Climate Change, Women With Disabilities, Invisibility And Networking Response

Area – Kendrapada, Rajnagar

Implemented By

Shanta Memorial Rehabilitation Centre

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Abbreviations

DECCMA-The Deltas, vulnerability and Climate Change, Migration and Adaptation

FGD- Focus Group Discussion

GP- Gram Panchayat

IPCC- Intergovernmental Panel on Climate Change

ISRO- Indian Space Research Organisation

IUCN-International Union for Conservation of Nature

NAPCC- National Action Plan for Climate Change

OHCHR – Office of High Commissioner of Human Rights

PWD- Persons with Disabilities

RPWD- Right of Persons with Disabilities

SDG- Sustainable Development Goals

SHG- Self-Help Group

SMRC- Shanta Memorial Rehabilitation Centre

UDHR- Universal Declaration of Human Rights

UNCRPD- United Nations Convention on the Rights of Persons with Disabilities

UNEP-United Nations Environment Programme

UNFCC- United Nations Framework Convention on Climate Change

WCOP - Women and Climate Change Conference

WWDCCN -Women with Disabilities Climate Change Network

WwDs- Women with Disabilities

List of Tables & Charts

EXECUTIVE SUMMARY

Accelerated sea level rise due to global warming and climate change is of great significance to India (UNEP 1991) because of its low-lying densely populated coastal areas. Research studies mention that "sea level has risen @ 2.5mm per year along the coastline since the 1950s. A mean sea level rise of between 15 and 38cm is projected by the mid-21st century along India's coast and the estimate is that a 1m rise in sea level could displace 7 million people from their homes in India (IPCC 2001). Patnaik and Narayan (2005) reported that the eastern coast is more vulnerable than the western coast of India due to the frequency of extra-climatic conditions.

Vulnerability of the people residing in coastal areas is determined by spatial locations, socio-economic condition and physical ability of individuals. Observed through an intersectional lens we find that vulnerability multiplies if someone is disabled, a woman, and a lower caste or class. Humans have survival instincts and develop survival strategies to tread through difficult situations. Thus, self-adaptation to variable climatic conditions is a preferred practice in households.

As per the 2011 Census India has a 2.68 crore disabled population amounting to 2.21% of the total population of the country. Out of this 1.18 crore are women. Feminist research studies have observed that these women are subject to multiple vulnerabilities due to the operational mechanisms of a patriarchal social structure. In the RPWD Act 2016, India has identified 21 forms of disabilities instead of seven forms previously identified in the PWD Act 1995. Some are affected by multiple forms of disabilities.

Adaptation to climate change is considered a rational option for the state and the researchers as well. As we observed adaptation can be non-planned self-adaptation and planned adaptation addressed through public policies. This Research Report makes an effort to prepare an adaptation inventory for the disabled women of households affected by coastal erosion.

The study was conducted in different Gram Panchayats of Rajnagar Block of Kendrapada District of Odisha, India where the Government of Odisha has resettled people displaced by coastal erosion in the East coast in a relocation colony named Bagapatia. A qualitative research design was developed to do the field study. A total of 169 women with disabilities were identified in the hotspots and 29 Key informants/stakeholders were interviewed. They were interviewed using a semi-structured questionnaire. Case studies were also collected to have a better understanding of the vulnerabilities of Women with Disabilities from an intersectional standpoint.

It is expected that the Project will have the following significance:

1. Improved access to knowledge on climate change impacts on hotspots. It will also create interest in the affected population to explore adaptation options and help in reducing the vulnerability of women with disabilities.
2. It developed a disability inclusion adaptation option inventory with the aid of a 'Women with Disabilities Climate Change Network' (WWDCCN) which will be of help to women with Disabilities
3. Collaboration and coordination by WWDCCN with the Government to advocate for enhanced adaptation financing will be facilitated.

Introduction

The globe is in the grip of climatic changes. People on different continents are experiencing weather variability. Coastal erosion, global warming and rising sea levels are significant problems in island nations and deltas across the globe. The coastal regions are highly vulnerable to climate change and disasters (Power et al 2016; Kossin 2018). Climate Governance Initiative in 70 countries states that the sea has reduced the beach width by 20 km. Also, the DECCMA Study states that the region in deltas is most vulnerable to storm surges, coastal erosion and disasters due to their low-lying geographic location (Arto et al. 2019: p1285). Increases in such events bring changes in the eco-system affecting in turn, the lives and livelihoods of people residing there. It affects more if the vulnerability of the affected population is greater. For example, people with disabilities in general and women with disabilities in particular are severely affected by the adverse impacts of climate change.

It is important to note that coastal erosion is a complex issue that is influenced by various factors and they differ from location to location. India is experiencing a monsoonal climate that witnesses cyclones, a storm surges producing aggressive waves that cause coastal erosion. Besides, Anthropocene activities like industrialization, construction activities and harbours offshore obstruct the natural flow of water. The length of the Coastline of the Indian mainland (6100 km.) and that of Andaman and Nicobar Islands in the Bay of Bengal and Lakshadweep Islands in the Arabian Sea is 7517 km. India has been experiencing coastal erosion along with a variety of frequent disasters and 50 percent of this is experienced by the eastern Indian federal unit, Odisha. Mahanadi Delta and Bengal Delta are the two major delta regions of India. Mahanadi Delta is in Odisha, India.

Climate change has discernible direct and indirect impacts

India is the 12th most vulnerable country in terms of climate change. (*Global Climate Risk Index,2022*) though Coastal Zone Management began in 1972 and is administered by the National Oceanic and Atmospheric Administration. The impact of climate change on India has great significance because of its extensive low-lying densely populated coastal

zone. Observations suggest that a 1m rise in sea level could displace nearly 7 million people from their homes in India (IPCC 2001). More than 2489 hectares of land in Odisha faced erosion *(2006-2018 satellite images, ISRO*)**.** Villagers moved inland to create five new villages but lost their paddy fields which had become unproductive due to salinity. The grasslands for livestock started shrinking due to salinity. More than 3000 people were displaced in Satbhaya panchayat. The displaced people of Satbhaya are probably India's first *climate refugees.* The beautiful beaches were lost to tourists and the poor who earned their livelihood from tourism. The affected population has also experienced a **s**hifting pattern of disease vectors.

Coastal erosion has occurred due to some natural and anthropogenic activities. Some natural processes are sea-level rise, coastal erosion and saltwater intrusion to cultivable land damaging paddy fields. Some anthropogenic activities are the construction of dams, sea walls, ports and harbours. The most affected are the people who reside near the seashore. Their journey is from poverty to vulnerability rather than prosperity**.**

It has a cumulative impact on their realization of all SDGs. There are no specific and instant solutions to these problems, but long-term measures will enable us to keep a check on the situation. SDG 13 calls on national governments to take urgent action to combat climate change and its consequences.

Climate Change, Vulnerability and Women with Disabilities

Vulnerability due to climate change impacts is just not caused by climatic changes, but rather due to the interaction between the ecology, the communities and the governments. The vulnerability increases in the case of those who are already experiencing marginalization in society. These include the people at the lower level of the social hierarchy, poor economic conditions, specific geographic locations, children, and elderly women. Climate change presents different risks and exacerbates the cycle of poverty, sometimes resulting in displacement, sometimes encouraging local adaptation, or impelling a migratory process. Lack of knowledge of the impact of climatic changes and resultant unpreparedness to face its consequences enhances the level of vulnerability.

A segment of the population that is most vulnerable is Women with Disabilities (WwDs) compared to women without disabilities. Climate change has a disproportionate impact on WwDs who experience a range of factors that put them at higher risk of injury, death, loss of property and loss of independence (Twigg, Kett and Lovell 2018; National Council on Disability 2019: 11) The group is more likely to be socially marginalized and face discrimination and so more likely to live in inadequate housing in hazardous locations, increasing their vulnerability to extreme weather. They are the most neglected. Persons with disabilities have less access to education and livelihood than the rest of the population (Burns, 2017).

Policy Responses

There has been a gradual addressing of the climate change on disability. IPCC states for the first time, "Persons who are socially, economically, culturally, politically, institutionally and otherwise marginalized are especially vulnerable to climate change and also to some adaptation and mitigation responses (IPCC, 2014). This was also highlighted in the Women and Climate Change Conference (WCOP, 2020). In July 2020, the UN Human Rights Council created history by passing a Resolution that calls on national governments to adopt a disability-inclusive approach while making policies to address climate change in terms of adaptation and mitigation measures.

It is important to mention here that the UN Charter recognizes the inherent dignity, worth and equal and inalienable rights of all members of human family as the foundation of freedom, peace and justice in the world. Based on these principles Universal Declaration of Human Rights reaffirmed the universality, interdependence and interrelatedness of all Human rights, fundamental freedom and needs of all persons. This is important to mention here that these provisions guarantee the fulfillment of the needs of all persons with disabilities and the enjoyment of all rights without any discrimination.

Convention on Rights of Persons with Disabilities adopted on 12th December 2006 in the 61st session of the UN General Assembly recognized that disability is an evolving concept, and disability results from the interaction between persons with physical and mental impairments on the one hand and environmental and attitudinal barriers existing in the society on the other that hinders their full and effective participation in society and access to a sustainable livelihood. Thus, the major concern is to understand barriers through the lens of intersectionality and emphasize mainstreaming disability issues as an integral part of relevant strategies for sustainable development. Article 6 of the UNCRPD gives a call to national governments to recognize that women and girls with Disabilities are subject to multiple discrimination and in this regard, States shall take appropriate measures to develop and empower them which will give them adequate opportunities to enjoy their fundamental freedoms. Article 8 of the UNCRPD advises States to adopt effective and appropriate measures to combat stereotypes, and prejudiced and harmful practices relating to persons with Disabilities. CEDAW gives a call to States to end all forms of discrimination against women.

Further, under article 11 of the UNCRPD, States are obliged to take "all necessary measures to ensure the protection and safety of persons with disabilities in situations of risk, including situations of armed conflict, humanitarian emergencies and the occurrence of natural disasters."[1]Disabled are nearly one billion population or 15 percent of world

[1] UN Convention on the Rights of Persons with Disabilities, December 13 2006, 2515 UNTS 3 (entered into force 3 May 2008) [UNCRPD].

population and they are disproportionally affected by climate change. Looking through the intersectional lens we find that disability intersects with different forms of oppression tied to gender, race, class and many other characteristics to shape processes and outcomes of climate governance vulnerability. Unfortunately, climate change policymakers have largely failed to factor in the needs and issues of the disabled in the climate change Action Plans. Since they are invisible in climate change public policies, little is known about the factors that build up the capacities of disabled persons to cope with climate impacts. Therefore, the preamble to the Paris Agreement states that "Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights," including the rights of persons with disabilities.[2] In a recent resolution on human rights and climate change, the UNHRC specifically called on States "to support the resilience and adaptive capacities of persons with disabilities both in rural and urban areas to respond to the adverse impacts of climate change."[3] Similarly, a recent OHCHR study emphasizes that because persons with disabilities are disproportionately impacted by climate change impacts, countries should adopt disability-inclusive and human rights-based approaches to policy-making that empower persons with disabilities to be "agents of change" in climate adaptation and mitigation efforts[4].

India signed the UNCRPD and subsequently ratified it on 1st October 2007. In pursuance to this obligation, the Rights of PWD Act 2016 replaced the PWD Act 1995 to comply with the various provisions of UNCRPD. India is also a signatory to the United Nations Framework Convention on Climate Change (UNFCCC), its Kyoto Protocol and the Paris Agreement. The country has been highly appreciated by researchers for its efforts to be compliant with the provisions of the Paris Agreement. The Government of India stands committed to combating climate change

The Government of India stands committed to combating climate change impacts through its public policies including the National Action Plan on Climate Change(NAPCC).through its several programs and schemes including the National Action Plan on Climate Change (NAPCC) placed in the public domain on 30th June 2008. The NAPCC provides an overarching framework for all climate action and disaster management initiatives. It has identified eight mission in specific areas namely solar energy, energy efficiency, water, agriculture, Himalayan eco system, sustainable habitat, green India and development of strategic knowledge on climate change. All states and Union Territories have developed their State Action Plan on Climate Change. These state-specific Action Plans have been developed in sync with the NAPCC taking into account the needs of all sections of population. These Plans outline sector-specific and cross-sectoral priority actions including adaptation sector-specific and cross-sectoral priority actions, including

[2] See Paris Agreement to the United Nations Framework Convention on Climate Change, 12 Dec 2015, TIAS No. 16-1104, preamble.

[3] See Human Rights and Climate Change, Res 41/21, UNHRC, 42nd Sess, UN Doc A/HRC/41/L.24 (2019) at 4 -5.

[4] See Analytical Study on the Promotion and Protection of the Rights of Persons with Disabilities in the Context of Climate Change, OHCHR, 423rd March 20214th Sess, UN Doc A/HRC/44/30 (2020), 1 at 4 [Analytical Study].

adaptation, informed the Union Minister of Science & Technology, Earth Sciences and Health & Family Welfare in Rajya Sabha on 23rd March 2021 in Rajya Sabha, the Upper House of Indian Parliament.[5]

India being a signatory to UNFCCC and also to the Kyoto Protocol, has been playing an active role in taking appropriate initiative to support Adaptation, as a part of action in the mainframe National Policies; besides, featuring Adaptation in the National Action Plan Climate Change in 2008, which mentions budget but women only in context of water. There are also 8 Missions related to the Plan e.g. Agriculture, Water, Forest, Energy, livelihood Security, etc. Disability and specifically women with disabilities are missing in all these documents.

Notwithstanding the increase in interest, women with disability are left behind without any attention. Contextually, activism and research have for some time been revealing the responsibilities borne by women in terms of collecting water and biomass or ensuring food security, but rarely on women with disabilities. However, the basic factor remains that despite their vulnerability, WwDs are the holders of knowledge that has not been acknowledged.

Adaptation to climate change and weather variability has recently become a significant subject in climate change research and disaster management exercises. The objective of this contemporary focus is to reduce the vulnerability of climate-sensitive people, rehabilitate climate refugees and ensure climate justice. Adaptation refers to adjustment in ecological, social and economic systems in response to expected climate change stimuli or impacts leaving none behind (IPCC 2001). In other words, the Climate change adaptation action plan of a nation has to be inclusive in distributing resources and ensuring livelihoods (Maiti et al. 2014: 653). Adaptation can happen in two ways:

a) It may be a state-sponsored planned one and take the shape of a public policy. Its effective implementation depends on the existing administrative machinery at all levels of the administrative hierarchy.
b) Humans have a survival instinct. They try to respond to crises and develop adaptative measures to restore their livelihoods. Later on, the State intervenes to provide assistance and make the unplanned adaptation measures developed by the people into planned ones.

The intersectionality of adaptation with disability as the focus needs strengthening fulfilling the Principles of Climate justice. Therefore, a conceptual framework for analyzing

[5] Press Information Bureau, 2021, Assessment of Climate Change over Indian Region Retrieved from https://pib.gov.in/PressReleasePage.aspx?PRID=1706938

adaptive capacity and multi-level learning processes in resource governance regimes is the need of the hour.

Objectives of the Study:

1. To link knowledge of women with disabilities at the grassroots and bring in other stakeholders to endorse and supplement the knowledge of the WwDs.
2. To link with policy matters to enhance barriers to financial support to adaptation for WwDs
3. An understanding of grassroots politics and how it influences the decision-making power on gendered disability can give a comprehensive view of understanding climate and gender from a bottom-up perspective.

Significance of the Project:

4. Improved access to knowledge on climate change impact hotspots. It also creates interest in the affected population to explore adaptation options and helps in reducing the vulnerability of women with disabilities.
5. Developed a disability inclusion adaptation option inventory with the aid of a 'Women with Disabilities Climate Change Network' (WWDCCN).
6. Collaboration and coordination by WWDCCN with the Government to advocate for enhanced adaptation financing.

Methodology:

The Project has applied research on adaptation options, limits and potential to current weather variability. The research has adopted the following stages:

1. To critically assess the climate change impacts on Women with Disabilities
2. To seek Stakeholders' feedback on the barriers to the implementation of planned Adaptation measures and criteria for successful adaptation
3. To prepare an Adaptation inventory with the help of Women with Disabilities and other stakeholders

A total of 169 women with disabilities were identified and 29 Key informants were identified for interview. They were interviewed using a semi-structured questionnaire. The Washington group of question set was used in the introductory section to understand better the level and complexity of disabilities of women respondents.

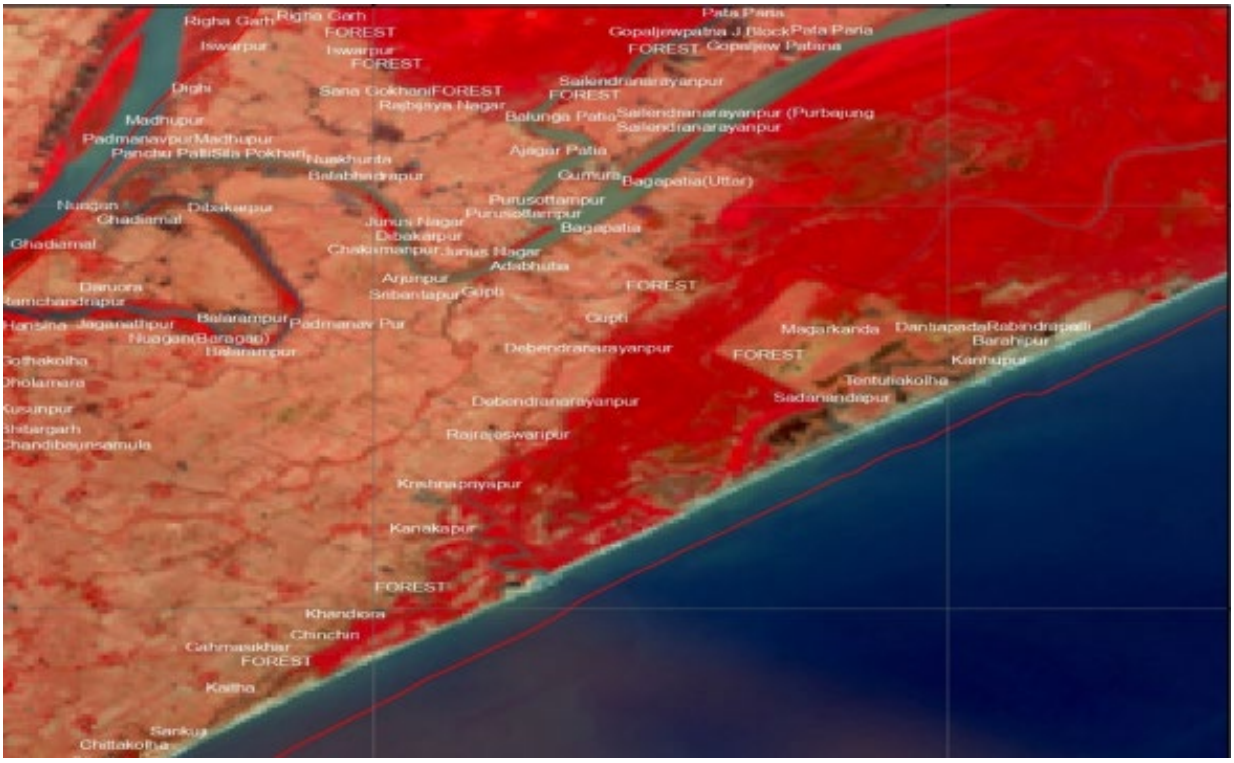
The analysis in this research is primarily a qualitative one. Barriers to adaptation for women with disabilities have been identified in a few case studies. Stakeholder mapping has been done to understand the interest and desire to influence the process of change on the part of the different stakeholders.

Identifying the HOTSPOT

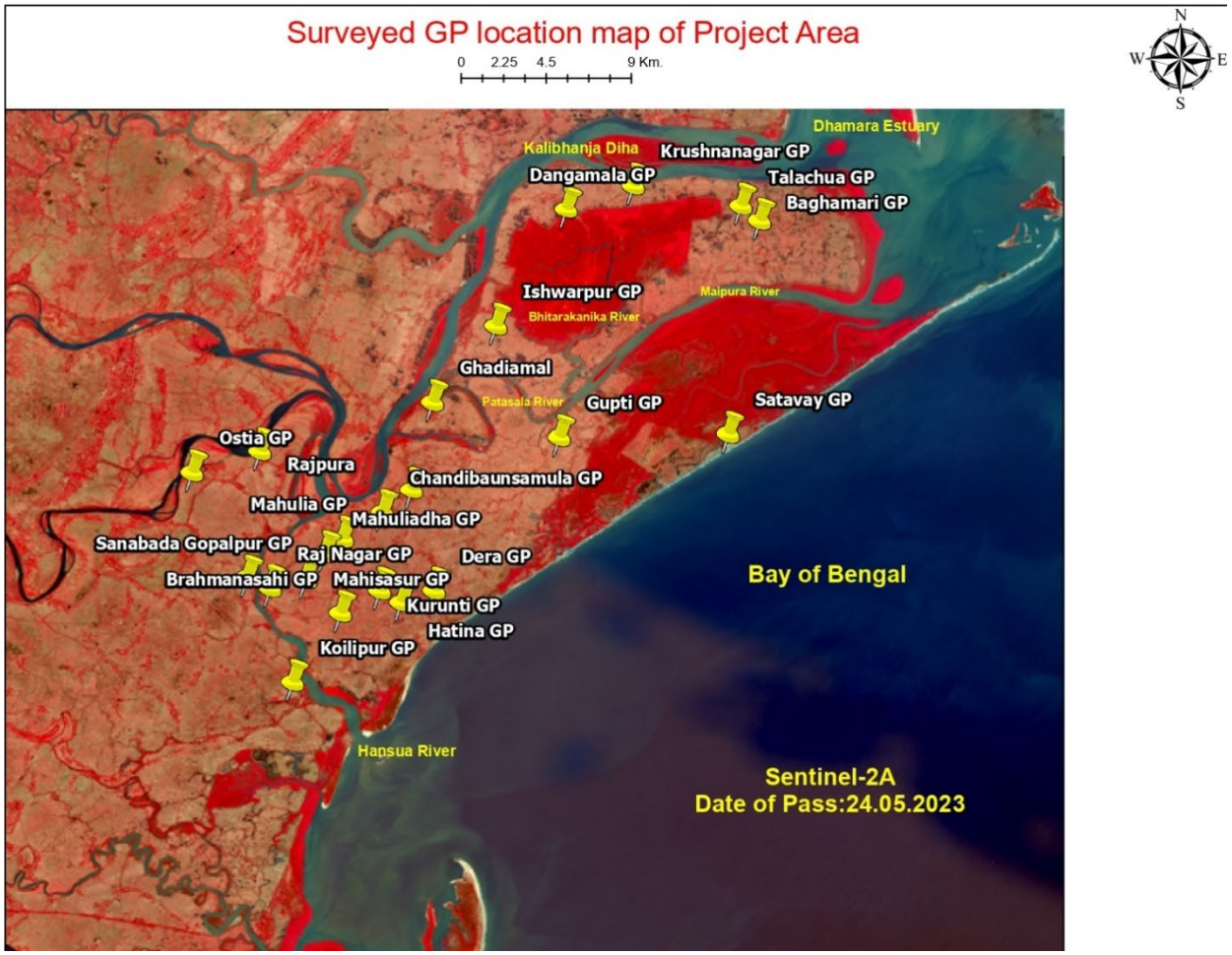
For carrying out the research study hotspots were identified in a district on the east coast of India. India has a long coastline of more than 7000km. Two states of India namely Odisha and Andhra Pradesh are most prone to coastal erosion. Besides, the Sundarban Delta and the Mahanadi Delta have a long history of coastal erosion, displacement, adaptation and climate mobility.

Odisha has a 480 km. long coastline. Anthropocene activities like the construction of ports have put pressure on the flow of the water to one side. Climate change and anthropogenic activities have caused coastal erosion in the state. Kendrapada, the identified district for research is an east coast district. It is situated in the state of Odisha in India. It is in the Mahanadi Delta region. The specific location was selected for the study because of its proximity to the Bay of Bengal and the shoreline has been going through drastic changes since 1971.

<u>Coastal Erosion in Kendrapada Map</u>



Identified GP map



The coast of Rajnagar block of Kendrapada district of Odisha, India is one such affected area. The sea has taken into itself a panchayat named Satbhaya, a cluster of seven villages one after another. The process of erosion commenced in the early seventies of the last century and it continues till date. The villages engulfed by the sea were Kanpur, Manpur, Kanhupur, Satbhaya, Gobindpur, Sahebnagar and Tentuliabhindi.

Life in Satbhaya panchayat was difficult. The village households were earning their livelihood from fishing, agriculture and the collection of forest produce and sea products like shells and other things. However, the villagers had multiple displacements and relocations to new areas at higher levels and a little farther from the sea. Interaction with a school headmaster and some elderly residents indicates that the residents of Satbhaya Panchayat shifted to Magarkanda, then to Barahipur and now to the Bagpatia relocation colony. The earlier two efforts were non-planned self-adaptation measures and the later incident of relocation is a planned adaptation initiative.

Bagpatia is a planned relocation colony established by the Government of Odisha in Gupti Panchayat of Kendrapada District where the affected families have been resettled. The process is continuing to date. The erstwhile Satbhaya residents have been relocated here in three phases. The relatively well-off could relocate with less difficulty, but the poor had to face tremendous difficulty in the transportation of their household. They usually commuted multiple times with their bicycle to bring their commodities.

During this process of displacement and relocation disabled, women and girls experienced myriad problems. It is assumed that disabled women and girls must have experienced much difficulty in this process. The ARA project attempts to find out what were the experiences of disabled women and girls. How did they adapt to the new location? Is it possible to develop an adaptation inventory to provide inputs to the process of policy-making?

Base-line Survey findings

Introducing the Research field

Kendrapara is one of the six coastal districts of Odisha with a coastline of 48 kilometers. It has a geographical span of 2644 square kilometers and ranks 26th in the state.

Kendrapara lies in the Eastern Coastal plain of the country and has a mean elevation of 6-13 meters above sea level (topographic-map.com). The district has one sub-division and is divided into nine Blocks and nine Tahsils. According to KrishiVigyan Kendra, Kendrapara, around 15850 hectare of land is the waterlogged area, which supports the mangrove forests. The internationally known Ramsar wetland, Bhitarkanika, the sanctuary for crocodiles is located in this district.

POPULATION DEMOGRAPHICS OF KENDRAPARA

As per the Census 2011, the total population of the district Kendrapara stands at 14,40,361 and ranks 14 in terms of population in Odisha (DSHB Kendrapara, 2018). The female population of the district is 7,22,547 while the male population is 7,17,814. The sex ratio of the district is 1007 females per 1000 males and the population density stands at 545 with a decadal growth rate of 10.6 percent for 2001-2011. Kendrapara district has a small urban population of about 83,534 and a large rural population of about 13,56,827, which is 5.8 percent and 94.2 percent respectively. The urban population is below the state average of 16.7 percent. The Scheduled Castes population in the district stands at 3,09,780 out of which 1,55,531 are male and 1,54,249 are female. The Scheduled Tribe population is 9,484, which suggests that the ST population is very low. The Directorate of Economics and Statistics, Odisha has projected that the population will increase to 15,29,000 as of 2022, based on the decadal growth rate.

Table 1: Block and ULB-wise population of Kendrapara with SC and ST population..

Population of Kendrapara Census 2011									
	Total Population			SC population			ST Population		
Blocks/ULBs	Male	Female	Total	Male	Female	Total	Male	Female	Total
Aul	65371	74257	139628	17326	18428	35754	243	216	459
Derabis	73866	70722	144588	18674	17741	36415	362	368	730
Garadpur	55910	54706	110616	12105	11801	23906	67	54	121
Kendrapara	75827	75309	151136	19042	18549	37591	304	471	775
Mahakalpara	107889	104574	212463	19038	18371	37409	1860	1717	3577
Marshaghai	64606	62353	126959	11974	11231	23205	326	322	648
Pattamundai	79064	83284	162348	22753	23223	45976	144	136	280
Rajkanika	66579	72400	138979	15629	16230	31859	23	28	51
Rajnagar	85941	84169	170110	10812	10764	21576	1095	1126	2221
Kendrapara (M)	24212	22794	47006	2482	2408	4890	315	290	605
Pattamundai (NAC)	18549	17979	36528	5696	5503	11199	9	8	17
Total	717814	722547	1440361	155531	154249	309780	4748	4736	9484

Source: DSHB, Kendrapara 2018

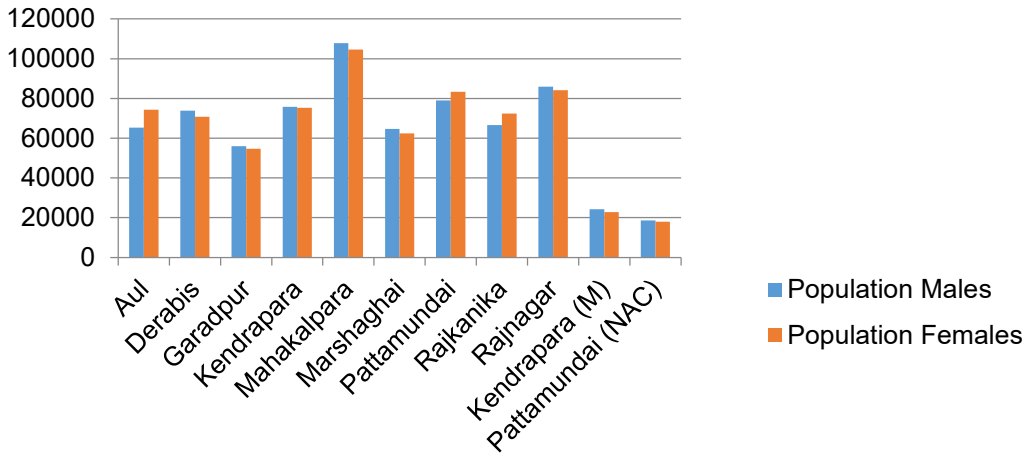


Chart 1: Population of Kendrapara, blocks and ULBs disaggregated, Census 2011

Kendrapada district is divided into 9 blocks and 9 tahasils for administrative convenience. The districts are Aul (also known as Ali), Derabis, Garadpur, Kendrapara Sadar, Mahakalpara, Mashaghai, Pattamundai, Rajkanika and Rajnagar. Out of the 9 blocks, Mahakalpara is the largest block, both by area and population, followed by Rajnagar. Both Rajnagar and Mahakalpara are on the coast. There are two municipalities in the district, that is, Kendrapara and Pattamundai (DES, 2023). Kendrapara is mostly a rural district of Odisha and there are 249 Gram Panchayats. According to the Census 2011, there are 1415 inhabited villages and 132 uninhabited villages in Kendrapara.

The sex ratio of Kendrapra stands at 1007 females per 1000 males as of Census 2011. As per the 2001 Census, the sex ratio stood at 1014 females per 1000 males. The sex ratio is higher than the state average. The population of females exceeds the population of males in three blocks, namely Aul, Pattamundai and Rajkanika. The sex ratio in rural areas is higher than the urban areas. The sex ratio between SC and ST population is just below 1000 females per 1000 males. Due to the absence of sex-segregated Census data, it is difficult to know the exact number of women with Disabilities.

Table 2: Persons with disability in Kendrapara disaggregated by type, sex and rural/urban, Census 2011.

Types of Disability	**Total/Rural/Urban**	**Total number of disabled persons**		
		PWD	**MWD**	**FWD**
Total number of disabled persons	Total	40110	22503	17607
	Rural	38058	21318	16740
	Urban	2052	1185	867
In seeing	Total	6309	3293	3016
	Rural	5971	3114	2857
	Urban	338	179	159
In Hearing	Total	7643	3920	3723
	Rural	7334	3769	3565
	Urban	309	151	158
In Speech	Total	2084	1228	856

	Rural	1996	1175	821
	Urban	88	53	35
In Movement	Total	9314	5808	3506
	Rural	8804	5483	3321
	Urban	510	325	185
Mental Retardation	Total	3017	1706	1311
	Rural	2791	1564	1227
	Urban	226	142	84
Mental Illness	Total	1727	970	757
	Rural	1618	898	720
	Urban	109	72	37
Any Other	Total	6067	3377	2690
	Rural	5839	3242	2597
	Urban	228	135	93
Multiple Disability	Total	3949	2201	1748
	Rural	3705	2073	1632
	Urban	244	128	116

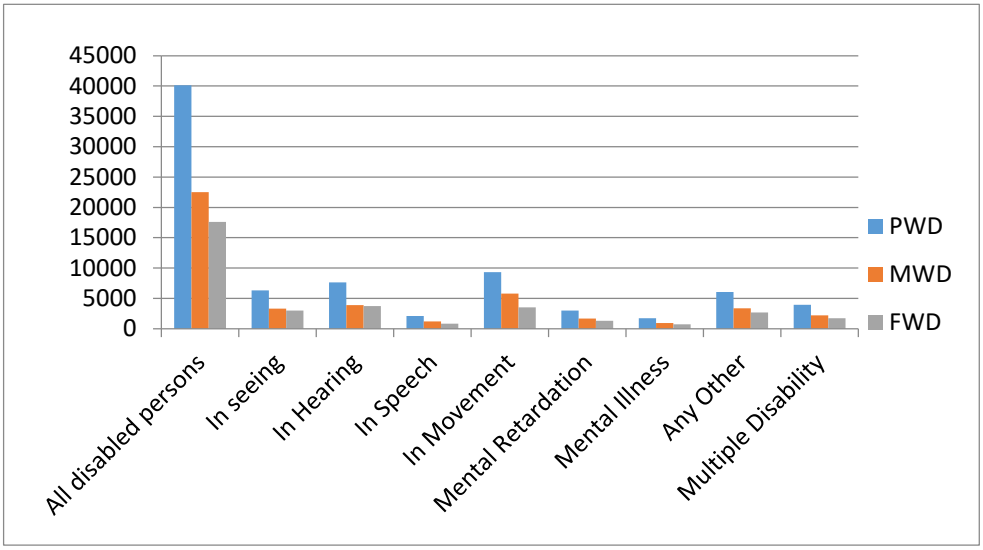


Chart 2: Population of Persons with disbaility in Kendrapara District, Census 2011

The population of persons with disability in Kendrapara district is 40,110. It is about 3.22 percent of the total persons with disability in the state and 2.78 percent of the total population of the district, according to the Census 2011. Out of the total population of PWD in the district, 22,503 are males with a disability which is about 56.1 percent and 17,607 are females with disability which is 43.9 percent of the total population of PWD. Disability in movement is the prominent disability with 9,314 PWDs followed by disability in hearing and disability in seeing. Out of the total FWDs, 16740 live in rural areas of the district and only 867 reside in the urban areas. For FWDs, disability in hearing is the most prominent with 3723 FWDs, followed by disability in movement, in seeing, other types of disability, multiple disabilities, mental retardation, disability in speech and intellectual disability.

To sum up, the population of PwDs in Kendrapada is 40,110. Which is 3.22 percent of the PwDs in Odisha and 2.78 percent of the total population of the district. (Census of India,2011). Males constitute 56.1 percent and females are 17,607 which is 43.9 percent of the total population of PWD. Disability in movement is the prominent disability with 9,314 PWDs followed by disability in hearing and disability in seeing. Out of the total FWDs, 16740 live in rural areas of the district and only 867 reside in the urban areas. For FWDs, disability in hearing is the most prominent with 3723.

Literacy and Employment

Literacy in Kendrapara district surpasses that of the state average with 85.2 percent of people being literate (DSHB Kendrapra, 2018). About 91.5 percent of the male population is literate whereas female literacy in the district is about 79 percent. Literacy in rural areas is about 85 percent and in the urban area, it is about 88.3 percent.

Table 3: Literacy in Kendrapara, disaggregated by sex, and rural/urban, Census 2011

Total /Rural /Urban	Age-group	Total			Illiterate			Literate		
		Persons	Males	Females	Persons	Males	Females	Persons	Males	Females
Total	excluding 0-6	1279202	634160	645042	189937	54190	135747	1089265	579970	509295
Rural	excluding 0-6	1204689	596154	608535	181204	51395	129809	1023485	544759	478726
Urban	excluding 0-6	74513	38006	36507	8733	2795	5938	65780	35211	30569

Table 4: Population and main workers in Kendrapada, disaggregated by sex, age group and rural/urban, Census 2011.

Area	Total/ Urban/ Rural	Age-Group	Population			Main workers		
			Persons	Males	Females	Persons	Males	Females
Kendrapara	Total	Total	1440361	717814	722547	322265	295890	26375
Kendrapara	Total	**15-59**	885286	433395	451891	281843	258000	23843
Kendrapara	Total	**60+**	169309	86502	82807	38312	36197	2115
Kendrapara	Rural	Total	1356827	675053	681774	299189	275110	24079
Kendrapara	Rural	**15-59**	831281	405984	425297	260503	238821	21682
Kendrapara	Rural	**60+**	161315	82468	78847	36780	34763	2017
Kendrapara	Urban	Total	83534	42761	40773	23076	20780	2296
Kendrapara	Urban	**15-59**	54005	27411	26594	21340	19179	2161
Kendrapara	Urban	**60+**	7994	4034	3960	1532	1434	98

There are 8,85,286 persons of working age in Kendrapa and out of the working-age population 4,33,395 are males and 4,51,891 are females (Census, 2011). Out of the total main workers in the district, 2,95,890 males and 26,375 females. Only 3.65 percent of females are the main workers out of the total female population whereas for males it is about 41.22 percent. Among the marginal workers, there are 12401 males and 14107 females who have worked for less than 3 months total. There are 78,091 male workers and 40026 female workers who have worked for 3 to 6 months total. About 68727 workers are seeking/available for work. The population of Non-workers in the working age of 15-59 stands at 4,77,260 out of which 3,80,368 are females and 96,892 are males.

Table 5: Marginal workers in Kendrapra, disaggregated by age, sex and rural/urban, Census 2011

Area	Total/ Urban / Rural	Age-Group	Marginal workers								
			Worked for less than 3 months Total			Worked for 3 to 6 months Total			Seeking/available for work		
			Persons	Males	Females	Persons	Males	Females	Persons	Males	Females
5	6	7	14	15	16	17	18	19	20	21	22
Kendrapara	Total	Total	26508	12401	14107	118117	78091	40026	68727	54975	13752
Kendrapara	Total	**15-59**	22210	10013	12197	103973	68490	35483	65037	52074	12963
Kendrapara	Total	**60+**	3202	1801	1401	11778	8216	3562	2704	2241	463
Kendrapara	Rural	Total	25686	11963	13723	114823	76284	38539	66909	53550	13359
Kendrapara	Rural	**15-59**	21488	9641	11847	101026	66890	34136	63304	50719	12585
Kendrapara	Rural	**60+**	3142	1761	1381	11501	8055	3446	2653	2201	452
Kendrapara	Urban	Total	822	438	384	3294	1807	1487	1818	1425	393
Kendrapara	Urban	**15-59**	722	372	350	2947	1600	1347	1733	1355	378
Kendrapara	Urban	**60+**	60	40	20	277	161	116	51	40	11

Table 6: Non-workers population in Kendrapara, disaggregated by, age, sex and rural/urban, census 2011.

Area	Total/ Urban/ Rural	Age-Group	Non-workers		
			Total		
			Persons	Males	Females
5	6	7	23	24	25
Kendrapara	Total	Total	973471	331432	642039
Kendrapara	Total	**15-59**	477260	96892	380368
Kendrapara	Total	**60+**	116017	40288	75729
Kendrapara	Rural	Total	917129	311696	605433
Kendrapara	Rural	**15-59**	448264	90632	357632
Kendrapara	Rural	**60+**	109892	37889	72003
Kendrapara	Urban	Total	56342	19736	36606

Kendrapara	Urban	**15-59**	28996	6260	22736
Kendrapara	Urban	**60+**	6125	2399	3726

Climatic condition in Kendrapada

Kendrapara receives annual average rainfall of about 1556 mm. Though the onset of monsoon usually begins in June every year, the district receives rainfall throughout June to October with July and August being the wettest months. According to Table 1

YEAR MONTH WISE RAINFALL REPORT (in mm) OF KENDRAPARA DISTRICT.													
YEAR 1994 - 2017													
Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
1994	0	9.44	0	52.67	45.78	274.78	305.17	506.06	208.06	102.28	1.78	0	1506.02
1995	2.58	12.33	1.22	6	513.22	73.22	131.22	286.2	285.03	382.78	215.44	0	1909.24
1996	0	1.11	0	0	41.44	217.23	287.17	262.72	34.8	100.7	33.62	0	978.79
1997	10.94	3.56	23.28	54.78	32	222.4	477.22	608.69	288.78	19.5	4.06	9.5	1754.71
1998	1.78	1.78	104.28	22.68	4.44	182.27	121.94	151.47	276.94	315.39	87.22	0	1270.19
1999	0	0	0	0	188.61	194.67	356.67	320.94	188.78	822.44	0	0	2072.11
2000	0	22	0	11.86	44.66	224.28	115.78	235.04	141.61	68.22	0	0	863.45
2001	0	0	4.33	7	26.89	151.07	317.97	333.34	169.11	93.06	104.06	0.22	1207.05
2002	17.44	0	0.83	25.67	33.2	147.06	96.57	228.94	175.56	44.72	96.56	0	866.55
2003	0	0.56	5.5	0	16	212.33	441.34	395.56	294.17	636.28	0	21.11	2022.85
2004	0	2.78	0	14.33	24	176.5	241.67	430	203.11	290.28	0	0	1382.67
2005	24.28	0	17	12.78	36	76.78	497.44	178.72	469.33	457.83	0	0	1770.16
2006	0	0	5.56	2.56	84.06	156.56	329.33	567.92	246.33	24.33	9.22	0	1425.87
2007	0	61.89	25.22	2.56	97.08	190.22	206.17	438.56	498	110.11	8.33	0	1638.14
2008	35.33	14.22	5	78.89	83.61	431	176.03	252.89	509.11	75	0	0	1661.08
2009	8.89	0	0	1.44	172.89	39.56	589	175.67	362.33	170.78	34.67	0	1555.23
2010	0	0	4	0	92.33	96.5	225.39	182.11	201.44	380	34.56	33.89	1250.22
2011	0	1.89	20.89	34.33	114.22	421.39	228.56	293.78	380.78	13.67	0	0	1509.51
2012	33.56	0	0	13.89	38.78	90.22	309.28	224.89	171.11	65.56	164.67	6.94	1118.9
2013	0	0	3.33	77.89	100.56	229.94	273.22	217.78	163.89	647	0	0	1713.61
2014	0	24.11	68.67	0	189.89	121	396.33	328.44	295.33	136.11	0	1.44	1561.32
2015	51.56	3.56	14.56	78.44	26	121	431.33	247.89	123.33	87.67	19.22	0.33	1204.89
2016	2.44	17	6.44	4	184.22	192.67	216.49	510.47	276.09	149.68	83.18	0	1642.68
2017	0.67	0	81.47	2.67	30.53	142.83	343.24	330.92	148.02	228.89	146.16	48.93	1504.33

Table 7: Year wise Rainfall report of Kendrapara district (1994-2017)

Source: statistical report of Kendrapara, Government of Odisha.

there have been certain years when the district received rainfall below and above the normal, hence it has been unpredictable. During the last three years, that is, in 2019, 2020, and 2021, the district received an average annual rainfall of 1583.1 mm, 1887.6 mm and 1890.2 mm respectively (DES, 2021; 2022; 2023). Kendrapada being a coastal district has an average humidity of 81 percent in the day and 78 percent in the evening measured in 2015 (DSHB Kendrapara, 2018). The average temperature of Kendrapara district for the year 2015 was 32.9°C maximum and 16.3° minimum. The average temperature for January was 26.2°C maximum and 16.3°C minimum and the average temperature for May was 32.8°C maximum and 28.0°C minimum. The diurnal

temperature range during the summer season is shorter than that of the winter. From March to November the maximum temperature stays above 30°C. On 11th April 2016, the maximum temperature recorded was 43.7° Centigrade and in 2023 the maximum temperature recorded on 16th June 2023 was 45° Centigrade (*retrieved from Accuweather*).

Table 8: Maximum and minimum temperature of Kendrapara district in Centigrade, for the year 2015.

2015	Monthly Temperature in Centigrade	
Month	Maximum	Minimum
January	26.2	16.3
February	28.3	19.6
March	30.9	23
April	31.6	25.7
May	32.8	28
June	32.5	27.7
July	31.6	26.6
August	32.5	26.9
September	32.9	27.1
October	32.3	25.4
November	30.3	21.6
December	27.4	19.5

Source: District Statistical Handbook Kendrapara, 2018.

Kendrapada district is drained by the rivers Mahanadi, Bramhani and Baitarani, as well as numerous tributaries and distributaries of these three rivers. The delta of rivers Brahmani and Biatarani is a marshy land supporting the growth of mangroves and houses saltwater crocodiles and a wide variety of flora and fauna. These rivers are the major source of irrigation in Kendrapara district and according to Krishi Vikash Kendra, Kendrapara, about 46,150 hectare of land is irrigated through Major irrigation projects

According to the Krishi Vigyan Kendra, Kendrapara, the prevalent soil in the district is Alluvium which is about 92 percent. The rest 8 percent soil is Black soil. Out of the total alluvium soil, 16.1 percent are saline in nature. The rest 75.9 percent soil is irrigated and rainfed alluvium. The district has a small forest area of 3462 hecatre and the Mahakalapada has the highest 2778 hectare of forest region (DSHB Kendrapara, 2018)

3. NATURAL CALAMITIES IN KENDRAPARA

Kendrapara being a coastal district has a maximum temperature of 37° Centigrade during the summer season whereas during the winter season temperature can drop to 13°

Centigrade (DDMA,2023). On 11th April 2016, the maximum temperature recorded was 43.7° Centigrade and in 2023 the maximum temperature recorded on 16th June 2023 was 45° Centigrade (*retrieved from Accuweather*). The average normal annual rainfall received in the district is about 1556 mm (DDMA 2023). However, the rainfall data from 1994-2017 of Kendrapara district (retrieved from the Kendrapara district website of the government of Odisha) has been unpredictable. The district is badly affected by cyclones and has been regarded as the most cyclone-prone district of Odisha. From the record of natural hazards, it has been observed that Rajnagar block faced a lot of natural calamities especially floods over the past as well as recent years (Chatterjee, 2018).

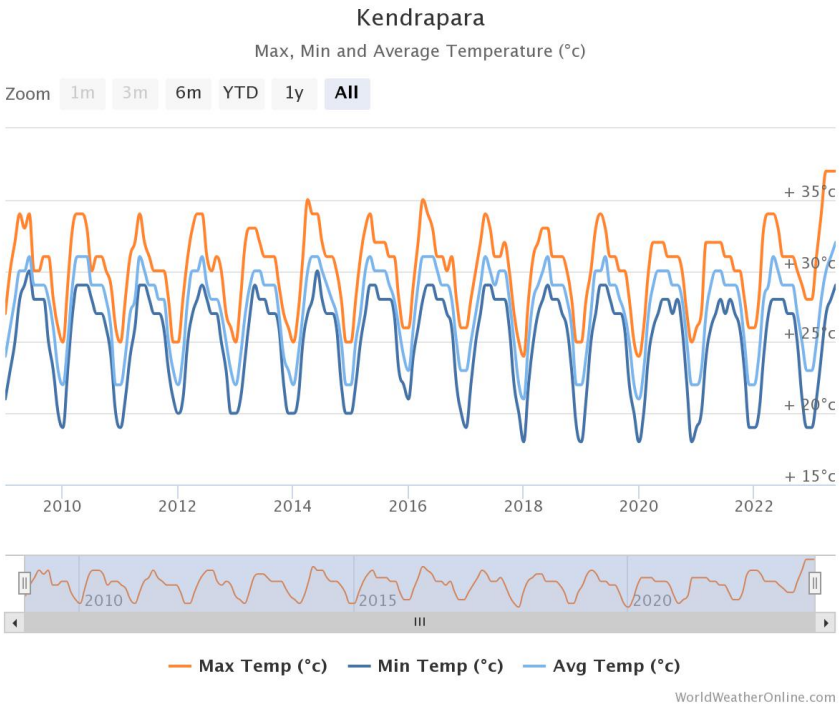


Chart 3: Annual temperature of Kendrapara district from 2009-2023, *source: worldweatheronline.com, retrieved on 27.07.2023 time: 16:36*

According to the annual temperature data of World Weather Online, the average temperature of Kendrpara reached 35° Centigrade in the year 2014 and 2016, whereas it reached 37° Centigrade in 2023. From 2017 to 2023 the minimum temperature has stayed below 20° Centigrade reaching 18° Centigrade, whereas from 2012 to 2015 it stayed at 20° Centigrade. The rainfall has been unpredictable from 2009 to 2023. In the years 2009, 2011, 2012, 2014, 2016, 2018 and 2019 the average rainfall during the month of July-September exceeded 400mm whereas in other years, it stayed below 400mm. In 2021, Kendrapara received rainfall in the March-June quarter as well as the July-September quarter. During the January-March quarter, which is usually dry, in the years 2015, 2017, 2020 and 2023 there was substantial rain recorded.

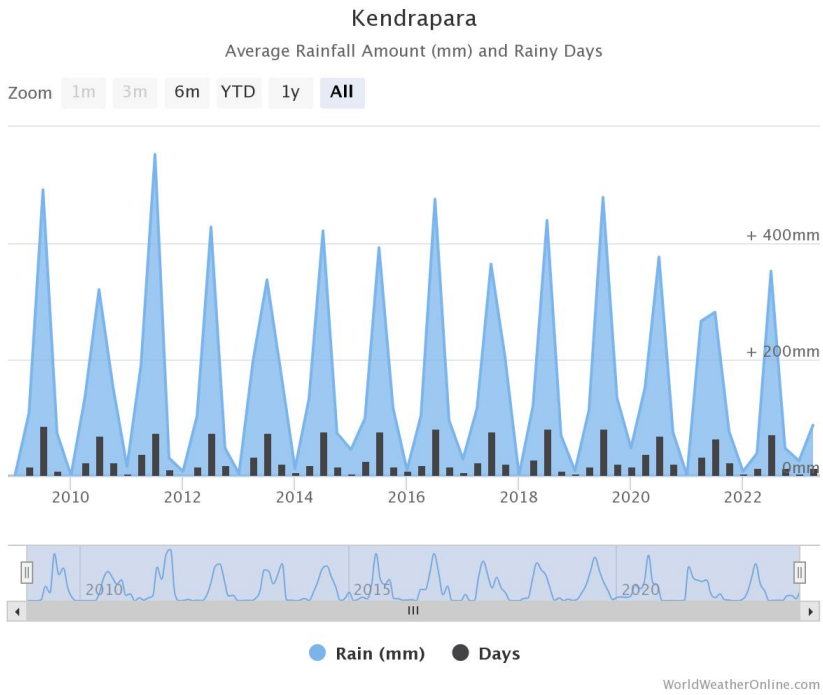


Chart 4: Annual rainfall in Kendrapara district from 2009-2023, *source: worldweatheronline.com, retrieved on 27.07.2023 time: 16:45*

Table 9: Types of Disaster, year and month of occurrence in Rajnagar block, Kendrapra

Type of Disaster	Year of Occurrence	Month of Occurrence
Flood	1992	August
Flood	1999	October
Flood	2001	July
Flood	2003	July-August
Flood	2006	August
Flood	2008	September
Flood	2009	September
Flood	2011	August
Cyclone	1967	October
Cyclone	1971	October
Cyclone	1982	August
Cyclone	1999	October

Cyclone	2013	October
Cyclone	2014	October
Heavy Rainfall	1995	May
Unseasonal Rain	2010	December

. *Source: Rajnagar Automatic Rain Recording Station extracted from Chatterjee, 2018.*

According to the data recorded by the Rajnagar Automatic Rain Recording Station, the district has been affected by severe floods during the years 1992, 1999, 2001, 2003, 2006, 2008, 2009 and 2011. The district being on the eastern coastal plain and having low mean elevation is prone to flood. During the monsoon, the rivers Brahmani and Baitarani and their tributaries swell above danger level and Kendrapara is affected by the flood water. The district has been affected by the flood, eight times between 2011 to 2021 (DDMA, 2023). The District Disaster Management Authority, Kendrapara has notified that the floods have affected a total population of 1445891 and caused 19 deaths apart from damages to infrastructures. There have been two hailstorms recorded within the decade where 18 persons lost their lives with houses being damaged.

Table 10: Types of disasters, number of incidences and effect on Kendrapara, occurred from 2011 to 2021

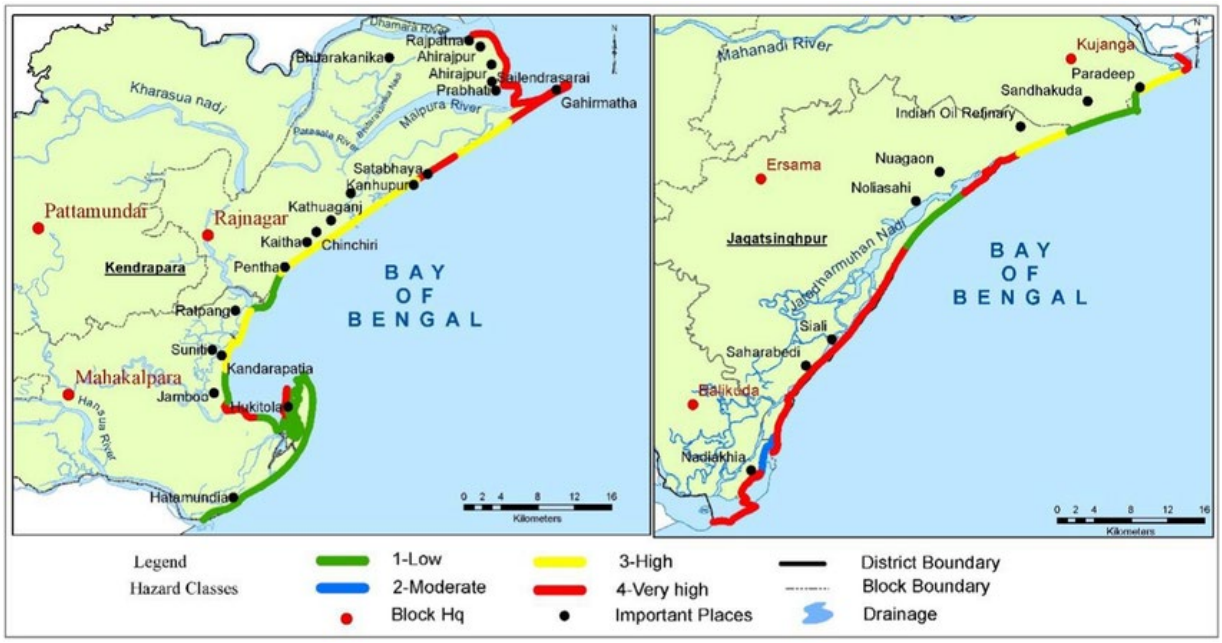
Sl. No.	Disasters	No. of incidents during (2011-2021)	No. of deaths	Affected Population	Livestock Loss	Houses Damaged	Schools/AWC Buildings Damaged	Hospitals Damaged	Road in Km. Damaged	Other Critical Infrastructure Damaged	Damage and loss of Crop Area (in Hectare)
1	Flood	8	19	1445891	331990	47235	290	83	1090.72	246	6925
2	Drought	0	0	0	0	0	0	0	0	0	0
3	Fire	14	14	0	0	0	0	0	0	0	0
4	Hail Storm	2	18	0	0	1425	0	0	0	0	0
5	Cyclone	7	6	1522901	55982	3611	0	0	19	0	16480
6	Earthquake	0	0	0	0	0	0	0	0	0	0
7	Tsunami	0	0	0	0	0	0	0	0	0	0

Source: District Disaster Management Authority 2022-2023

The district has been badly affected by cyclones in 1967, 1971, 1982, and 1999, with the 1999 Super Cyclone being the most devastating one. The frequency of cyclones was low till the end of 1999, with the Super Cyclone happening 17 years after the cyclone occurred in 1982. The frequency of cyclones from 2011 to 2021 has increased substantially with seven recorded cyclones affecting the district (DDMA 2023). There were six deaths notified by DDMA, Kendrapara with 15,22,901 population affected by the cyclones apart from the damages to infrastructure and loss of livestock.

Table11: Detailed effects of Cyclones on Kendrapara District:

Name of Cyclone	Year	Losses
Super Cyclone	**1999**	The district was badly hit by the super cyclone which occurred on 29.10.1999. All nine blocks were severely affected with 375 human causalities and the value of loss of property was estimated to be Rs. 6,18,43,23,000.00. Around 1,45,000 houses were completely damaged. Besides, there was unreported loss of life, domestic animals and loss of property. As per the Revenue Department report, nine Blocks and 2 Municipalities of Kendrapara District were affected by Super Cyclone in which 205 G.Ps. and 1564 Villages consisting of Lakhs of population were affected.
Phailin	**2013**	In cyclonic storm Phailin followed by heavy rain, one human life was lost with the crop loss in an area of 192.59.43 Ha of agricultural land. The amount of agriculture input subsidy payable to 51798 affected farmers was Rs. 1,37,17,11,900.00.
Huudhud	**2014**	There was no loss of property in the cyclonic storm HUD-HUD" 2014; two human lives were lost during their shifting to safer places by the District Administration in anticipation of the cyclonic storm.
Fani	**2019**	In cyclonic storm Fani, three human lives were lost and three were severely injured with the crop loss in an area of 1099.55 Ha of agricultural land. All the people from the 9 blocks of this district were affected by the Extremely Severe Cyclonic storm FANI. The value of the total loss of property due to the said disaster is Rs. 4058 crores.
Bulbul	**2019**	On 5th November 2019 cyclonic storm Bulbul, caused a crop loss of 71792 Ha of agricultural land. All the people from the 9 blocks of this district were affected by the Severe Cyclonic storm Bulbul. The value of the total loss of property due to the said disaster is Rs. 210.19 crores.
Amphan	**2020**	In cyclonic storm Amphan, there are crop loss of 478 Ha of agricultural land. The value of the total loss of property due to the said disaster is Rs. 14.64 crores.
Yaas	**2021**	In cyclonic storm Yass, there are crop loss of 952 Ha of agricultural land. The value of the total loss of property due to the said disaster is Rs. 57.64 crores.
Jawad	**2021**	In cyclonic storm Jawad, there are crop loss of 20,522 Ha of agricultural land. The value of the total loss of property due to the said disaster is Rs. 92.59 crores.



Picture 1: Risk assessment of coastal erosion for Odisha coast along the Bay of Bengal, India using coastal hazard wheel model - Scientific Figure on ResearchGate. *Available from: https://www.researchgate.net/figure/Vulnerability-profile-of-coastal-erosion-along-Kendrapara-and-Jagatsinghpur-District_fig8_357824978 [accessed 28 Jul 2023]*

Kendrapara district is susceptible to Coastal erosion. According to the risk assessment of coastal erosion in Odisha (Panda *et.al*, 2022), the coastal region from Pentha to Stabhaya has a high risk of erosion whereas, from Satabhaya onwards, the risk of coastal erosion is very high. Coastal erosion is very high near the mouth of the Brahmani River. The shoreline of Rajnagar and Mahakalpara recorded higher erosion between 2000-2005 and 2005-2010 (Barik*et.al* 2019; 7).

4. EDUCATION IN KENDRAPARA

Literacy in Kendrapara district is higher than the state average. According to DESO (2023), there are 908 primary schools, 746 Upper-Primary schools, 373 high schools, 94 junior colleges and 56 degree colleges as of 2021-2022 sessions where 224512 students are enrolled in the schools. During the 2017-2018 sessions, there were 37944 boys and 37648 girls enrolled in Primary Schools (DSHB, 2018). In the Aul, Derabish and Mahakalpara blocks, the enrollment of girls is higher than that of boys. Similarly, for upper primary, the enrollment of girls was higher than that of boys in Aul, Derabish, Kendrapara, Rajakanika and Rajnagar. Interestingly, enrollment of girls in Secondary schools has been higher than that of boys. The enrollment of girls in colleges stands at 18263 whereas for boys it is 14400. In Kendrapara town, enrollment of girls in college is 2886, whereas for boys it is 1034. The females in the district are opting for higher education, more than the males.

4. HEALTH CARE IN KENDRAPARA

The healthcare system lags in the district in comparison with Khurda and Cuttack District. There are no medical colleges in the district. There is one district headquarters hospital located in the Kendrapara town as of January 2021 (DES, 2023). There are two other sub-divisional and other hospitals for providing special care. There are 8 Community Healthcare Centers, 46 Primary Health Care centers and 227 Health Sub Centers. Number of beds available for the patients throughout the district is about 381. There are 16 Ayurvedic and 19 Homeopathic Hospitals and dispensaries as of January 2021. There are 98 doctors, 87 staff nurses and 1281 ASHA workers in the district as of 2018 (DSHB Kendrapara, 2018). Infant (0-1 years) mortality in the district has reduced from 89 in 2016 to 54 in 2017. A total of 1415 villages of Kendrapara are covered under the Rural Drinking Water Supply Program and there are 249 piped water projects as of 2018.

6. ECONOMY AND EMPLOYMENT

Table 12: Main workers and primary sector employment in Kendrapara, Census 2011

Area	Total/	Age	Main workers											
Name	Rural/	group				A								
	Urban					A- Agriculture, Forestry and Fishing								
						Cultivators			Agricultural labourers			Plantation,Livestock,Forestry, Fishing, Hunting and allied activities		
			Persons	Males	Females	Persons	Males	Females	Persons	Males	Females	Persons	Males	Females
4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Kendrapara	Total	Total	321971	295483	26488	122975	119443	3532	70136	65120	5016	9682	7764	1918
Kendrapara	Rural	Total	298904	274585	24319	121033	117594	3439	68599	63775	4824	9436	7572	1864
Kendrapara	Urban	Total	23067	20898	2169	1942	1849	93	1537	1345	192	246	192	54

There are a total of 3,21,971 main workers in the district (Census, 2011). Out of the total main workers, about 8.23 percent are female and the rest 91.77 percent are male. Out of the total main workers, 2,02,793 workers are employed in the Agriculture, Forestry and Fishing industries. The district is primarily an agricultural district that could be ascertained, as well as employment opportunities for females are quite low, even though literacy among women is high and the sex ratio of the district exceeds 1000 females for 1000 males. Other important industries in the district are the manufacturing industry, construction industry and wholesale and retail trade of commodities.

As of 31st December 2018, the total deposit with banks in the district stands at Rs. 5253.65 crore, while the credit given by the banks is about Rs. 1829.21 crore. The credit-to-deposit ratio of the district is 34.81 percent whereas the state average is 47.15 percent. There is a network of 135 branches of different banks with 2 urban branches, 41 semi-urban branches and 92 rural branches as of 31st December 2018.

The Hotspot

Odisha has a 480sqkm. Coastline.Sea has been constantly engulfing the coast. area of Satabhaya which was 350 square kilometers- according to a settlement map of 1930- has reduced to around 140 square kilometers as of 2015 (Banerjee, 2016; New India Express, 2015). The villages of Govindpur, Mahnipur, and Kuanriora were among the first to vanish into the sea. “Two more villages- Kharikula and Sarpada- were submerged in the mid-1990s” (Mishra, 2017: 96).

Large-scale dependence on climate-sensitive livelihood systems such as agriculture, fisheries, and livestock has added to the vulnerabilities of the population in a situation of climate variability and erratic weather conditions. Rapid and unplanned urbanization in many parts of the district has created waterlogging conditions that have caused flash floods. Socio-political and cultural factors have marginalized women, the disabled and the poor. Therefore, the magnitude of vulnerability varies with different sections of population-poor, disabled etc. Intersectionality in terms of gender, caste and class has multiplied vulnerability.

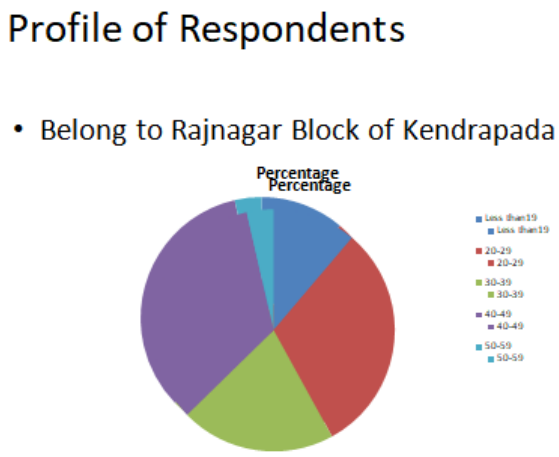
Research Universe:

Women with disabilities are the targeted group for this research. The women belonged to different panchayats of the Rajnagar Block in Kendrapara District, Odisha.169 women with disabilities in this affected region were surveyed. Out of the 169 respondents, 75 respondents had experienced multiple displacements due to coastal erosion and riverbank (Brahmani-Baitarani Delt) erosion and relocated to a safer location. About 169 responses have been uploaded to a spreadsheet. The average household size calculated from the uploaded data is about 4.2 members in each family with the largest household of 11 members and the smallest one with two members.

Table 13: Age profile of respondents

Respondents Age in years	Frequency	Percentage
Less than19	19	11.2
20-29	52	30.8

30-39	35	20.7
40-49	57	33.7
50-59	6	3.6
Total respondents	169	100.00



The reason for taking 18 years as the minimum age is that at this age girls from poorer families migrate as domestic workers or as skilled workers to garment industries under the skill-development programme of the State. All the respondents are within the working age group of 15-64 years age. The youngest respondent is 18 years old while the oldest respondent is 55 years old. The mean age of all the respondents is 33.4 years. 19 respondents are in the age group of 10-19, while 52 respondents are in the age group of 20-29 years. There are 35 respondents in the age group of 30-39, and 57 respondents in the age group of 40-49. The rest 6 respondents are within the age group of 50-59 years age.

24 respondents belong to the General Category, 116 respondents belong to the Other Backward Classes category and the rest 27 WwDs belong to Scheduled Castes and two WwDs are Scheduled tribes.

Type of disabilities among respondents

Women and girls experiencing disabilities are having multiple disabilities. Multiple disabilities create barriers to their livelihoods and living. This physical condition deprives them of having access to their essential needs.

Table 14: Type of Disabilities among Respondents

Types of Disability among Respondents	Frequency	Percentage
In Movement	64	37.9
Psycho-social	50	29.6
In Hearing	8	4.7

In Speech	7	4.1
In Hearing and speech	11	6.5
In seeing	14	8.3
Intellectual disability	6	3.6
Multiple Disability	8	4.7
Any other	1	0.6
Total	169	100

The respondents have different forms of disability. 58 of them are incapable of movement, 52 of them have intellectual disabilities, 14 of them are visually impaired, and 26 of them are finding difficulty in hearing and speech. 8 of them have multiple disabilities. 37.9 percent of the respondents have a disability in movement. with one of them has a case of severe burn from the waist down, while another has a Hunchback along with disability in movement. 29.6 percent have a psycho-social disability. Among the rest, 6.5 percent of respondents have a disability in hearing and speech, 4.7 percent of respondents have a disability in hearing only and 4.1 percent of respondents have a disability in speech only. Out of 169 respondents, 8.3 percent of respondents have a disability in seeing, 3.6 percent of respondents have intellectual disability, 4.7 percent of respondents have multiple disabilities and 0.6 percent of respondents have any other type of disability.

Marriage is a casualty among women with disabilities. These women and girls stay in their paternal homes either with their parents or brothers. 58 percent of the respondents are not married and three of them are deserted by their husbands and are living alone with their parents. Among all the respondents, 63 respondents are married, with the youngest of them being 19 years old with disability in movement. Three respondents are widows. The rest 100 respondents are unmarried with the oldest respondent being 45 years old with disability in movement.

There are 12133 female workers in Rajnagar block (Census, 2011) which is 14.4 percent of the total female population in the block. According to the survey, 15.4 percent of the total respondents are workers, with only three respondents having regular employment one is a migrant laborer, two respondents have casual employment and the rest 20 are self-employed. According to the Census (2011), 79 percent of the total female population of Kendrapara is literate, whereas 78.7 percent of the total rural female population of the district is literate. But, it is found from the survey that 59.8 percent of our respondents are literate.

Table 15: Educational Profile of Respondents

Level of literacy	Frequency	Percentage
Illiterate	68	40.2
Primary	64	37.9
Secondary	30	17.7
Higher Secondary	4	2.4
Graduate and above	3	1.8

40.68 percent of them have no education and 39.34 percent of them have only elementary education. 16 percent of them have high school level qualifications, but no jobs though the government has reserved 4 percent of jobs in every sector or public institution. The family members of disabled girls hardly explore in what way they can develop them. 2 percent of the respondents have a graduation degree, but no livelihood. 98 percent of the respondents are unemployed and only three of them have livelihoods like grazing the goats of the neighbours and as a domestic help in the village.

26 out of 169 respondents have stated that they are working. Out of these 26 women with disabilities, four respondents have regular employment. One of the respondents has recently been appointed as an ASHA worker which is a regular employment but with very little salary. One respondent runs a shop, while another is a daily wage laborer. Only two respondents are contractually appointed in a school and one does weaving. One respondent has migrated to Kerala for work. 15 of them are engaged in goat rearing and poultry farming on a very small scale and are taking their cattle or goats for grazing. Two respondents are engaged in aquaculture and two are earning livelihoods from poultry farming. One respondent has shared that she is running her father's shop.

56.68 percent of them have no job card under MGNREG, though they can do unskilled work. Even they do not have labour cards under the Construction Worker's Welfare Board, though at times the hearing and speech impaired girls can do such work. During days of financial crisis, the first saving that is used is the allowances received from the government by the disabled girls.

Access to Welfare policies:

Indian State and the Odisha government have multiple schemes to assist the poorer households to escape from poverty conditions. The Union and state administration have provisioned healthcare benefits, monthly allowances and livelihood assistance to the poorer families. Women with disabilities belonging to such families have access to such benefits in law.

However, our baseline survey reflects that among all the respondents, only nine respondents do not possess the Disability Card, which implies that, they are not able to avail disability pension provided by the State Government.

165 respondents possess the Unique Identification card (AADHAR). Among all the respondents, 22 respondents do not possess a Voter ID card even though they are

eligible to vote. Among the respondents, 20 respondents do not possess the BSKY (BijuSwasthyaKalyanYojana) card under which their household could have availed free health insurance of up to Rs. 10 Lakh. BSKY is a policy of the Government of Odisha where the underprivileged families of Odisha can avail health insurance up to Rs. 500,000 and particularly an additional Rs. 5,000,000 health insurance is meant for the treatment of women and girls.

Among the respondents, only seven respondents hold the Job Card under MGNREGA five respondents hold the Labor Card.

Changes in Climate Observed by Respondents:

The term “climate change” is unknown to the majority of the respondents. When enquired if they knew about climate change, about 77 percent of the respondents denied any knowledge of climate change. However, 95.3 percent of respondents have informed that they have observed changes in the rainfall pattern over the last 10 years ranging from mild changes to major changes. Almost all the respondents have accepted that they have observed mild to major increases in temperature during the summer season within the last 10 years. 93.5 percent of respondents informed that the temperature is unusually very high and there are heat waves in summer. When the respondents enquired about observing coastal erosion or riverbank erosion within the last 10 years, 59.2 percent of the respondents informed that they had observed erosion in their region along the coastline and riverbank. Similarly, 90.5 percent of the respondents have informed that they have observed changes in the winter and 14.2 percent of the respondents have specifically observed that the temperature during winter reduces more than usual with unusually short periods of winter.

Table 16: Climatic changes observed by the Respondents

In the last 10 years.	**Major Change**	**Mild Change**	**No Change**
Rainfall pattern	75.8%	19.5%	4.7%
Temperature in Summer	94.7%	5.3%	0
Temperature in Winter	78.7%	11.8%	9.5%
Coastal or Riverbank Erosion	10.1%	49.1%	40.8%

Climate change impacts:

The impact of climate change on agriculture is more intense in the regions where farming is more primitive and the scope of adoption of technology is less (Mishra *et al.* 2015). The paddy cultivation in coastal regions is vulnerable to salinization, inundation and coastal erosion, as witnessed in Satabhaya. Besides crop losses, many farmers also lost livestock which includes large and small draught animals, milch animals and poultry birds.

How has the Project adapted or expanded its focus on intersectionality? (addressing women with disabilities and elderly women, youth, migrant etc. since the midline survey)

The Project team has tried to understand the multiple vulnerabilities of the respondents in the study by focusing on intersectionality in deprivation and discrimination. Intersectionality implies the ways in which caste, economic status gender identity, disability, and other forms of discrimination "intersect" to create unique dynamics of discrimination and deprivation effects.

By analyzing through the lens of intersectionality, we found that any sort misfortunes that befall on the family the worst affected are the disabled women and girls. 88.68 percent of our respndents' households had experienced crop loss during disasters. This amounts to Rs5000 to Rs50,000. In such a scenario, the disabled women and girls experience lack of nutritious food, medical care and some of them are compelled to work in the neighbourhoods as domestic helps. 55.35 percent of our respondents' households have experienced loss of cattles, goats and chickens.17.35 respondents have shared that the household assets were damaged during disaster and relocation. Most of the respondents lack assistive devices that include wheelchair and walking stick. Though the government provide these assistive devices through the Block social welfare officer, families of disabled girls are very casual in renewing their disability ID card or getting those devices from the block office. The respondents shared that they are the last person to be shifted to the cyclone shelter before the onset of the disaster.

Health issues- 12 percent of our respondents shared with us that their disabilities multiplied during cyclones that happened in 1999 and 2015. 60 percent of them faced health issues in a post-disaster situation. Due to insufficient water in cyclone shelters girls and women suffer from reproductive health problems. 62 percent of them shared that their health problems multiply during winter. During the rainy season, the relocation colony becomes so wet that they find difficulty in movement within the colony itself.

Due to insufficient water in cyclone shelters girls and women suffer from reproductive health problems. 62percent of them shared that due to their health problems multiply due to severe cold during winter. During rainy season, the relocation colony become so wet that they find difficulty in movement within the colony itself.

A very negligible number have job cards under Right to Work programme named MGNREGA. This scheme provides 100 days of unskilled work to a household and worst affected are the disabled women who have no access to these 100 days of work. So, no one in the family bother to get a job card for them. Also though Odisha has Construction Workers' Welfare Board, these women have no access to its benefits though a negligible number have labour card. We found that the family members do not bother to renew their labour cards out of their ignorance.

The women with disabilities shared with pain that they are not eligible to get a house under the State's housing schemes though they are adults. They have to stay with their parents or in brother's house though they are adults. This subjects them to more torture

and exploitation. Family members take their allowances as they are giving food and shelter to the disabled women.

Adaptation:

Adaptation to climate change and weather variability has recently become a significant subject in climate change research and disaster management exercises. The objective of this contemporary focus is to reduce the vulnerability of climate-sensitive people, rehabilitate climate refugees and ensure climate justice. Adaptation refers to adjustment in ecological, social and economic systems in response to expected climate change stimuli or impacts leaving none behind (IPCC 2001). In other words, the Climate change adaptation action plan of a nation has to be inclusive in distributing resources and ensuring livelihoods(Maiti et al. 2014: 653). Adaptation can happen in two ways:

a) It may be a state-sponsored planned one and take the shape of a public policy. Its effective implementation depends on the existing administrative machinery at all levels of the administrative hierarchy.
b) Humans have a survival instinct. They try to respond to crises and develop adaptative measures to restore their livelihoods. Later on, the State intervenes to provide assistance and make the unplanned adaptation measures developed by the people into planned ones.

Adaptation Planning in India

In India, adaptation planning is interlinked with planning for mitigation and financing (Patra, 2016: 27). According to Patra (2016), “adaptation planning efforts in the country have gained new momentum as adaptation actions have become a key component of India’s national development agenda”. The National Action Plan on Climate Change (NAPCC) is the Government of India’s primary program from mitigation and adaptation to climate change adopted in 2008. The NAPCC incorporates eight National Missions for the implementation of various sectoral and regional programs. According to Byravan & Rajan (2012), there is inadequate inter-ministerial coordination and lack of clarity in NAPCC implementation. But, the NAPCC recognized the gender dimensions of impact of climate change, while ambiguity looms on the implementation of proposed plans and mission sensitive to gender. Of the eight National Missions, the more adaptation centric missions are National Water Mission, National Mission for Sustainable Agriculture, National Mission for Sustaining the Himalayan Ecosystem, National Mission for Green India and National Mission on Strategic Knowledge for Climate Change.

Aadaptation strategies in the case of sea level rise and coastal erosion have been developed in three ways, that is, protectional approach, accommodative approach and retreat approach (Linham & Nicholls, 2010; 12). According to Linham & Nicholls (2010), the protectional adaptation envisages to "defend vulnerable areas, especially population centers, economic activities and natural resources," while accommodational adaption is about occupying vulnerable areas with acceptance of vulnerability and improving preparedness. Under the planned retreat adaptation, abandonment of vulnerable structures and resettlement of inhabitants away from the shore is considered. "Adaptation is an ongoing process requiring constant prioritization of risks and opportunities, implementation of risk reduction measures and review of their effectiveness" (Linham & Nicholls, 2010; 14). There is not a 'best solution' available for the adaptation to coastal erosion (Linham & Nicholls, 2010; 17) and simultaneous application of complementary adaptation technologies will reduce the risk of catastrophic failure.

Protectional Approach

The desire of society to develop infrastructures near the coast and utilize the resources leads to adoption of protection measures (Cooper & Harlow, 1998; 1). Protection of shore refers to "reduction or elimination of damage to the shore and back land, as might be caused by flooding, wave attack and erosion using barriers to exclude hydraulic influences" (Linham & Nicholls, 2010; 20; Kraus, 2005). Protection approaches involve measures that are defensive infrastructures to protect the region against tidal flooding, storm surges, corrosive action of waves, inundation and salinity intrusion. There are various 'hard' and 'soft' structural solutions and they can be applied "alone or in combination, depending upon the specific conditions of the site (Linham & Nicholls, 2010;

21). The ‘hard’ protection measures are the infrastructures that are created on the shore to prevent direct interaction between sea and the land by arresting the energy of wave

and tides (Linham & Nicholls, 2010; 21). The hard protection infrastructures include “seawalls, sea dikes, revetments, armour units and breakwaters”. Though they can protect the hinterland, their immediate aftereffect is observed on the seabed and the adjacent coast (Linham & Nicholls, 2010; 21). Another problem with such a hard protection measure is, the cost of building such infrastructure and effect on the natural dynamicity of coastlines. Therefore, the ‘soft’ protection measures are adopted to “adapt to and supplement natural processes”. The soft protection measures include beach nourishment, artificial sand dunes and dune rehabilitations, which would soften the impact of waves and tides. Though it is more sustainable, it requires periodic monitoring and maintenance. Nourished beach requires periodic re-nourishments to effectively protect against the waves and tides which adds to the cost of maintenance.

Accommodation Approach

While protection measures are more proactive steps in checking coastal erosion, the accommodation approach focuses on the adaptation technologies which “involves the continued occupancy and use of vulnerable zones by increasing society’s ability to cope with the effects of extreme events” (Linham & Nicholls, 2010; 69). The accommodation approach is a two-pronged strategy where in the first part such adaptation technologies are adopted which would be comprised of infrastructural changes to accommodate flooding and erosion and the second part is spreading awareness and developing an understanding of locals regarding coastal risks. Flood-proofing is one of the structural adaptation technologies that is being widely applied in the USA where wet and dry proofing are being used (Linham & Nicholls, 2010; 70). Under wet proofing, the structures are modified to let the water percolate easily without damaging the structure or the

structure is built on an elevated platform. Under dry proofing, the structures are built watertight to protect against flood water intrusion. Since the adaptation technology is individually adopted; it requires proactive participation of the community as well as the financial viability is a concern for many. The more participative and inclusive technology is wetland restoration, which would reduce coastal erosion and can provide environmental benefits and a new habitat for wildlife. Wetlands are “a diverse range of shallow water and intertidal habitats” and can be regarded as a transitional zone between land and water. The natural vegetation of wetlands could be mangroves or salt marshes. Wetland restoration has more advantages to disadvantages and it “reduces the incoming wave and tidal energy by enhancing energy dissipation in the intertidal zone” (Linham & Nicholls, 2010; 77).

Another accommodation approach is the Floating Agricultural System which is a method of using the areas under prolonged water logging in the production of food (Linham & Nicholls, 2010; 82). Floating agriculture is extensively practiced in Bangladesh, where the farmers use the floating beds of rotting vegetation which acts as a source of nutrition and land for plants. The floating rafts are secured with bamboo poles to secure them in one place against wave action. Flood Hazard Mapping and Flood warning are the two complimentary accommodation adaptation approaches used by the authorities to reduce the risk. These are used in increasing the effectiveness of town or village planning as well as employing emergency response units for disaster rescue.

Retreat Approach

Rather than an unplanned and forced retreat, a planned withdrawal from the shore because of sea level rise and climate change is envisaged under the retreat approaches (Linham & Nicholls, 2010; 101). According to IPCC CZMS (1990), the retreat approach involves “preventing development in coastal areas” or permitting the development with the precondition of abandonment if necessary. Coastal setbacks are one of the vital retreat strategies of adaptation, which is “a prescribed distance to coastal feature such as the line of permanent vegetation, within which all or certain types of development are prohibited” (Cambers, 1998; 1). By placing setbacks on developmental activities near the coasts susceptible to erosion, property loss could be reduced (Linham & Nicholls, 2010; 109). But, with rising sea levels and other natural process, the buffer zone will continue reducing and hence the effectiveness of such measures is limited (Linham & Nicholls, 2010; 111).

The Chilika Development Authority which is the nodal agency in managing the Ramsar sites of Odisha has recommended three soft protection approaches, and an accommodation approach, which are, beach nourishment and dune development and plantation, Geo-synthetic tubes, and mangrove plantation (GoO, 2023; 101-102). The technical expert committee which was formed for the Odisha cyclone, realizing the importance of mangroves recommended restoration and plantation of mangroves along the coast over a width of 1 km (GoO, 2023; 102).With the support of the Integrated Coastal Zone Management Program (ICZMP), the Rajnagar Wildlife Division is actively pursuing mangrove plantation in Bhitarkanika Sanctuary. The Government of Odisha with support from ICZMP has constructed a geotextile tube embankment in the Pentha region where the erosion was the highest.

LIVELIHOOD ADAPTATION IN THE CONTEXT OF COASTAL EROSION

According to the DES, Odisha (2023), about 62.8 percent of total workers of Kendrapara district are engaged in agricultural sector as cultivator or agricultural worker. In the coastal blocks it increases to 69.4 percent which suggests higher dependency of people on agriculture in coastal areas. Because of climate change, agriculture has become the most vulnerable sector in coastal areas (Hossain *et al.* (2016); Mohiuddin *et al.* (2021); WAPRO (2006) & Hossain *et al.* (2021); 1607). Mani Murali *et al.* (2018) has assessed the Coastal Vulnerability Index (CVI) of central coast of Odisha, that is, the coast of Jagatsinghpur and Kendrapara by considering the physical-geographical as well as socio-economic parameters. In the study Physical Vulnerability Index (PVI) showed 30 percent of shoreline under high vulnerability and 57 percent under medium vulnerability (Mani Murali *et al.* 2018; 18). The Socio-economic Vulnerability Index (SVI) showed 26 percent of shoreline under high vulnerability and 56 percent shoreline under medium vulnerability. The CVI calculated from the PVI and SVI ranges from 264.29 to 325.15 where 35 percent of coastline is assessed as highly vulnerable and 39 percent of coastline as medium vulnerable.

A study by the CARIAA in the Mahanadi Delta states that migration is a major adaptation strategy practiced in the region. According to Hazra *et al*. (2020), "the planned and autonomous adaptation activities have varying degrees of success, but are currently inadequate to meet people's requirements. The male out-migration has put more burdens on work and 70 percent of the women-headed households have not received any support from the government and NGOs which has increased issues like malnutrition and inadequate sanitation and inability to pay for health care services (Hazra *et al.* 2021).

Table 17:Types of Adaptation observed in the Study area among Women with Disabilities

Planned Adaptation		
SECTORS	Types of interventions	Autonomous Adaptation at the household level
Agriculture	a) Crop diversification, Improved agricultural practices, Crop insurance, b) Stress tolerant high yield rice c) Assistance from Govt. regarding sale of seeds, fertilizers d) Distribution of women-friendly farm-equipments e) Creation of Farmer's producer organizations for marketing of products	a) Producing Indigenous stress-tolerant rice varieties b) Migration as a form of adaptation c) Goat-grazing d) Goat-rearing e) Floating Garden or bag garden f) Community level Conservation and regeneration practices- Mangroves g) Mixed fishing/farming h) Loan for repairing the houses i) Working for wages in outside the village

Disaster Risk Reduction	Shifting and evacuation within 5km buffer zone, Construction of multi-purpose cyclone shelters, Construction of Synthetic sea-wall, Climate resilient infrastructure and houses	
Water	Water Resource Management, Harvesting of rain water	
Capability Building	a) Alternative Livelihood Promotion- b) Financial assistance under Balaram& KALIA Scheme for landless shareholders c) KALIA Scholarship foe disabled girls of farmers d) Formation of Join Liability Group to get financial assistance under BalaramYojana e) Shops for Disabled women in Baliyatra fair f) Get training from regional KRISHI VigyanKendras g) Rs 50,000 loan under BhimabhoiSamarthyaAbhiyan for development of entrepreneurship	

Concluding suggestions:

The unique geography of India exposes the country to arrange of extreme climatic events like cyclone, flash floods, storm surges and droughts. These climatic events otherwise understood as disasters by the common men are visible to us. What is not visible is the silent fury of the sea that eats out the coastline. Coastal erosion is a measure problem for small island developing nations, river delta regions and coastal areas. The people experiencing coastal erosion can only contribute to realistic public policy-making to address adaptation to climate change impacts.

Climate change, poverty, gender and disability are the major drivers of vulnerability for people residing in coastal areas. This vulnerability increases with corresponding increase in India's susceptibility to climate variability and change. Recognizing this India and its states have initiated variety of climate change adaptation plans and programs. Such initiatives are diverse both in context and content. It involves a broad range of stakeholders from national government to donor-supported community-based actions.

It is within this context, the Report reviews the climate change adaptation policies, programmes and projects with respect to WwDS. It also documents the non-planned self-adaptation initiatives taken up by women and communities. It also captures the aspirations and expectations of WwDs who were subject to multiple displacements being affected by coastal erosion.

The aim of this research endeavor is to enhance the resilience of women, the poor and the WwDs against climate change in hotspots of India. One such hotspot is the Rajnagar

Block in Kendrapada District of Odisha, India. Government of Odisha has taken steps to resettle the people in a relocation colony named Bagapatia by the side of the Pentha beach of the district.

- The research has done a baseline study, a stakeholder mapping and has formed 'Women with Disabilities Climate Change Network' (WWDCCN). The research team has tried to do the following:
- WwDs were sensitized regarding the impacts of climate change and the difference between climate change and disaster.
- It also created interest in the affected population to explore adaptation options which will help in reducing the vulnerability of women with disabilities.
- It developed a disability inclusion adaptation option inventory with the aid of a 'Women with Disabilities Climate Change Network' (WWDCCN).
- It engaged with WwDS and WWDCCN so that the members can collaborate and coordinate with the Government to advocate for enhanced adaptation financing.

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