CHAPTER TWO
RESEARCH METHODOLOGY

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Introduction to the chapter:

A sound research methodology based on practical aspects goes a long way and results in a good approach. The research topic being totally new area in India at the community level, the methodology is based on the experiences of the researcher and familiarity with the methods.

The first part contains the title of the study, significance, objectives, key research questions, research design, etc and the second part of the chapter focuses on the research setting.

Title of the study

Social Vulnerability and Resilience to Climate Change in Gujarat- A Social Work Response to Vulnerable Communities

Introduction of the research study

Climate change is not a myth. Climate change is affecting human life. Irrespective of the cause of climate change whether natural or human induced, the fact remains that nations are suffering due to climate change. The population bomb in India is ticking every day, making it very difficulty to meet the needs of the population due to more pressure/stress on natural resources. India is also vulnerable due to its diverse geographical context in terms of long sea coast, mountainous region, massive rivers and dessert like conditions. India has strong reason to be concerned. Climate change is projected to impact tropical countries more negatively than temperate ones. As a tropical country, our geography is our destiny. India's 7500 km coastline will be particularly hard-hit by storm surges and sea-level rise displacing millions, flooding low-lying areas, and damaging economic assets and infrastructure. The encroaching salt water will poison fields and make coastal agriculture unviable, deepening the crisis that is already full blown in India's farm sector. Just these impacts alone could severely test India's governance systems and its institutional and social resilience. Unless dealt with effectively they could also quickly turn into political challenges.

For the 700 million people in rural India who are dependent on the most climate-sensitive sectors for their livelihoods - agriculture, forests and fisheries - the future brings declining crop yields, degraded lands, water shortages and ill health. It also brings confusion and helplessness as people lose their traditional capacity to 'read' the weather and adjust accordingly.

When the rains do not come and when the natural world does not behave as it should, societies which have survived by observing the world and adapting to it lose essential coping skills. Gujarat has a long history of climate related hazards in form of droughts, cyclones and floods. Of late incidences of sea

level rise are also reported from many places like Udvada, coastal settlement along Jamnagar coast; etc. The entire coastline of Saurashtra and Kutch is susceptible to cyclones and storm surges. Due to climate change, the frequency of such hazards is increasing (data available with GSDMA).There is an increase in temperature and the year 2010 was one of the hottest year in the entire history so far where temperatures sore as high as 48-49 degree Celsius. Thus in view of this, there is a need to identify communities which are more vulnerable in terms of climate change so that these communities can be taken care of on priority basis. There is a need to understand their resilience in form of adaptability so that grass root communities can survive with minimal outside help. Presently there is very little work done at National and State level to identify vulnerable communities to prioritize implementation of programmes except the DRM (Disaster Risk Management) exercise which was taken up. The need of the hour is to develop indicators for assessing vulnerability and resilience at the community level so that each community understands its vulnerability and resilience to meet the demands of climate change. This would help the people in identifying their needs for development and ultimately their resilience. This would enable developmental workers to plan programmes according to the community's priorities and work towards community resilience. Researches so far has been focusing on technical, geographical and social vulnerability. Programmes have been designed to reduce the vulnerability and increase economic, technical and geographical resilience but very less research has been carried out to tackle the issues of social vulnerability and resilience. Researchers today agree that unless the social vulnerability issue is tackled, the impact of technical resilience or economic resilience will not be able to have the optimum effect.

Conceptual Framework: Studies of vulnerability and resilience have multiplied with the growing realization that societal response, particularly societal capacity to adapt to climate change impacts, determines both the severity of impacts and the costs of adaptation. The definition and focus of such studies come from other research communities, including research in impacts of climate change (emphasizing physical impacts), natural hazards and disasters (the hazards themselves plus societal preparation and

response/recovery), and sustainability (societal conditions and decisions about using natural resources). Although research in vulnerability and resilience began by emphasizing vulnerability, the focus has shifted at least in part to resilience as a positive concept that can be more integrated with general development goals.

The present study is based on the theory of resilience in terms of community resilience. Social workers have used this theory with more stress on analysis of vulnerability but there is a growing interest among the professionals to develop the theory further by focusing more on the resilience. This study therefore is based on both the dimensions- vulnerability and resilience.

The three major dimensions are Social Vulnerability, Adaptive Capacity and Social Resilience. Following are the key definitions used for the conceptual framework for the study:

Climate Change:
UNFCCC (United Nations Framework Convention On Climate Change) definition:

A change of climate, which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods'.

Extreme Events: (IPCC 2001)

- Higher maximum temperatures and hotter days
- Higher minimum temperatures, fewer cold days and cold waves
- Increased summer drying and associated risk of drought
- Increased tropical cyclone peak wind intensities
- Intensified drought and floods associated with EL Nino events
- Increased Asian Summer Monsoon
- Increased intensity of mild latitude storms

Adaptive capacity (IPCC 2001)

Adaptive capacity is the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

(It is important in CC in two ways- in reducing the impacts of the future climate change and in understanding the options for such adaptation to climate changes in face of the fact that Asian region is most vulnerable to climate change impacts due to its vulnerability which is socially differentiated)

Social vulnerability

Social Vulnerability is the exposure of groups or individuals to stress as a result of social and environmental change, where stress refers to unexpected changes and disruption. (W. Neil Adger 98-02)

Social Resilience:

Social resilience is the ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change. (W. Neil Adger 2000)

Social Vulnerability and Social Resilience:

Vulnerability determines the extent to which individuals or a community will potentially suffer from climate-related events and resilience is the ability to manage and adapt. It incorporates the notions of self-organization and the ability to learn, cope, and maintain future options. Rather than a concern about how to stop, change or minimize impacts, resilience is the ability to manage and adapt to change.

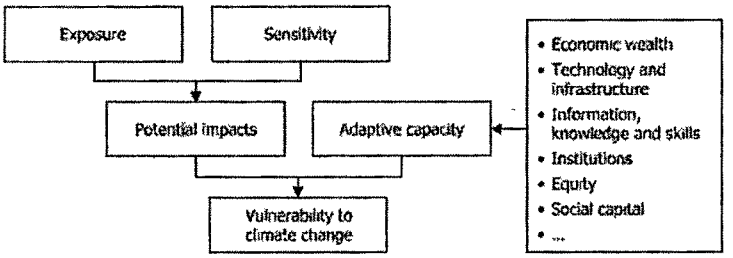


Figure 1. Graphical representation of the conceptualisation of vulnerability to climate change in the IPCC Third Assessment Report.

Significance of Study

Social indicators provide a means of measuring social characteristics to provide decision-makers with an effective and influential tool. The review of literature carried out so far reveals that the theory of social indicators in terms of vulnerability, resilience and adaptive capacity to climate change is largely based upon the quantitative indicators. The emerging challenges of integrating disaster management and climate change into development needs more research based on the qualitative dimensions of social vulnerability and social resilience. Though for assessing the overall vulnerability and resilience of the community, region or nation needs a multidisciplinary approach, the contribution of social indicators is of immense importance to complex issues of climate change. It calls for more research especially from people involved in sociology and social work. Contribution in the field of qualitative social indicators will enable social scientists, researchers and practitioners to have more tailor made approaches to make communities more resilient to climate change taking into consideration their perceptions. It is the inherent vulnerability of the communities which needs to be dealt with using adaptive capacity. Moreover, the present study also proposes to suggest toolkit for practitioners to make communities more resilient.

Purpose:

The purpose of the study is to develop social vulnerability and social resilience indictors based on community's perceptions for developing

community specific vulnerability and resilience index and suggest toolkit for making communities more resilient to climate change.

Objectives

1. To understand community's perceptions regarding social vulnerability and social resilience to extreme events/Sea Level Rise and develop indicators.
2. To understand how social vulnerability intensifies the vulnerability of the community when exposed to extreme events/Sea Level Rise.
3. To understand how adaptation measures of the community increases the social resilience of the community and decreases the social vulnerability of a community to extreme events and climate change
4. To develop community specific social vulnerability and social resilience indicators for developing Social Vulnerability Index (SVI) and Social Resilience Index (SRI)

Research Design

The research design is exploratory in nature since the study undertaken will try to explore different indicators involving community people and social scientists and researchers. Different dimensions of social vulnerability and social resilience will be explored using different tools and methods.

Methods of Data Collection:

Both qualitative and quantitative methods are used for the research. It was ensured that the two methods supplemented and complimented each other. An indicator that was used in qualitative method was also tested in the quantitative method so that there was no ambiguity in data collection.

The entire qualitative data was collected by the researcher and help for taken from the two emulators who were trained by the researcher on field for quantitative data collection.

Universe and Population

The universe consist of two coastal districts of Gujarat (Valsad and Junagadh) where incidence of Sea Level Rise/Coastal erosion has been noted and also extreme weather conditions are prevailing like cyclones, floods and droughts. These areas are also susceptible to Tsunami. All the families of fishermen residing on coastline of the two villages will be the universe of the study.

Sample and Sampling Method

The sampling is Purposive in nature. Moreover sampling procedure is as under

1. Community: Horizontal spectrum (various groups) considered for sampling.
2. Key Informants from community
3. Key Informants at District level/Taluka level – Collector, DMO
4. Groups of Men, Women, Youth and Elderly from the two communities
5. Households (10%) of the selected community through systematic random sampling

Inclusion Criteria

1. Coastal Community which has already experienced extreme events/ Sea Level Rise
2. Community residents in the age group of 15+
3. Old Men & Young Men, Old Women & Young Women, Youth & Children
4. Village level functionaries like PRI member(s)
5. Functionaries of CSO/NGOs/CBOs working in the community

Exclusion Criteria

1. Coastal Community which has not experienced extreme events/Sea Level Rise
2. Community residents who have now settled down in other part of the village/other villages/towns/cities
3. Community Residents below 15yrs

Sample Size:

1. One community (a village or community within village) in each selected district. A total of 2 fishermen communities
2. Minimum 10 Key Informants from each village (5 members, 5 others including CBO/NGO/Others)
3. Focus Group Discussions (5- 6 per village)
4. 10% of the affected household of these two communities

Tools of Data Collection:

The tools were first used for pilot study in both the communities and then were modified accordingly.

1. Focus Group Discussions : Observation Guide
2. Transect Walk/Seasonal Calendar: Personally with village volunteers
3. Key Informant Interviews : Interview Guide
4. Household level Interview : Interview Schedule

The household tool is based upon a similar tool adapted in Building Social Resilience into human marine communities in and around MPA (Marine Protection Area) used by Nadia P. Abesamis, Colleen Corrigan, Mark Drew, Stuart Campbell, Giselle Samonte in the project MPA Networks Learning Partnership, Global Conservation Program, USAID, September 2006. The group had designed the tool based on the social resilience principles and variable from folke et all 2003. This tool was used as a guideline to develop the present one used in the study as per requirement and was tested in a pilot bases in both the communities.

Reference Period:

The major data was collected from the study area during the period of April 2010 to September 2010 in both the communities.

Treatment of Data

The data collected at the household level was quantitative in nature. A comparative analysis of the quantitative data analysis was carried out and

single variate tables were computed. The qualitative data from the FGDs was analyzed in form of transcripts and grouped together under common sectors. Similarly, the data from transect walk was analyzed according to the important sectors and important observations were noted as points. The qualitative data in form of qualitative interviews of key informants was analyzed and grouped as per the emerging important sectors.

Limitation of the Study

1. The major limitation of the study is that social vulnerability or social resilience by itself alone cannot measure the vulnerability or resilience of a community. A multi disciplinary approach is needed.
2. Due to constrain of financial resources and time, the study is restricted to two communities of two villages of two districts of Gujarat only.
3. No specific studies have been carried out exclusively for social vulnerability and social resilience in Indian as well as in Gujarat and hence the researcher had to depend on researches carried out by other countries for disaster risk reduction and climate change in developed and developing countries.
4. Dependency on Gujarat State Disaster Management Authority (GSDMA) and Department of Climate Change, Gandhinagar for finalizing the selection of communities acted as constrain.

Chapter Scheme

The thesis will be presented in form of the following chapters:

1. Introduction
2. Review of Literature
3. Research Methodology
4. Data Analysis and Interpretation
5. Findings, Discussion and Recommendations
6. Bibliography
7. Annexure

Some Research Experience:

Since the topic of the study is new one, the researcher had some totally different experiences while undertaking the data collection. In spite trying to contact department of climate change, the researcher could not get an appointment. Moreover there is neither a website of the department nor any material available for the downloading. Thus what is functioning of the department etc could not be known except from the newspapers. GSDMA (Gujarat State Disaster Management Authority) was approached and the researcher had a meeting with Dr. Ranjeet Banerjee (CEO) and he informed that GSDMA is not involved in climate change activities. Thus there was a clear lack of coordination between the two organizations. At the district level and the taluka level also, people were nearly unaware about the functioning of the department of climate change. Mamlatdar, Taluka Development Officer and other functionaries were totally unaware about the issue of climate change but they knew about disasters and the DRM activity. The Non government organizations on the contrary knew some things since their organizations were undertaking planning of one project or the other which took into consideration issues of climate change. Thus the researcher had to indirectly ask questions pertaining to climate change for seeking information.

Apart from this, people at all levels tried to help the researcher in whatever way they could. They were inquisitive about the topic and wanted to know more about it. They expressed their interest in the topic and shared their observations once they knew what climate change is. The response of both the community people was amazing. They shared about their lives and their community and offered good hospitality. The leaders have expressed their interest in willingness to help any other researcher who would take up such researches in their community.

Part II Research Setting

India

Gujarat

Junagadh District

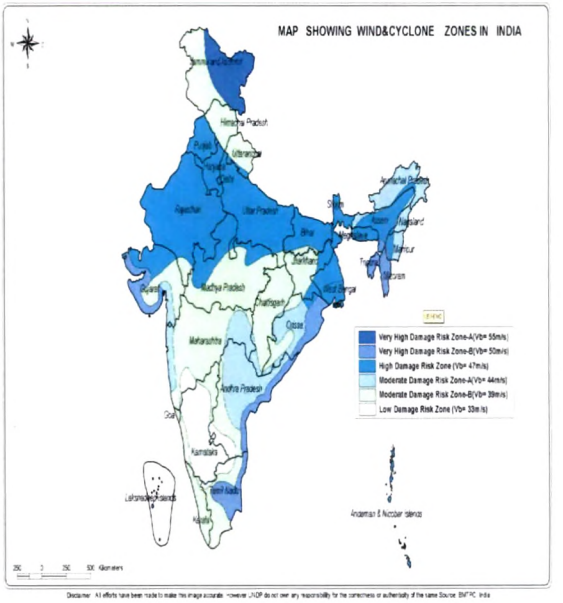
Valsad District

Madhavad

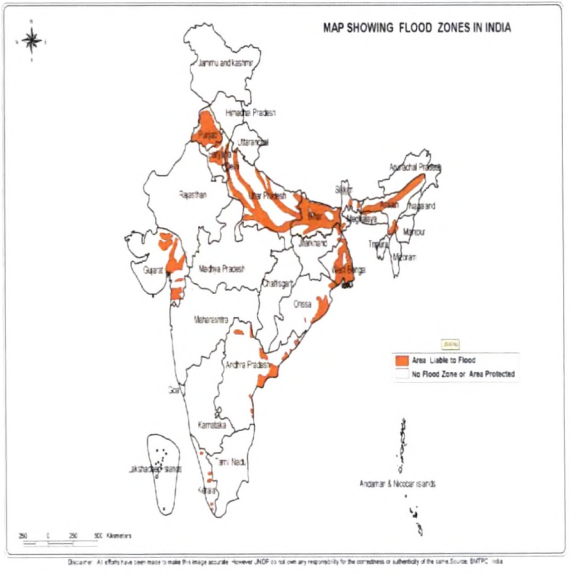
Umarsadi

Hazard Profile of India:

As seen in the cyclone hazard map of India, Gujarat state shoreline falls under the second most sensitive zone especially the eastern coastline



As seen in the flood zone hazard map of India, Gujarat state, especially the eastern parts are prone to flood zone hazards. This also includes the selected Valsad Taluka in south Gujarat.



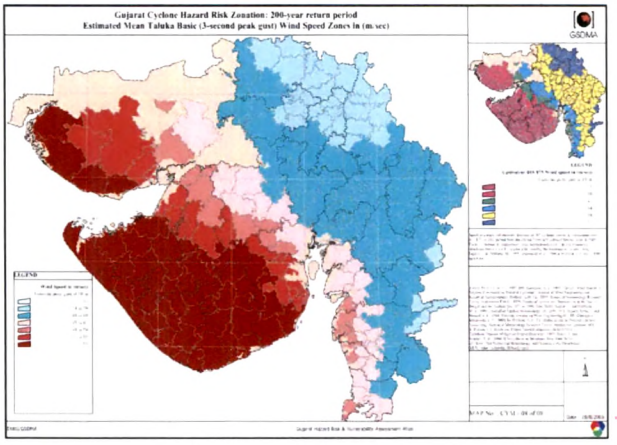
Gujarat is a state in western India. It has an area of 75,686 sq mi (196,030 km^2) with a coastline of 1,600 km, most of which lies on the Kathiawar peninsula, and a population in excess of 60 million. The state is bordered by Rajasthan to the north, Maharashtra to the south, Madhya Pradesh to the east, and the Arabian Sea as well as the Pakistan province of Sindh on the west. Its capital city is Gandhinagar, while its largest city is Ahmedabad. It is one of the most industrialized states of India, and has a per capita GDP above the national average.

Demographic Profile of Gujarat (2001 Census)

Estimated Population	6.03 Crores
Actual Population	60,383,628
Population Growth	19.17%
Area km2	196,024
Area mi2	75,685
Density/km2	308
Density/mi2	798
Male	31,482,282
Female	28,901,346
Sex Ratio	918
Percentage of total Population	4.99%
Literacy	79.31
Male Literacy	87.23
Female Literacy	70.73
Total Literate	41,948,677
Male Literate	23,995,500
Female Literate	17,953,177

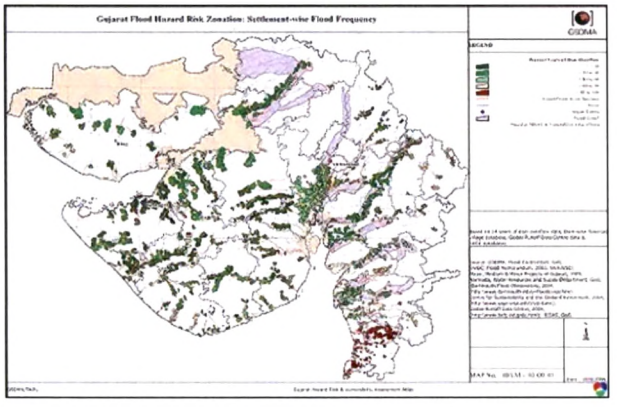
Hazard risk profile of Gujarat State:

Cyclone Hazard Risk:



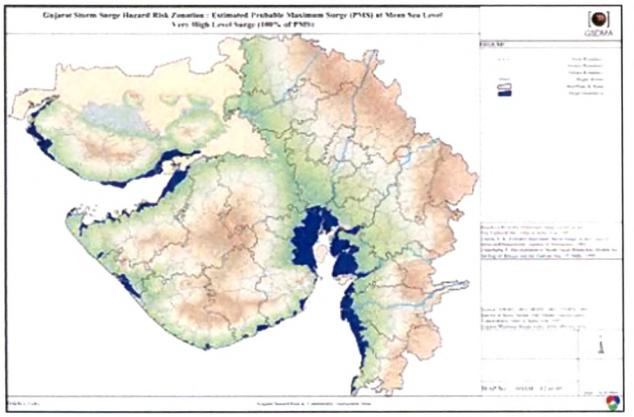
The hazard risk profile of Gujarat indicates that the entire eastern coastline of the state right from Koteshware in Kutch till around Bhavnagar coast including Junagadh district, the entire coastal area falls under high intensity cyclone hazard zone. The sea coast from Khambhat to Umargam area falls under the mediate zone..

Flood Hazard Risk:



As seen from the flood hazard risk map of Gujarat, both the selected communities are prone to flood hazard risk in Junagadh and Valsad district respectively.

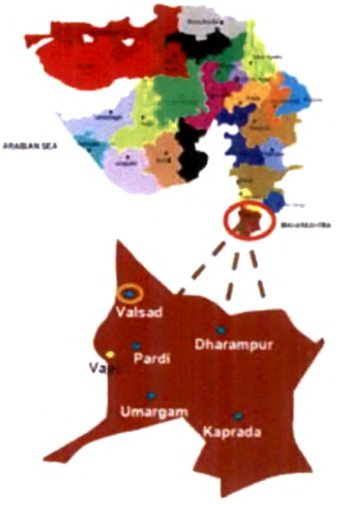
Storm Surge Hazard Risk :



As depicted in the storm surge hazard risk map of Gujarat, both, Umarsadi in Valsad and Madhvad in Junagadh district fall under high storm surge zone in Gujarat.

Valsad District

Geographical location	72.73° to 73° East (Longitude) 20.07° to 21.05° North (Latitude)
Area :	2,939 sq. km
District headquarter :	Valsad
Population :	1,410,553 (As per Census 2001)
Population density :	423 persons per sq. km
Sex ratio :	920 Females per 1000 Males
Literacy rate :	69.41%
Airport:	Surat
Nearest port :	Hazira
Major Industrial	7 Industrial Estates and Port based park



Junagadh District

Geographical location	69.40° to 71.05 ° East (Longitude) 20.44 ° to 21.40 ° North (Latitude)
Area :	8,846 sq. km
District headquarter :	Junagadh
Population :	24,48,173 (As per 2001 Census)
Population density :	277 persons per sq. km.
Sex ratio :	955 Females per 1000 Males
Literacy rate :	68.35%
Nearest Airport :	Keshod
Nearest port :	Veraval port
Major Industrial	6 Industrial estates, Integrated Textile Park.

Vellan- Kotada- Madhvad Village:

The village is around 15 kms from the taluka head quarters at Kodinar. Kodinar is an important taluka of Jamnagar district. The village lies on the sea shore of the Arabian Sea. Once, it had a jetty of its own which over the years was rendered non functional. On one side is the Sodham Wetland and the Sodhan Check Dam is within the village. There is mangroves plantation as we enter the village. It is well connected by road. Though the village is one, the people have already applied for a separate Panchayat at Madhvad. Madhvad is 3 kms away from vellan.

For the research purpose, Madhvad with its 700 households was selected as a community. Madhvad has the entire infrastructure necessary for a community. The major ones being, a prathana mandir, overhead tank, public toilets (sauchalaya), primary school, Aanganwadi, electricity, water facility etc. The community is a fishermen community all of whom belong to the Kharvas.

Being a part of the Gir forest –Sodham wet land – coastal ecological system, the community is very unique. It has witnessed many climatic hazards in form of floods and cyclones and storm surges.

Umarsadi Macchiwad- Mangelwad- Desaiwad:

Umarsadi is situated in Pardi Taluka of Valsad district of Gujarat State. It is situated on the Arabian Sea. The village is well connected by road. Three is a railway station at Pardi which is around 6 kms from the village. Though the village is one, Umarsadi macchiwadi has already applied for a separate Panchayat. It is surrounded by Par river on the right hand side and in the north is the Arabian sea.

For the research purpose, Umarsadi Macchiwad with its 1000 households was selected as a community. The entire community belongs to fishermen and they all are Machimars. The community has all the necessary infrastructure for functioning in form of drinking water supply of the Panchayat, overhead tanks, Aanganwadis, public toilets , primary school, electricity, laxmi narayan temple, prathana mandir, jetty, etc.

The community is part of the Vaghai forest range- coastal ecology-Valsad-Vapi Industrial area. Thus on one hand it has coastal ecology and on the other hand, there is industrialization in the vicinity.

It is situated in the moderate cyclone zone and high flood and storm surge zones. The community has witnessed many cyclones and flooding in the surrounding areas. Coastal erosion is too high in the area along with industrial pollution.