.012
		Construction of Check dam at Hallasalkeri in Belamber GP	5.00	0.010
		Construction of Check dam at Hadava in Shetgeri GP	5.00	0.08
		Construction of Check dam at Kalanchi in Belamber GP	10.00	0.013
		Construction of Check dam at Shilye in Shetgeri GP	5.00	0.07
Kumta	Gram Panchayat	Construction of of Protection Work near Aganashini Kumta Taluk U.K. Dist	150.00	2.00
		Construction of of Protection Work near Manikatta in Kumta Taluk U.K. Dist	150.00	2.00
Honnavar	Gram Panchayat	Construction of of KLS near Pavin Village in Honnavar Taluk U.K. Dist	120.00	1.2
		Construction of of KLS from kirubail to Taribagil in Honnavar Taluk U.K. Dist	100.00	1.00
Bhatkal	Gram Panchayat	Construction of Kharland Scheme at Saraswati KLS L/B at Ch.500.00M. in Bhatkal Taluk. (U.K. Dist.)	100.00	0.50
		Construction of Kharland Scheme at Mundalli KLS R/B at Ch.500.00M. in Bhatkal Taluk. (U.K. Dist.)	85.00	0.50
		Total	**1291.00**	**9.495**

8. Implementing Arrangements

The National Disaster Management Authority (NDMA) is the Nodal Agency at the National Level for monitoring the implementation of the National Cyclone Risk Mitigation Project (NCRMP). The different agencies that would be involved in the implementation and management of the NCRMP are as follows:

- At the national Level

1. Project Steering Committee (PSC)
2. Project Management Unit (PMU) at NDMA.
3. Project Implementation Unit (PIU) at NIDM.

- At the state Level

1. State Steering Committee (SSC)
2. State Project Implementation Unit (PIU)
3. District Offices

The relation between the various levels is represented as follows

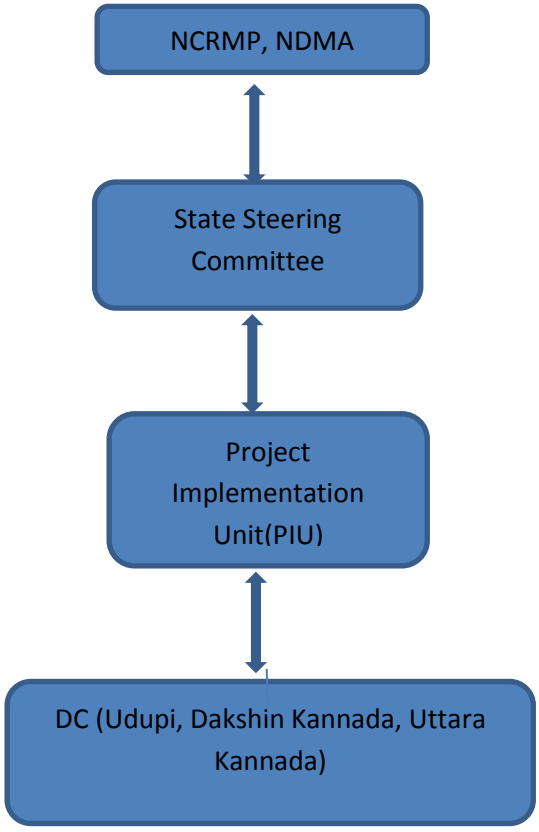

Figure 11: Flowchart Showing Responsibility Setup

A **Project Monitoring Unit** (PMU) is headed by the Secretary NDMA and the respective Chief Secretaries of the states.

During implementation, the PSC will provide strategic oversight over the operations of the NCRMP. This shall be done through regular review meetings, where the PSC shall:

- Review and monitor progress of project implementation Review critical findings of the audit reports.
- Discuss and approve the annual work plan and budget of the project.
- Provide administrative clarifications and instructions regarding the project norms and implementation procedures.
- Suggest proposals for modifications on the project framework for implementation to NDMA as and when required, in consultation with the State.
- Provide such guidance, as it may deem necessary for the project.

Ministry of Home Affairs (MHA) will be the nodal ministry of Government of India for the Project. Funds to the States and NDMA will flow through the budgets of MHA/NDMA.

State Steering Committee

A State Steering Committee (SSC) has been constituted under the chairmanship of Additional Chief Secretary and Revenue Secretary (ex-officio Project Director) as Member Secretary and other Senior Officers of Line Departments as members.

At the implementation stage, the committee will give strategic oversight to the project. The key functions will include the following:

- Supervise, guide and approve proposals of various Line Departments
- Reviewing project implementation progress and giving guidance for achieving project goals and targets.
- Review critical findings of the audit and evaluation reports.
- Ensure all rules laid for the project are being complied to.

The PIU is headed by the Secretary to Government, Department of Revenue (Disaster Management) who will be the Ex-officio **Project Director (PD)** will oversee the implementation of the NCRMP in the State. Project Director will be assisted by Technical Project Director (Chief Engineer, PWD). There will be a Project Manager under PD who will oversee day-to-day functioning. PIU will have sector experts, Finance, procurement, Social and environment specialist looking after different domains. PIU will coordinate all

aspects of the project preparation phase including preparation of IP, DPRs, and bid documents, etc.

7.1 Organizational Structure of Project Implementation Unit (PIU) and its relationship with Implementing Districts

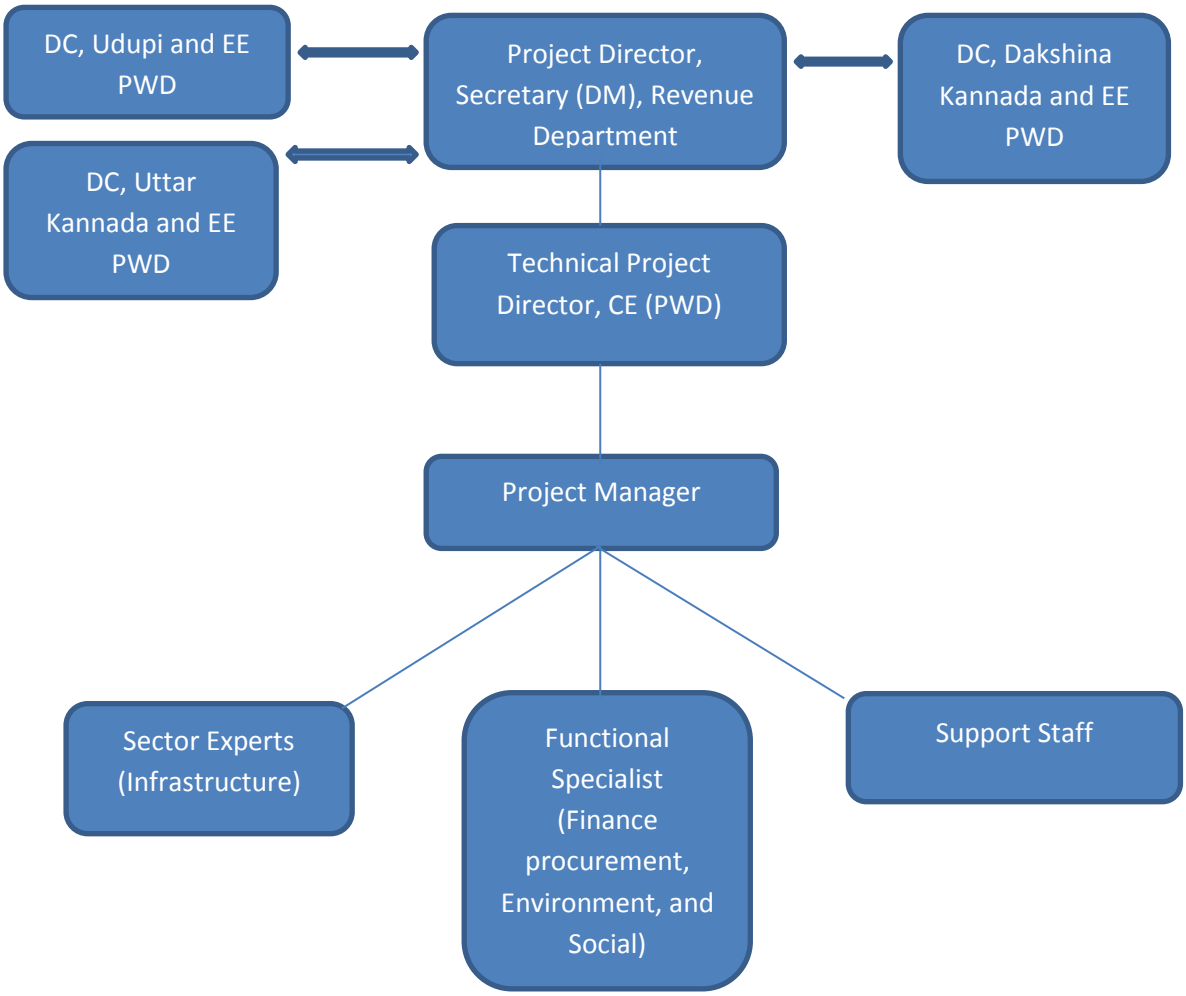

Figure 12: PIU Organizational chart

9. Environmental and Social Impact

An environment specialist will assist PIU.

1. To assess applicability of coastal regulations
2. To assess proximity to environmentally safe areas
3. To assess extent to displacement of personnel and rehabilitation that may require on account of the proposed construction works

At present, it is envisaged that the shelters will be made on government land and as such, they will be free from land acquisition issues and will not involve any displacement of people or have any significant social impacts. However, necessary remedial steps will be taken for safe disposal of the solid waste, proper ventilation of kitchen to avoid circulation of smoke in the shelter, etc. All these aspects will be updated in the site specific environmental and social screening forms and the environment management plans that will be enclosed in the individual Detailed Project Reports.

The proposed sites are outside of 1 km distance from the environmentally safe areas, a generic Environmental Management Plan will be updated in the Detailed Project report along with the updated screening form. If however, it is determined that the proposed location is within 1 km distance of the environmentally sensitive area, an environmental impact assessment will be conducted. Similarly, based on the results of the social screening, a social impact assessment would be performed and adequate resettlement action plans will be documented and included in the Detailed Project Reports.

The environment plans shall be included in the DPR and the bid document. This shall be confirmed by the PIU environment specialist.

Moreover, Construction of Cyclone Shelters and saline embankments are considered as permissible activity, the department will be obtaining the necessary clearances required for these shelters, including those which are in the No Development Zone. Any other clearances that are required for these shelters will be determined during the screening process.

10. NCRMP Financial Management Arrangement, Third Party Quality Audit, and Project Timelines

10.1 Financial Management Arrangement

State Finance Department had already consented to open budged code 2245-80-102-0-80 (plan) for NCRMP project. The head of account will be operationalized from the Financial year 2015-16 by providing token grant under this account. The funds released from GOI will be credited to the said account. The funds provided will be released by the Revenue Department to the concerned implementing authorities based on their requirement through treasury mechanism and external audit will be done through the Accountant General of Karnataka.

10.2 Third Party Quality Audit

Reputed Institutions based in Bengaluru having domain expertise in similar projects will be roped in as Third Party Quality Audit Consultant.

10.3 Project Timelines

Sr. No.	Activity	Starting Month(1st) Dec-2014(months)												ending(30th) June-2017		
		1	2	3	4	5	6	7	8	9	10	11	12	.. ..	29	30
1	Finalization of site													.. ..		
2	Preparation and finalization of ‘Type Design’s													.. ..		
3	Screening													.. ..		
4	Soil Testing													.. ..		
5	Preparation of Procurement Plan													.. ..		
6	Preparation of DPR and Bid Document													.. ..		
7	Bidding and Contracting													.. ..		
8	Execution of Work													.. ..		
9	Evaluation															

Table 15: Project Timelines

11. Conclusion

NCRMP is a startup opportunity for institutions and stakeholders to take a proactive approach in mitigating the cyclone threat in the state. It is expected that the proposed investments will lead to reduction of losses to life and property. In the short term, life loss and property damage reduction are aimed at; and in long term benefits in livelihood improvements, awareness increase and capacity building are expected.

An important benefit of the proposed NCRMP is an opportunity for collaborative and practical research leading to knowledge building in cyclones as a disaster management subject. This will lead to educative and intellectual capacity building of the government, NGOs, educational and research institutions in the district.

Securing livelihoods of vulnerable population is the major concern and is expected to be strengthened by this programme along with the reforms and improvement arrangements underway by the state government in the area of disaster management.

It is the effective, timely, responsible and output oriented communication between the Revenue Department (DM) with the three chosen Districts which will yield results and success to the project.

Annexures

- Government Orders
- Multi-hazard and Geological Maps
- Model MPSC Design.