CHAPTER FIVE
FINDINGS, DISCUSSION AND RECOMMENDATION

Major Findings:

- 58.8% of the total respondents are male. The figure is high with 80% in case of Madhvad while in Umarsadi its 62.0%
- Umarsadi is dominated by the Hindu Machi caste amounting to 99%. It is the Kharvas who dominate Madhvad with 97.1%. Also all 170 respondents are Hindus. All the respondents belong to general category.
- 90% of the respondents from Umarsadi are married while 94.3% of the respondents from Madhvad are married. 5% of the respondents from Umarsadi are widows.
- In case of Madhvad, 4.3% of the respondents are graduates and 2.9% of the respondents are post graduates while in case of Umarsadi, this is 31% and 4% respectively.
- 62.9% of the respondents in case of Madhvad are Fishermen as compared to 21.0% in Umarsadi. 30.0% of respondents in case of Umarsadi are dependent on service sector as compared to none in case of Madhvad
- The house hold heads account for more than 75% of the respondents with 79% in case of Umarsadi and 78.6% in case of Madhvad. 15.7% of the respondents in Madhvad were second generation representatives of the households in terms of daughter in laws
- All the respondents in Madhvad are residents of the community since the beginning of their lives as compared to 96% in case of Umarsadi.
- 65% of the houses in Umarsadi are Pucca houses, the percentage is 34.3% in case of Madhvad. In contrast to this, 38.6% of the houses in Madhvad are Kutcha as compared to 7% in Umarsadi.
- 66.0% of the houses in Umarsadi have latrines which is only 21.4% in case of Madhvad. In case of bathrooms, 86% of the houses in Umarsadi as compared to 50% in case of Madhvad have them. 65% of the houses in Umarsadi as compared to 15.7% in case of Madhvad have ventilation; in case of separate kitchen this is 83% in case of Umarsadi as compared to 25.7% in case of Madhvad. 34.3% of the houses in Madhvad have no facilities conveying one room houses.

- 65% of the families in Umarsadi and 65.7% of the families in Madhvad have nuclear families.
- 22.9% of the families in Madhvad are large families with 8-12 members as compared to1% families in Umarsadi. 52% of the families in Madhvad have 5-7 members as compared to 41.0% in Umarsadi.
- There is no significance difference between the genders of family members of both the communities
- 145 family members migrate seasonally for livelihood in Madhvad while only 15 members migrate for livelihood in case of Umarsadi.
- 70% of the respondents in Madhvad are not able to save as compared to 28% in Umarsadi.
- 93.1% of the households save money in form of cash at home in Umarsadi as compared to 71.4% opting for Saving accounts in Bank in case of Madhvad
- 50% of the respondents in Umarsadi rate the economic status of their households as compared to other families of the community to be above average as compared to 34.3% respondents in Madhvad stating that the economic status of their household is average as compared to economic status of others families in the community. 52.9% of the respondents in Madhvad did not respond.
- 65.7% of the respondents in case of Madhvad take debts as compared to 40%of the respondents in Umarsadi
- 95.7% of the respondents in Madhvad stated that they take debts to meet the household expenses while 80.0% of the households in Umarsadi take debts for marriage as compared to 82.6% of the respondents. 87% of the respondents in Madhvad also take debt for basic necessities. 67.5% of the households in Umarsadi take debt for building house or renovation. 84.8% of the households in Madhvad take the debt for religious purpose also
- 72.5% of the people in Umarsadi take loans from the bank as compared to 50% in case of Madhvad who resort to taking loan from relatives. 39.1% of the households in Madhvad also take loan provided by community organizations.

- 89.1% of the of the households in Madhvad are able to repay the loans while 72.5% of the households in Umarsadi are not able to repay the debts they take.
- 97% of the households in Umarsadi have been exposed to climate related hazard of storm surge as compared to 1.4% at Madhvad.
- 58% of the households in Umarsadi have rated the intensity of storm surge to be high as compared to 21.4% of households in Madhvad stating it to be medium.
- 96% of the respondents stated that their households have experienced Coastal Erosion as a climate hazard in Umarsadi as compared to 25.7% of the respondents in Madhvad.
- 54% of the respondents in Umarsadi have stated that the intensity of coastal erosion as a climate hazard as experienced by the household to be high as compared to 21.4% of the respondents stating it to be medium in Madhvad.
- 100% of the respondents in Madhvad stated that their households have been exposed to cyclone climate hazard as compared to 87% of the respondents in Umarsadi area.
- 61% of the respondents have rated cyclones to be of low intensity in Umarsadi while 97.1% of the respondents in Madhvad stated it to be of medium intensity
- 75.7% of the respondents from Madhvad stated that their households have been exposed to flood related climate hazard as compared to 99% of the respondents from Umarsadi stating that their households have not been exposed to flood related climate hazard.
- 45.7% of the respondents in Madhvad have rated the intensity of the flood as experienced by the household to be of High and 30% of them rate it as medium. This almost makes 75.7% of the respondents in the area. In case of Umarsadi, 99% of the respondents have stated it to be non applicable.
- All the households in Madhvad have stated that they have been exposed to salinity ingress hazard as compared to 16% of the households in case of Umarsadi

- 15.7% of the households in Madhvad state that there has been depletion of mangrove covers in the area. No such exposure has been felt in case of Umarsadi.
- 10% of the respondents state that the intensity of depletion of mangroves is high while 5.7% say its low in Madhvad area. No such incidence is reported from Umarsadi area.
- Regarding the frequency of cyclones witnessed by the households, 31.9% of the households in Madhvad as compared to 4.2% in Umarsadi state this to be high. 58.0% of them in Madhvad report this to be medium while 77.1% of them in Umarsadi state that the frequency is low.
- Regarding sensitivity of the households towards cyclones, 75.0% of the households in Umarsadi rate it as low and 20.8% rate it as medium as against 39.1% of them in Madhvad rating it as low and 55.1% of them rating it as medium.
- Regarding the negative impact of cyclones as witnessed by the households, 66.7% of the households in Umarsadi as compared to 37.7% in Madhvad rate it as low. 53.6%of the households in Madhvad as compared to 29.2% in Umarsadi rate it as medium.
- 71.9% of the households in Umarsadi as compared to 39.1% in Madhvad rate difficulty in coping with impact of cyclones witnessed by the households to be low while 27.1% and 20.3% rate it to be medium in Umarsadi and Madhvad. It is to be noted that 40.6% of the households in Madhvad have rated it to be high.
- Regarding the frequency of coastal erosion, 56.3% of the households in Umarsadi and 50.0%of the households in Madhvad have rated this to be high. Coastal erosion is a major hazard identified by both the communities.
- 60.4% of the households in Umarsadi and 27.8% of the households in Madhvad state that the sensitivity of their households to coastal erosion is high. It is to be noted that 50.0% of the households in Madhvad rate this to be low.
- 80.6% of the households in Madhvad rate the negative impact of coastal erosion on their households as medium while 55.2% of the households rate it to be high in Umarsadi.

- Regarding difficulty in coping with impact of coastal erosion by the households, 77.8% of the respondent households in Madhvad rate this to be medium while 58.3% of the households in Umarsadi rate this to be high.
- 60.0% of the households in Madhvad have rated frequency of increase in sea level to be medium as compared to 43.2% of the households in Umarsadi. 25.3% of the households in Umarsadi have rated this to be high while 31.6% have rated this to be low.
- 45.7% of the households in Madhvad have rated sensitivity to increase in sea level to be high as37.9% of the households in Umarsadi rating it to be medium.
- Regarding the negative impact of increase in sea level on the households, 81.4% of the households in Madhvad have rated it to be low as compared to 36.8% in Umarsadi. 35.8% and 10.0% of the households have rated this to be medium in Umarsadi and Madhvad respectively.
- As regards the difficulty in coping with impact of increase in sea level by the households, 42.9% of the households in Madhvad have rated it to be high compared to 40.0% of the households in Umarsadi rating it to be low. It is to be noted that 33.7% of the households in Umarsadi have rated this to be as medium.
- 69.0% and 50.0% of the households have rated the frequency of salty water in the farms to be low in Umarsadi and Madhvad. This is to be noted that the respondents belong to fishermen community. While 20.7% and 28.6% households in Umarsadi and Madhvad rate it as medium respectively. 21.4% of the households in Madhvad rate this to be high suggestive of salinity ingress.
- 75.9% and 50.0% of the households in Umarsadi and Madhvad respectively state that the sensitivity to salty water in the farms is low. It is to be noted that 21.4% of the households in Madhvad have rated it to be high and 28.6% stating it to be medium.
- The negative impact of salty water in farms has been rated as low by 75.9% of the households in Umarsadi as against 53.6% of the households in Madhvad rating it to be high.

- Regarding difficulty in coping by the households due to salty water in farms, it is rated low by 72.4% and 32.1% of the households in Umarsadi and Madhvad respectively. 51.8% of the households have rated this to be high in Madhvad.
- 62.9% of the households in Madhvad and 42.7% of the households in Umarsadi state that frequency of salty water in wells is high.
- 81.4% of the households in Madhvad and 42.7% of the households in Umarsadi state that the sensitivity to salty water in wells is high
- Regarding the negative impact of salty water in wells on the households, 55.7% and 43.8% of the respondent households in Madhvad and Umarsadi have rated this to be high. 26.0% and 35.7% in Umarsadi and Madhvad respectively state it to be medium.
- 51.4% and 40.6% of the households in Madhvad and Umarsadi respectively have rated difficulty in coping with salty water in well by the households to be high and 38.6% and 26.0% have rated it to be medium
- 47.1% of the households in Madhvad state that the frequency of change in weather is medium while 85.7% of the households in Umarsadi rate it as low.
- 92.3% of the households in Umarsadi rate sensitivity to change in weather of households to be low while 55.7% of the households in Madhvad rate it to be medium. It is to be noted that 24.3% of the households rate this to be high in case of Madhvad.
- 76.9% and 72.9% of the households in Umarsadi and Madhvad respectively rate negative impact of change in weather on households to be low. It is to be noted that 27.1% in Madhvad rate this to be medium
- Regarding difficulty in coping with changes in weather by the households, 83.5% and 72.9% of the households in Umarsadi and Madhvad respectively rate it to be low.
- Regarding frequency of floods, 47.8% of the households have stated it to be high in Madhvad. It is to be noted that in Umarsadi, only 4.2% of the household have stated it to be low.
- 58.0% of the households in Madhvad out of the total 69, state that there is high sensitivity to floods of their households.

- 42.0% of the households in Madhvad state that the negative impact on flood on their households is high. In case of Umarsadi only one household has responded to the question and has rated it as medium.
- 36.2% of the households state that the difficulty in coping with impact of floods in high in Madhvad while 30.4% state it to be medium. The rest state it to be low.
- Regarding the sea water becoming hot, 92.6% of the households of the total 27 households who have responded to this question state that the frequency of sea water becoming hot is high in Umarsadi as compared to 90.9% of the 20 households in Madhvad
- Under stress free conditions, 54.0% and 39.0% of the households have Bore well and Handpump as major source of drinking water in Umarsadi as compared to 58.6%, 20.0% and 15.7% households having Tap water, Well and Tanker as major source of drinking water in Madhvad.
- In case of emergency situations, 77.1% of the households in Madhvad and 69.0% households in Umarsadi resort to tankers selling water and Government sources for drinking water facility.
- Under stress free conditions, 96.0% of the households in Umarsadi and 62.9 % of the households in Madhvad depend on government power supply. It is to be noted that 37.1% of the households in Madhvad have no electricity as compared to 4%in case of Umarsadi.
- 72.9%, 55.7% and 60% of the households in Madhvad depend on government sources, candle and lamps as compared to 30%, 55% and 64% in case of Umarsadi. It is worth noting that households in Umarsadi also have facilities like emergency light and inverters.
- Under stress free conditions (Normal conditions), 94% of the respondents go to private health care service providers in Umarsadi for their health care needs while 92.9% of the respondent households in Madhvad go to private health care service providers. In contrast to this, 31.4% of the households opt for government health care service providers in Madhvad.
- In emergency situations, households in Umarsadi resort to Government as well as private health care providers with 84.0% opting for government health care providers and 62.0% opting for private health care providers.

71.4%, 44. 3% and 42.9% households in Madhvad opt for Private, 108 emergency services and government health care providers respectively.

- Regarding the sources of communication under stress free conditions, households in Umarsadi use Phone and Mobile with 35.0% and 58.0% as compared to 18.6% and 24.3% in Madhvad . 64.3% use TV and 57.1% use Radio in Madhvad as compared to 31.0% and 6.0% in Umarsadi. It is worth noting that 34.0% and 31.4% of the respondent households in Umarsadi and Madhvad have not responded to the question as they do not have any major source of communication.
- 33% of households in Umarsadi and 37% of the households in Madhvad have not responded to the question regarding sources of communication. The major source of communication in Madhvad with 40% of the households responding is Public Address System as compared to 28.0% in Umarsadi. In Umarsadi, major source still remains Phone, Mobile and TV while for Madhvad, its Radio and TV.
- 62.0% and 34.3% of the households in Madhvad use Rickshaw (chakada) and other mode of transportation like bicycle in stress free conditions as compared to 46.0% and 44% of the households in Umarsadi using two wheeler and rickshaw.
- 64.0% and 74.0% of the households in Umarsadi use Government and Private transportation in times of emergency while in Madhvad, 67.1% use the private vehicles.
- 17.1% and 3% of the respondents in Madhvad and Umarsadi have stated that under stress free conditions, they use their boats as occupation resources.
- 1.4% of the total household respondents use boat as occupation resources in times of emergency in Madhvad.
- In case of emergencies, households in Madhvad, 30% go to relatives or stay in own houses, 41.4% take shelter in School and 17.0 % take shelter in the temple. In Umarsadi, 62.0% go to schools and 32% take shelter in society.
- 68.6% of the respondents households in Madhvad utilizes coral reef as coastal and marine resources for fishing in form of goods and services for household consumption

- 8.6% of the respondent households in Madhvad utilize fishing from coral reef to sell and earn livelihood. No such activity is found to be in practice in Umarsadi area.
- 51.4% of the households in Madhvad utilize mangroves wood in the households. No such practice is seen in Umarsadi.
- 54.3% of the households in Madhvad use mangrove wood for cooking purpose. No such activity is reported in case of Umarsadi.
- 15.7% of the respondent households utilize mangroves for making coal which is used for cooking in the households. It is to be noted that no such activity is noted in Umarsadi.
- 71.4% of the respondent households in Madhvad utilize coastal and marine resource of mangroves for fishing which they sell. No such activity is found to be there in case of Umarsadi
- 71.3% of the respondent households in Madhvad and 23.0% in Umarsadi state that the main source of livelihood for their household use is in form of fishing. It is to be noted that 77% of the households in Umarsadi do not depend on fishing for household use
- 19.0% of the households in Umarsadi and 1.4% of the households in Madhvad are engaged in fishing as a main source of livelihood for business use only
- 38.6% of the respondent households in Madhvad as compared to 17.0% in Umarsadi state that it is the household head who is engaged in fishing for livelihood. 21.4% and 2.0% of the households in Madhvad and Umarsadi respectively have engagement of wives in the same livelihood. Only 12.9% of the households in Madhvad and 78.0% of the households in Umarsadi are not engaged in fishing for livelihood.
- 44.3% of the households in Madhvad depend on other marine life in form of crabs, lobsters and shells for household purpose as main source of livelihood. It is to be noted that no such activity is reported in case of Umarsadi
- As pertaining to role of family members engaged in livelihood from other marine lives like crabs, prawns and shells, 15.7% of the households in Madhvad have the wives engaged in this while 28.6% are in form of sons.

- 54% of the respondent households in Umarsadi and 1.4% of the households in Madhvad are engaged in service/job as the major source of income for household consumption
- 10% of the households in Umarsadi and 57.1% of the households in Madhvad are engaged in business as a main source of livelihood for their subsistence.
- Regarding other sources as main source of livelihood for household use, 31.0%of the households and 1.4% of the people have opted for this suggestive of engagement in other occupations like driving auto, bus etc
- 17.0% of the household heads, 11.0% of the sons, 8.0% of the husbands, and 1.0% of father and father in law each in Umarsadi are engaged in livelihood in form of seaman while no such occupational engagement is found to be there in Madhvad.
- Regarding the perception of the household as regards the ability of the community to make community plans to deal with climate related events, 77% of the households in Umarsadi and Madhvad state that they agree or strongly agree to the statement, 23% of the households in Umarsadi have provided a neutral rating. 12.8% of the households in Madhvad have disagreed to the statement.
- As regards the perception of the household regarding the ability of the community to coordinate activities to respond quickly to the impacts of natural events, 88.0% of the households in Umarsadi and 85.7% of households in Madhvad agree or strongly agree to the statement while 12.0% and 11.4% in Umarsadi and Madhvad respectively remain neutral. 2.8% of the household respondents in Madhvad disagree.
- Regarding the perception of the household as regards the ability of the community to reorganize to respond to new situation, 46.0% and 55.7% of the households in Umarsadi and Madhvad respectively state that they strongly agree to this statement. 26.0% of households in Umarsadi are neutral while 14.3% of the households strongly disagree in Madhvad.
- Regarding the perception of the household with respect to the ability of the community institutions to support the members in need to reorganize to cope with new problems, 49.0% and 54.3% of the households in Umarsadi and Madhvad state that they strongly agree with the statement. 13.0 % of

the households in Umarsadi state they are neutral. 21.4% of the households in Madhvad disagree to this statement.

- Regarding perception of the household with respect to the ability of the community members to work well with each other, 54.0% and 61.4% of the households in Umarsadi and Madhvad state that they strongly agree to the statement while 26.0% and 10.0% of the households in Umarsadi and Madhvad state that they agree with the statement. 19.0% and 18.6% of the households in Umarsadi and Madhvad have stated that they are neutral.
- With regards to perception of the household regarding the ability of the community to access outside support when needed, 28.6% of the households in Madhvad state that they totally disagree to the statement as compared to 64.3% of the households stating that they agree to the statement. 46.0% and 37.0% of the households in Umarsadi strongly agree and agree to the statement respectively. 15.0% of the households in Umarsadi have stated that they are neutral towards the statement.
- With regards to attitude of the households towards community leaders to successfully lead them through climate related events in the past, 50.0% and 91.4% of the households in Umarsadi and Madhvad respectively strongly agree to this statement while 27.0% of the households in Umarsadi are neutral towards this. This shows that leadership in Madhvad is more capable then in Umarsadi.
- With regards attitude of the households towards community leaders being interested in climate change issues and the impact on the community, 44.0% and 39.0% of the households in Umarsadi agree and strongly agree to the statement. 62.7% of the households in Madhvad strongly agree to the statement. 16.0% of the households in Umarsadi are neutral towards the statement.
- Regarding the attitude of the households towards community leaders who have knowledge and skills to effectively take charge of climate change adaptation, 62.9% and 35.0% of the households in Madhvad and Umarsadi strongly agree to the statement while 29.0% and 32.9% in Umarsadi and Madhvad agree to the statement. 28.0% of the households in Umarsadi are neutral towards this.

- Regarding attitude of the households towards trust in community leaders to lead the community through climate change adaptation, 28.6% of the households in Madhvad disagree to this statement while 23.0% of the households in Umarsadi are neutral. 52.0% and 62.9% strongly agree to the statement in Umarsadi and Madhvad respectively.
- Regarding the attitude of the households towards ability of the leaders to inform them of national and regional climate change policy or initiatives, 91.4% of the households in Madhvad strongly agree to the statement while 40.0% and 39.0% of the households in Umarsadi strongly agree and agree to the statement. 15.0% of the households in Umarsadi have remained neutral towards the statement.
- Regarding attitude of the households towards ability of the leaders to inform them from where to get climate related information, 62.9% of the households in Madhvad and 46.0% of the households in Umarsadi strongly agree to the statement. 25.0% of the households in Umarsadi have stated that they are neutral
- With regards attitude of the households towards ability of the leaders to suggest what can the community people do to adapt to climate change, 53.0 % and 71.4% of the households in Umarsadi and Madhvad strongly agree to the given statement. It is to be noted that 18.0% and 21.4% of the households in Umarsadi and Madhvad are neutral
- With regards to attitude of the households towards ability of the leaders to provide them with resources needed for climate change activities, 91.4% and 37.0% of the households in Madhvad and Umarsadi strongly agree to the statement. 37.0% of the respondent households in Umarsadi state that they agree. 19.0% of the households in Umarsadi are neutral towards the statement. Around 7.0% of the households in Umarsadi are in disagreement.
- Regarding the attitude of the households towards ability of the leaders to encourage community members, 46.0% of the households in Umarsadi state its neutral while 91.4% of the households in Madhvad state that they strongly agree to the statement
- Regarding the attitude of the households towards their voices being heard in community planning for climate change adaptation, 47.0% and 62.9% of

the households in Umarsadi and Madhvad strongly agree to the statement. 36.0% and 25.7% of the households in Umarsadi and Madhvad respectively are neutral about this.

- As regards attitude of the households towards ability of the leaders to provide opportunity to participate in community level decision making, 39.0% of the households in Umarsadi are neutral. 91.4% of the households in Madhvad strongly agree to the statement.

Findings and Discussion:

Based on the above findings, following points are put forward for discussion which would also enable the researcher to reach to certain important conclusions followed by suggestions to deal with the issues more realistically and constructively.

Demographic Details:

Caste:

Caste is an important socio economic determinant for any community especially in our country. Benefits based on reservations are a common paradigm in the developmental and emergency management sector. Homogeneous communities have stronger ties in terms of sociology and provide firm foundation for functioning of the community. In our country, reservations based on caste in various sectors do influence the developmental sectors. The general category has no privileges for accessing programmes meant for special categories. Thus single caste acts as a resilience factor

Marital Status:

Marital status also plays an important role in terms of family resilience. In terms of disaster management, researches have shown that single headed households or single women headed households have exhibited low on resilience and high on vulnerability factor. Presence of single headed or single women headed households in community acts as a vulnerability indicator. This makes Umarsadi relatively vulnerable due to widow headed households.

Education:

Education is an important indicator for social development which is integrated with the fields of disaster management and climate change. It is an accepted fact that the methods of working with literates and not literate people vary widely. Moreover right based approach is more understood by the educated

due to exposure to information and knowledge base. Education enables a community to be engaged in diversified trade and commerce also which acts as a resilience factor.

Occupation:

Occupation and diversified livelihoods acts as resilience factor in terms of disaster management and climate change. Overdependence on a particular sector especially if it is dependent on natural resources acts as a vulnerability enhancing factor when the sector is affected by climate change or disaster. Agriculture and Fishing are examples of such occupations. Overdependence on fishing along with marine and coastal resources acts as a vulnerability factor in Madhvad while diversification in case of Umarsadi over the period of time shows adaptation and acts as a resilience factor against climate change.

Housing and facilities :

Housing plays an important part in building resilience against extreme events like cyclones, floods, storm surge etc. The type of housing that a household has and its condition is one of the factors contributing to vulnerability or resilience. This kind of physical vulnerability also has its impact on overall vulnerability of a household. It is also linked to economic vulnerability. Researches in disaster management have shown that generally poor people live in kutcha or semi kutcha houses rendering them vulnerable in times of disaster. Moreover, pattern of housing, i.e. the distance between them in the lanes etc also is important as it enables or disables maneuvering vehicles or escape routes. It is to be noted that traditional housing are not to be considered vulnerable by themselves without taking into consideration the overall climate of the area and typology.

The pattern projected through the transect walk also suggests that the houses in Madhvad are adjutant to each other and the distance between the two row of houses is also very less in Madhvad rendering them more vulnerable due to its layout in times of emergency management during disasters.

Housing facilities like courtyard, separate kitchen, store room, ventilation, natural lighting adds to the overall atmosphere of the house. A well ventilated house has an advantage over a non ventilated room. Moreover, the space of housing is stated in sphere standards which are referred to while designing house according to disaster management. Facilities like drainage and lavatories plays a significant role in maintaining the over all health and hygiene of the residents. Also, access to basic sanitation need like lavatory and bathroom also plays an important part in resiliency. This clearly shows that Madhvad is more vulnerable than Umarsadi in term of facilities at household level.

Family Pattern and Size, Gender of family members :

Prevalence of nuclear families is seen in both the communities with In the Indian scenario, joint families have always acted as insurances against social problems like care of the widows, orphans, single mothers, disabled etc. Nuclear families have their own strengths. Joint families especially in traditional occupations like fisheries act as resilience factor as it paves way for division of labour amongst the family members. Nuclear families in rural areas where people are dependent on traditional occupations which are time consuming, act as vulnerability factor since it over burdens the family and at times leaves the children alone at the household. Also, if the family belongs to poor family, the vulnerability increases.

Size of the family, economic condition of the family, the occupation of the family and the space availability are all interrelated factors. If the family is poor, the size of the family and space availability is related. These three factors act as vulnerability inducing factors. The over all economic status of the families in Madhvad is low along with small semi kutchha houses while the size of the family is large. This combination adds to the social vulnerability of the community.

Gender is a very important indicator for human development and in resiliency literature, it is highlighted. In a patriarchal society, women have secondary roles to play and have secondary status as compared to men. More women

and children die in disasters than men due to their dependent status. Also gender ratio is an important determinant in the development of a nation. In Gujarat, the gender ratio is low as compared to the overall country ration. There is not much difference in the two communities as regards gender ratio.

Migration Pattern:

In the field of disaster management and climate change, in and out migration is a very important indicator of resilience. Migration due to climate change is a noted phenomenon all over the globe. In migration puts stress on the available resource of a community while out migration acts as a vulnerability factor and indicates lack of adaptation measures at the community level. It is to be noted that seasonal migration patterns are different then permanent migration patterns. In India, mostly, seasonal migration is noted. Seasonal migration is generally for livelihood by semi skilled or unskilled laborers. In case of Mahdvad people generally go to Veraval for working in fishing industries. Most of them are females who work for these industries. This shows the out migration. When women migrate for work, they leave their children with the elderly of the household. The absence of permanent migration may contribute in the adaptability of the households to manage and withstand disasters and climate change.

Economic Status, Savings and Indebtness:

Emergency risk management and safety nets in terms of savings is an important indicator. Ability to save is an economic indicator as well as a risk reduction indicator in emergency risk management. It ensures protection against exploitation also. Money saved can be invested to generate more money. Madhvad is found to be less resilient than Umarsadi in terms of savings to manage emergencies. Where do people save is also in an important indicator for resilience. Growth of money is ensured if it is reinvested in banks, bonds, securities, business etc. Also, access to banking institution and availing this kind of institutions also plays an important part in understanding the perceptions and choice of the people. Perceptions' regarding economic condition of one's household is directly related to risk perception of a household. If the household regards itself to be economically

weak, it will also rate itself high on risk related to emergency management. Taking debt is a way of meeting with the demands that a household faces when the income is not enough to maintain its functioning or when there is extra need to spend. In India, taking debts for social occasions like marriage, death rituals, religious functions etc due to prevailing social customs and traditions leverage additional burden on the household in terms of economic expenditure.

Another factor contributing to vulnerability is the reason for taking loan or debt. Vulnerability increases when the reasons for taking loans are to meet household expenses, for basic necessities and religious purpose. Moreover, source of taking debt or loans also talks about the existing traditional and modern sources. Ability of the household to repay loans is also a resilience factor related to indebtness.

Hazards, Disasters and Climate Change:

Exposure to climate related hazards, the intensity and the damage sustained due to it are important indicators in accessing the over all vulnerability to climate change. The history of disasters in a given area and the changing patterns of ecology in the area are all important indicators for vulnerability and resilience assessment. How a potential hazard is converted into disaster depends on various factors. Though it is not possible to stop natural disaster or climate change occurrences, disaster risk reduction and climate change adaptations plays an important role in saving loss and damage to lives of people and property. While disaster risk reduction makes a community resilient, its integration into developmental policies and programmes aims at increasing the over all resilience of the communities/regions/nations. The vulnerability increases when the intensity of any disaster is high.

Cyclone has long history in Gujarat and the Gujarat coast has experienced devastating cyclones like the Kandla cyclone. For a fishing community, cyclones have always been a threat to their lives, property and livelihoods. Some of the experiences of loss of lives, livelihood and property changes the course of lives of communities like it happened in case of Umarsadi due to the

Kandla cyclone in which the community sustained loss of lives and big vessels which had gone to sea. Moreover, most of the fishing communities stay on the shores very close to water. Policies like Coastal Regulation Zones do restrict building of houses or commercial properties on the coast according to the provisions of the rules and regulations.

Flooding can be due to river flooding or due to seas or oceans or due to heavy rainfall. This is also related to the climate. Madhvad is more prone to flooding due to its geographical location since it is surrounded by the sea and the wetland on all the sides. Moreover, the floods are due to heavy rainfall which it experiences. It also cuts off the village from the main land due to over flooding. In case of Umarsadi, the flooding is there but not near the households as the households are situation at a higher ground. Par river get flooded in the rainy season but it does not threatens the households. Thus Madhvad is more vulnerable to flooding in comparison to Umarsadi.

Salinity ingress is a well marked phenomenon on the entire Saurashtra coast. In Kodinar also, this is noted and efforts are undertaken by the government and other organizations like Ambuja Cement in combating salinity ingress by various methods.

Mangroves definitely act as a buffer against high winds waves and tsunami. Small fishes and crabs are found in the shallow water of the mangroves that provide source of food and livelihood for the community people. In Madhvad, once there were huge mangrove coverage which with times was depleted but for the past many years, there has been regeneration of mangroves due to government endeavors. In case of Umarsadi, the case is different. Over the decades, the mangroves have depleted completely and the pollution does not allows the mangroves to survive.

Amenities in normal times and in time of emergency:

The amenities available to a household in normal times reflect the ease or hardships that a household has to face in day to day life. These act as either resilience or vulnerability factor. If in normal day to day life, amenities are

hard to avail, in times of emergency, it acts as stressor and adds to the already stressed lives. Basic amenities are lifeline of a community. Disruption of the same in times of emergency acts as added burden. Disaster management efforts in form of community based disaster management or community based disaster risk reduction plays an important role in ensuring that there is minimal of disruption of life and the gap between disrupted life and regaining the normalcy is minimal. In terms of climate change, adaptation measures over a period of time ensure that the community has found newer ways of adjusting to the demand of times.

Drinking water:

Availability of safe, portable drinking water is an important indictor as far as basic amenities in life are concerned. Water is the basic need of all living beings. People can survive without food in emergency situation but not without water for longer time. In terms of climate change, availability of drinking water is an important indicator in terms of health and time also. There are still many communities where the women of the households have to travel long distance to fetch drinking water everyday in normal times.

In Madhvad, though the village has swajaldhara project which provides tap water at the door steps, there is no water in the taps and hence women have to fetch it from a distance. Also, even in normal times, Madhvad has to rely on private tankers for water. They have to buy water from these private providers making it more vulnerable than Umarsadi in term of drinking water during stress free times. In summer season or in times of stress or emergency, Madhvad has to resort to buying water for drinking as well as for other uses like washing adding financial burden while in Umarsadi; it's the government sources which are providing the services. Thus Madhvad is more vulnerable due to it's over dependence in case of safe, portable drinking water.

Electricity Facility:

Availability of electricity is also an important indicator for development. In our country there are still many villages where electricity is yet to be seen by the people. Electricity is a basic amenity. Kitchen appliances, home appliances,

study, entertainment, knowledge, communication etc are all dependent on electricity now a day in the evolving technical world. In absence of local provisions or alternative local technology, it hinders the day to day lives of people in a community. Thus unavailability of electricity under stress free conditions makes Madhvad more vulnerable than Umarsadi. Thus in times of emergency also, Madhvad depends on government sources for electricity.

Health Status and Health Care Services :

Availability of health services, accessibility, quality of health services and utility of the same are important indicators for health care in stress free times as well as in times of need. Health care needs are also basic needs of human beings. Incidence of malaria, dengue etc has increased due to increasing temperature in many places as shown by different researches across the globe. This is due to climate change. Maternal health care also is an important indicator along with IMR and MMR ratios. Fishermen's communities have some inherent health features like asthma and arthritis (Vaa) due to nearness to sea, skin diseases, cough and cold etc. Moreover, in case of Umarsadi, life style diseases like high blood pressure, cholesterol, diabetes are on rise. Both the communities have provisions for government as well as health care services which are easily accessible. But due to quality of services and availability of trained manpower, both the communities have heavy dependence on private health care providers. In case of both the communities, dependence on private sector at taluka head quarters is noted. In case of grime diseases, they travel long distance to other big cities like Veraval and Mumbai. Thus, in times of emergency or stress, Umarsadi depend heavily on government services for health care services while Madhvad continues to depend on private services but also utilize government services. Thus Madhvad is more vulnerable than Umarsadi in terms of health care services in times of stress as they have to travel to access these services.

Communication:

Communication is the lifeline of any community. Availability of communication tools and easy accessibility are important indictors. Communication media are

varied in nature and play an important role in communicating risk also. Diversified sources of communication lessen the dependence on any single source acting as a resilience factor. It also affects trade and commerce. There are more diversified modes of communication in Umarsadi

Transportation:

Mode of transport and its availability talks about mobility. People need transportation for accessing basic services like health care, information etc and also for purposes like going to work place, buying goods and services etc. Some households in Umarsadi also have their own cars which is absent in case of Madhvad. Also, many households in Umarsadi have bikes or scooters of their own which is less in case of Madhvad. Government bus facility in Madhvad is not there. They have to go to Velan which is two kms to catch the bus while in Umarsadi, the frequency of government buses and private buses is good providing ample amount of transportation. Thus transportation wise, Madhvad is more vulnerable than Umarsadi.

Shelter:

Emergency management especially in terms of housing is also an important indicator. Due to the Disaster Risk Reduction activity in terms of VDMP(Village Disaster Management Plan) undertaken in both the communities, people have identified and know where to go in times of emergencies like flooding and cyclones. These enable the community people to go to these places without being informed by anyone.

Resource Dependency:

People have since long been dependent on natural resources for their subsistence- for food, livelihood etc. In term of negative impact of climate change and extreme events, resource dependency leads to enhanced vulnerability and results in reduced resilience. Adaptation measures do enhance the resiliency of the community. In terms of fishing communities, over dependence on natural resources like coral reefs, oceans and mangroves leads to vulnerability in terms of absence of any alternative resources for food, livelihood and household consumption. This is especially

so in case where there is heavy dependence on one source of livelihood or there are no diversified livelihoods.

Fishermen from Madhvad travel long distance till Okha and Jakhau along the Gujarat sea coast where they find good fish catch and variety of sea fishes. It is however to be noted that the distance covered by these fishermen have increased over the decade due to depletion of natural resources. Earlier they used to get good variety of fishes near their community thus saving time and energy. Now they have to travel for days together to have good and varied variety of fishes and sea life for consumption as well as for selling. Being fisher folks, fish is their staple food.

Mangroves are an integral part of fishermen's community since they provide wood as well as livelihood to the households. Thus depletion of mangrove cover would burden the households in terms of wood availability for household consumption.

In rural fishing communities, people are still found to be dependent on fire wood for cooking purpose. Thus they are dependent on available wood of mangroves for cooking. There is a tradition of using dried wood of the mangroves for cooking. Depletion or lack of regenerating efforts may render the community vulnerable in term of resource dependency. .

The shallow muddy water of the mangroves is home to many small fishes and crabs which are used by the household as food or for selling in term of livelihood generation. Depletion of the same over the period of time or lack of regeneration efforts would act as a vulnerability factor. Resource dependency is observed more in Madhvad than in Umarsadi.

Livelihoods and Business:

Diversification of livelihoods is a very important indicator for resiliency. Disruption of livelihoods due to climate change and extreme events is a well known happening in the world. Both the disaster risk reduction literature and adaptability literature in terms of climate change talk about livelihoods and

their diversification. When an entire community is dependent on climate related livelihoods, in case of negative effect of climate change and extreme events, disruption of the same will render the entire community vulnerable. In case of fishing communities, a cyclone or warming of sea or oceanic water or pollution would stop the fishermen from going to the sea or make it difficult for them to go to sea. Industrial pollution damages the head gear of the machine boat. Similarly due to depletion of coastal and marine resource like fish variety, corals, shells, crouches, mangroves, beads etc, livelihoods would get affected. As it is noted in case of Madhvad and Umarsadi both, people have to travel long distances for finding a good catch as compared to earlier times. While Madhvad still continues with the traditional occupation of fishing, Umarsadi has seen dramatic diversity in terms of livelihood as an adaptation measure against the changing times. Resilience is closely linked to adaptation. The system is more resilient when it adapts to according to demands of time. Diversification in terms of service sector, business sector, handicraft, animal husbandry etc would act as resilience factors for a community as it minimizes the natural resource dependency of a community. Opportunities like being absorbed as seamen in the shipping industry also acts like a life line for the community as is observed in case of Umarsadi which is seeing the third generation being absorbed in the industry.

Moreover, whether the household is able to reinvest the money for further income generation is also as resilient factor. As is observed in some households, there is a tendency to reinvest the money earned from one source in some other kind of business.

Role of family members engaged in a particular occupation of a household also provides insights into the traditional, current and futuristic occupations of the community. It is observed in case of Madhvad that three generations of a family are engaged in the traditional occupation of fishing and it is adding to the resource dependency. While in case of Umarsadi, it is observed in case of Seamen's occupation. In Umarsadi, people are absorbed in the service industry.

Heavy dependence on fishing is marked in Madhvad. Fishing is the only livelihood they know and are engaged in Madhvad. There are only 5-6 medium scaled traders while others are small fishermen. There are no big vessels of fishing in Madhvad any more which also shows the kind of fishermen whether they are small, medium or large scaled fishermen or fishing traders (businessmen). Thus in term of dependence on fishing for livelihood, Madhvad is more vulnerable then Umarsadi. Small fishermen are generally engaged in fishing for self sufficiency and selling in small quantities. Some of the fishermen are engaged in fishing for business use only but this is negligible in case of Madhvad.

In case of Madhvad, second generation in form of daughter in law, sons, daughters etc are also involved in fishing unlike Umarsadi. This clearly indicates that the second generation in Madhvad is also actively engaged in the traditional occupation of fishing in Madhvad indicative of resource dependency in the generation next.

Marine life is often the main source of livelihood for the fishermen.. Thus depletion of such resources would render the households vulnerable. In Madhvad, earlier they use to get shells and crouches on the sea shore but the availability has depleted over the period of time as informed by the elderly men and women of the community. Thus being dependent on the marine resources, in absence of conservation efforts, the community has been rendered vulnerable as this has affected their income.

Service sector is another area where people are absorbed. It eases the over dependence on one resource as is observed in case of Umarsadi. It also shows the gradual shift from fishing to other sectors for livelihood. The nearness to GIDCs like Pardi GIDC and nearness to industrial areas like Vapi and Valsad also provides ample amount of opportunities for the community people to be absorbed in the near by industries . Also, the women folk from the community are engaged in the packaging industries in the nearby industries. They have pick up and drop in facilities in form of company buses. Moreover, there are many people engaged as teachers in the educational

settings. This is indicated Umarsadi to be more resilient then Madhvad as far as diversification of livelihood in the form of service industry is concerned. Many people are able to save the money earned from service and reinvest it in business which acts as a resilient factor.

In both the communities, business is in form of small fishing traders especially in Madhvad. Though they are involved in business, it is selling of fish on day to day basis which they have termed as business.

Formal and Informal Networks to support climate change adaptation:
Multilevel social networks are crucial for developing social capital and for supporting the legal, political, and financial frameworks that enhance sources of social and ecological resilience. The sharing of management/governance authority requires cross-level interactions and cooperation, not merely centralization or decentralization. In many cases, improved, strong leadership and changes of social norms within management organizations are required to implement adaptive governance of coastal social-ecological systems. There is no time to waste.

It is to be noted that in both the communities, under the DRM (Disaster Risk Management) exercise undertaken by UNDP and GOI, Village Disaster Management Plans have been made. These plans have to be modified at a regular period and mock drills are to be carried out as part of preparation. These plans are linked into the Taluka Disaster Management Plans and finally into the District Disaster Management Plans which later on merges with State Disaster Management Plans at the state level. These plans act as guidelines in times of disasters. Though no such plans are made for climate change incidences, it can be a good starting point for reference to built upon. Gujarat already has GSDMA and a separate department of climate change. What is needed is synchronization at some point.

Community resilience includes indicators like in terms of knowledge and learning from changes, adaptability in terms of vision and leadership and Self Organization in term of linkages and networks.

Planning to deal with changes, coordinating activities, ability to reorganize, helping members to reorganize within minimal of time, work in coordination with each other and seeking support from outside are important indicators for community resilience.

With respect to climate change, the ability of the community to make community plans to deal with the climate related events like cyclones, floods, coastal erosion, sea level rise etc is an important indicator of community resilience. Traditional knowledge enables a community to learn and adapt to the ,changing situation. On the basis of the same, a community can plan to deal with the climate changes. While both the communities have their VDMPs, there is need to update the same and carry out mock drills as only a handful of people remember about the plans.

Largely the community members think that they are able to plan effectively. However, there is a rising concern in the community regarding this ability as is reflected by households who have opt to be neutral or disagree with the statement. This is due to the fact that though the communities are able to deal with some of the impacts like cyclones, they need better plans for dealing with long term climatic effects. This is evident in case of Madhvad since the community is facing problem due to heavy dependence on fishing which has been adversely impacted due to climate change over the period of time in term of depletion of resources.

Disaster management calls for quick rescue, relief and ensured rehabilitation after any disaster. The lesser the time it takes a community to bounce back to normalcy, lesser is its vulnerability. In term of climate change, it's the adaptability which counts. i.e. the ability to change and adjust to the new way of life. Thus the communities are largely in agreement that their community can coordinate activities to respond quickly to the impacts of natural events like cyclone and floods but there is uncertainty and disagreement with respect to problems like depletion of resources due to natural events.

Social resilience in terms of ability to reorganize and respond to a new situation is an important indicator. Climate change not only calls for organization but also reorganization after a disruptive event or long term change. Its call for adaptation. The shorter the time for the same, higher is the resilience but the basic fact remains that there should be ability to reorganize to a new situation. e.g. in case of livelihoods, the ability to diversify and respond to the new situation rather than keep on depending upon the old one without any changes. While generally there is an agreement at large in both the communities, there are indications of uncertainty and disagreement to respond to the new emerging situation. This is clearly marked in case of Madhvad making it more vulnerable.

Community Institutions are the lifelines of the community. In case of the fishermen community in Gujarat and in Madhvad and Umarsadi both, their Samaj play a vital role in social organization of the community. There is a strong hold of these institutions on the community life of the people. They are governed by these institutions more then the common law and order institutions of the country. This mechanism has its limitations in case of Madhvad due to the kind of support that the members need. Degrading of occupational resources is the main reason behind this.

Being homogeneous communities in terms of religion, caste, culture and traditions, people blend well with each other. Moreover, both the communities show lineages I.e. they have their own kin and kith surrounding them. This enhances their social ties which are helpful in times of emergency too. They are well blended and their culture speaks of helping each other. Their samaj and their customs are such that helping each other in times of need is a way of life for them. There are who need to be taken care of as they are facing multiple problems.

Bridging and bonding social capital in form of social networks are the life line of community. Vertical and lateral collaboration with other institutions enables a community to seek support from outside in term of knowledge, information, expertise and other material and non material resources for the smooth

functioning of the community. These institutions played an important role in relief and rehabilitation during disasters so far but due to climate change impacts, the kind of support that the community need now is different than what they need in times of disasters like cyclones and floods. This shows weakening of the social capital in connection to outside the community ties with other institutions other than their Samaj.

Ability of the Community to Organize in terms of leadership and governance:

Adaptability in term of able leadership and governance is vital for social resilience. An able leader can see the community overcome most of its local problems. Governance since long has held the key to most of the disaster management activities and now to the climate change initiatives also. The integration of these initiatives into the developmental policies ensures the sustenance of the socio ecological systems as well as of the developmental policies. Whether the community recognizes the leader, trusts the leader, has trust in his capabilities etc does influence the resilience of a community. Both- able leader as well as good governance acts as resilience factors since they enable the community to adapt to the changing scenario in the long term. They facilitate speedy recovery and smooth functioning of the community.

Attitudes are formed based on the past experiences of the community. Both the communities have experienced climate related hazards and disasters. Their houses have experienced the negative impact also and they have overcome the obstacle successfully. In case of both the communities, their Samaj has always played an important role in disaster management. Thus the role of their leaders is very vital in the management of such events. The trust expressed in their leaders is an important indicator of resilience. This is observed more in Madhvad

Generally if leaders take interest in the issues of the community, there are more chances of these issues getting resolved. An indifferent attitude towards the issues that the community is facing will render even a capable leader helpless as the efforts put in by him/her would not be enough. Taking

interest in gaining knowledge about the issue, in the probable solutions, the resources needed to solve the same, trust in one's ability and bonding and bridging with other stakeholders all play an important part in making of an able leadership. It clearly shows that in both the communities people do believe that their leaders are truly interested in the issues and impact related to climate change which is directly linked with their welfare and livelihood. Thus it acts as a resilience factor for the community and adds to its resiliency. In case of Umarsadi there is indication that people have lost trust. This is due to changing nature of problems faced by the community. In Umarsadi, their problems are more related to pollution, coastal erosion etc for which they have to rely on the government machinery at large. Coastal regulation zones are still not decentralized and hence the community leaders may not be able to express their interests due to lack of knowledge resources at the community level.

Knowledge and skills are two important pillars of resiliency. The third one is the practice i.e. enforcement or putting in practice the knowledge and skill. A leadership with knowledge and skills is more resilient than leadership with is just a nominal head. The knowledge about disaster management and disaster risk reduction and emerging knowledge base of climate change impacts and adaptations would necessarily capacitate leadership to deal with the issues and problems. This also takes into consideration the traditional knowledge handed over from one generation to the next as well as the new technological aspects of the modern era. Many a times there is confusion as to which path to venture onto but the right integration of traditional and modern knowledge and skills is indispensable to combat the negative impacts of climate change . Thus largely, this acts as a resilience factor in both the communities but there is a rising concern in case of Umarsadi. If this is not addressed in a timely manner, people may loose their faith in their leaders knowledge and skills.

Climate change adaptations are quite different from disaster risk reduction measures. This is more so because of the uncertainty prevailing in the field of climate change. Though at the international platform, there is largely and

immerging community who accepts climate change as an imminent issue which has both positive and negative impacts, the initiatives required to combat the same are still vague. This is especially so at the community level in countries like India. What is a community like a fishermen's community suppose to do who rely totally on traditional knowledge of predicting the weather on base of nakshatras and vahana(Indian calendar) which are rendered a bit unpredictable due to the ever changing climate events? The emerging disagreement in Madhvad and uncertainty in Umarsadi are matters of concern for the leadership in terms of community resilience.

Information dissemination is the pivot of awareness generation activity. Though there are no formal platform for exchanging national level and regional level climate change policies, the informal network of the fishermen community acts as a strong information dissemination platform. This is because in both the communities, the local samaj is connected to the regional and national samaj who are in constant touch with other government and non government bodies. Thus this acts as a communication channel. The fishermen community gets updates related to fishing and its related policies and programmes from this network. Thus in both the communities, people do have access to such information which acts as a resilience factor in both the communities.

Climatic data is generated by the IMDs (Indian Meteorological Department) located at different locations in our country. Moreover, the state resource centres also help in dissemination of such information. It is practically not possible for the local governance or leaders to keep all the information pertaining to all the matters related to climate. But they can always facilitate availability of information from other sources like the government organizations, academic institutions, research centres, non government organizations and other valid organizations or institutions from where information can be accessed. Climate related information plays a very important part for the fishing communities. With the changing seasonal patters observed, such kind of information becomes an absolute need. The change observed in the monsoon cycle is also very important. Added to this is

the information related to probability of extreme event. Thus there is decreasing resilience observed in case of Umarsadi as people have expressed their confusion regarding the same due to magnitude of their problems.

Adaptation measures have long been part and parcel of community life. Some communities are able to adapt to the changes in the socio ecological systems while some are not, depending upon their resiliency. e.g. in case of Umarsadi, people have diversified their livelihoods with the help of the community while in case of Madhvad, this is not the case. Hence, both the communities have different modes of adaptation. There is a rising uncertainty in both the communities more so in case of Madhvad due to over dependence on the fishing industry which is highly dependent on climatic factor. Thus it acts as a vulnerability factor.

Different kinds of resources, both material and non material are need for climate change activities. These activities range from information dissemination, good practices, strengthening of the community assets and infrastructure, judicious use of resources to building social capital etc. There is a rising concern in Umarsadi regarding the leader's ability to provide the community with necessary resources adding to its vulnerability.

Public participation in disaster risk reduction as well as in climate change adaptation act as resilience factors for a community. Public participation ensures good governance as it leads to awareness and ownership of related decisions, policies and programmes. This increases the resilience of the community which helps it to adapt to the changing scenario. Madhvad is more resilient than Umarsadi in terms of resilience related to ability of the leaders to encourage community members for disaster risk reduction and climate change adaptations.

Good governance always encourages its community members to voice their concerns related to planning for disaster risk reduction and climate change adaptation measures. It reinforces the democratic values of governance in

true spirit in the community. Umarsadi is more vulnerable than Madhvad in terms of public participation in community planning. The hold of the samaj is such that people are not able to clearly say it and hence remain neutral.

. **Recommendations:**

Different Socio ecological systems are dependent on each other. The interconnection between the humans and nature is a world wide phenomenon. Based on the major findings and conclusions, the researcher wishes to make the following practical and need based recommendations at various levels across various stakeholders:

National Level:

India signed the UNFCCC on 10 June 1992 and ratified it on 1 November 1993. Under the UNFCCC, developing countries such as India do not have binding GHG mitigation commitments in recognition of their small contribution to the greenhouse problem as well as low financial and technical capacities. The Ministry of Environment and Forests is the nodal agency for climate change issues in India. It has constituted Working Groups on the UNFCCC and Kyoto Protocol. Indian has already provided its National Communication (NATCOM) to the UNFCCC which focused largely on five sectors: energy, industrial processes, agriculture, forestry, and waste. This exercise involved detailed work on estimation of sectoral GHG emissions and identification of country-specific emission factors. Vulnerability and adaptation assessment is also part of the National Communication project. The Prime Minister's Council on Climate Change created the National Action Plan on Climate Change which has eight missions these are National Solar Mission, National Mission for Advanced Energy Efficiency, National Mission on Sustainable Habitat, National Water Mission, National Mission for sustaining the Himalayan Ecosystem, National Mission for Sustainable Agriculture and National Mission on Strategic Knowledge on Climate Change. It outlines measures on climate change related adaptation and mitigation while simultaneously advancing development. The Missions form the core of the Plan, representing multi-pronged, long termed and integrated strategies for achieving goals in the context of climate change. India's 12th five year plan also has National Bio Energy mission. Besides the initiatives of the private sector and the government are those undertaken by non-governmental organizations. Also, India has NDMA (National Disaster Management Authority) at the national

level to cater to the needs of disaster management and disaster risk reduction. NDMA works through its network of state disaster management authorities. It works in coordination with various stakeholders like corporate, non government organizations, media, academia etc.

Recommendation One:

Awareness regarding India's national initiatives needs to be disseminated across cross sections of society. Presently this is limited only to the government departments at the national and state levels. The percolation of the same to the district and taluka level needs to be speed up if the impact at the grass root level is to be maximized. No other government except for Government of Gujarat, at the state level has a separate department of climate change to tackle the issue. Mechanisms for involvement of civil society organizations, academia and other stakeholder are already there which needs to be strengthened.

State Level :

Gujarat state is the only state in India to have a separate department on climate change (CCD). The department is yet to have its own websites and is still to submit its State Action Plan on Climate Change. The department is yet to set up the two climate change funds in form of Climate Change Trust Fund and a Climate Change Impact Studies & Related Projects Trust Fund for which financial allocations have already been made for two years (2011-2013). Gujarat State also has Gujarat State Disaster Management Authority (GSDMA) which looks after the needs of disaster management and disaster risk reductions activities of the state. With its full fledged working, all the districts, talukas and villages which are vulnerable to hazards, have been covered under the Disaster Risk Management activity conducted jointly by GOI and UNDP(United Nation's Development Programme) based on the community based disaster preparedness model. Villages have Village Disaster Management Plan, Talukas have Taluka Disaster Management Plan and the Districts have District Disaster Management Plans which are linked with state level disaster plans. Different task forces were trained and mock drills were conducted.

Recommendation two:

Apart from activating the department of climate change, the awareness about the climate change department and its activities needs to be disseminated especially at the taluka and village level. The active involvement of various stakeholders should be ensured through repeated refinement of the various disaster management plans. It should be incorporated as an integral part of a community life. The integration of disaster risk reduction and climate change adaptation measures needs to be integrated into the developmental policies. The players in disaster risk reduction and climate change should work in close coordination with each other so as to optimize the benefit for developmental planning.

Recommendation Three:

Citizen's forum and platforms can be created at the state level with active participation of various stakeholders. These platforms can act as a common ground to gain information and knowledge and share concerns about climate change issues, concerns and initiatives. These can also act as state level kiosks. Use of Information, Education and Communication (IEC) can be ensured in form of screening of documentaries, case studies, posters etc

Recommendation Four:

The same exercise should be followed at the taluka level also. Thus a systematic filtration of issues needs to be ensured. Micro scale interventions are to be more specific. The middle tier of governance is the one which acts as a balance and hence important in actual implementation of policies and programmes. This is more so especially in case of government functionaries and non governmental organizations.

The recommendations made above are on the experiences of the researcher during the study though the major study was carried out at the community level. The researcher took interest in understanding the issues at the state and taluka level and interacted with some of the functionaries at these levels.

The Village Community Level:

In the districts where the Disaster Risk Management exercise has been carried out in Gujarat, each village community has a Village Disaster Management Plan in form of a booklet. These plans are actualized by carrying out actual mock drills as per plans for the preparedness of the community. As for Climate Change Adaptation measures, these are sporadic in nature and are community specific. The National Mission planned for adaptation and mitigation in the National Action Plan for Climate Change are yet to be linked at the district and sub district levels. The results of DRM projects can be the starting point of interventions at the village community level.

Recommendation Five:

The present mechanisms available at the community level in the disaster vulnerable communities are in form of Community Based Disaster Preparedness.

Apart from disaster risk reduction measures at the community level in form of Village Disaster Management Plans and their gradual integration with the developmental policies and programmes at the village level, Climate Change Adaptation measures should be given an impetus. These two together should be integrated into the developmental policies and programmes.

Recommendation Six:

Integrated Coastal Zone Management offers mechanisms for adaptation through an attempt to balance environmental, economic, and social objectives. In a recent development, the Integrated Coastal Management Zone Management is being carried out on pilot basis in Orissa and Gujarat State. Thus, at the community level, this can provide the much needed platform for functioning at it takes into consideration a wider perspective.

So far the recommendations have been generic which applies to any community. Now focusing on the two communities that have been studied, the following recommendations are made:

Housing Pattern:

Housing especially in the disaster prone zone where the impact of extreme events is likely to be experienced more should be as per specifications according to ICRZ (Integrated Coastal Regulation Zones). The building codes and land use patter code should be adhered to, to avoid buildings immediately near the coast. At risk houses should identified and be either retrofitted to meet the design specifications or be shifted to higher altitudes with mutual understanding of the community, especially those houses on the sea shore. Care should be taken to study the traditional good practices and incorporate them in the new ones.

Water:

Water being the basic necessity of life, its availability should be ensured through projects like Swajaldhara which ensures water at the doorsteps. Alternatives like private players should not be encouraged as it many a times pave way for conflict. People should be educated and behavioral change education should be carried out. One of the ways to do so is to undertake salinity ingress measures at the village level. Rainwater harvesting system should also be encouraged to ensure safe drinking water. Water conservation practices should be given impetus wherever possible.

Drainage and Sanitation:

The local governance should take this up as an important aspect of community development. A community level mechanism like its own small drainage system can be worked out where there are no drains at all. At least make shift toilets near the sea shore can be beneficial to the community. There are schemes for drainage and sanitation from the government side too which can be implemented in the village. Care should be taken to spray disinfectants where open defecation is carried out. This way, the vulnerability can be reduced.

Health:

Accessibility to health and utility of health services can be worked upon in the communities by involving the non government organizations in the same. Health awareness is one such programme which needs constant repetition in a community. The National Rural Health Mission can reach the door steps via the government machinery as well as the non government machinery. The present government facility needs to be updated in terms of infrastructure and quality of services. Another factor is increasing accessibility by providing transportation facilities.

Education:

Where the education is less, it should be given impetus, especially in term of skill enhancement. Vigorous efforts are needed with the help of local stakeholders to see to it that more and more people are educated.

Occupation:

If traditional occupations like fishing are to be continued, it needs to be supported through management of coastal ecosystems or coast zone management so that the communities reap maximum benefits. This would ensure economic as well as social development as it encompasses two fold objectives.

Legal Services:

The formal legal services also need to be recognized by the community members since out of their own communities, they also need to deal with others. A right based approach for development can pave the way for effective synchronization with other segments of the larger society.

Hazards, Disasters and Climate Change:

The community should be equipped with dealing with extreme events and other climate change impacts. This can be done by taking the VDMPs as the starting point. It needs for a more holistic approach with multi stakeholder partnership with academia, non government organizations and the government. The ownership of these VDMPs should rest with the community

since it would enable them to modify it according to the changing scenario. What is required at this point of time is to recall and document the adaptation measures of each community e.g. the fishermen community so that the lessons learnt by one can be useful to the another one. This would synthesize knowledge needed for adaptation measures.

Reduction of coastal risk/hazards/disasters can be undertaken based on the Community Based Disaster Preparedness model with the help of multilayered stakeholder participation. Awareness regarding the new emerging issues related to climate change and its vulnerability is also a key factor for the community in terms of resilience. A culture of preparedness needs to be preserved and carried forward to the next generation.

Traditional Knowledge, Warning and Evacuation and Disaster Preparedness:

When people shift their livelihoods, there is a degradation of the traditional knowledge. The age old wisdom is lost as people lose interest in fishing. Community mechanisms in form of written down practices or folk art can enable a community to restore this traditional wisdom. A deep study of the same, the coping styles etc can act as treasures of wisdom for an entire community. e. g. earlier fishermen used to predict the sea with close observation of wind and ocean current, make predictions based on the Indian calendar with its nakshatras and vahanas. This was used as a warning too. The modern mechanisms of warning and evacuation are well understood by the community as part of disaster preparedness. Only the new and emerging issues like rapid coastal erosion and depletion of natural resources of the ecosystems are beyond their means which needs support from other segments of society.

Risk Knowledge and Disaster Recovery:

Factors like community involvement, accessibility to risk assessment, sharing of information with other institutions, formal and informal education programmes for risk knowledge all play a vital role in risk knowledge management which acts as a coastal resilience indicator. Similarly

coordinating with various agencies for disaster recovery apart from local institutions also acts as a resilience factor.

Livelihood and Resource Dependency:

Coastal Resource Management in terms of fisheries, coral reefs, mangroves etc which are used by the fishing communities for food, income and goods needs to be undertaken at the community level with the help of multi layered stakeholders. Protection and maintaining important coastal ecosystem is also the need of the hour. This is important not only for economic development but also for social development of a community which is dependent on coastal and marine resources for their livelihoods.

Regeneration of mangroves and coral reefs also plays an important part in protecting the coasts from strong winds and waves and helps in stopping erosion and also enables survival of small species in the muddy water. Such initiatives are already being taken by the government but it needs impetus and needs strict monitoring at the local level.

Livelihood diversification especially in areas where the resources have depleted over the year and it is difficult to sustain the population on the slowly regenerating resources, people should be provided with informed choices regarding livelihoods in their areas. Skilled based occupations can also be given impetus if the community opts for the same. Skill development centres are a good way of bridging this gap.

Many a times, people are not aware of the supplementary or alternative livelihoods they may have in vicinity. Such kind of opportunities and threat analysis can be carried out at the community level for better adaptation and resilience.

Formal and Informal Networks:

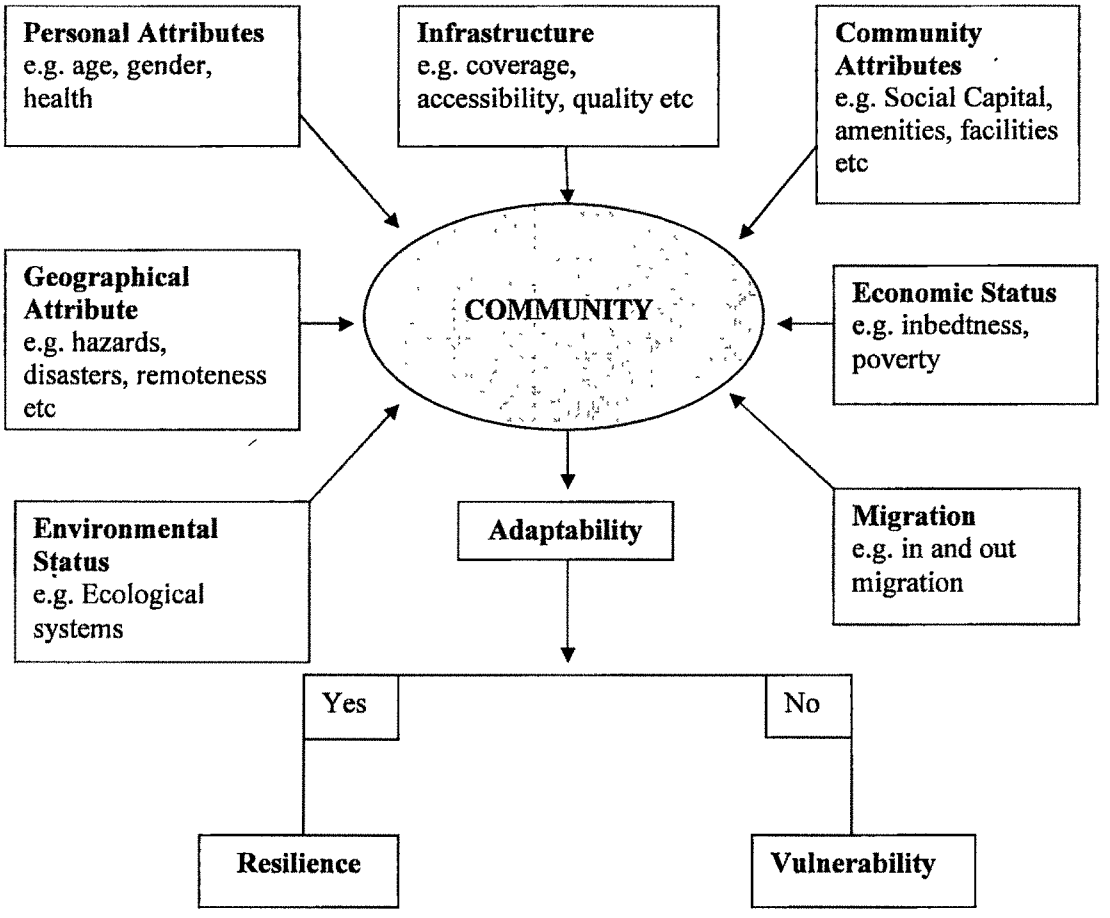
Social capital in form of bonding and bridging capitals are very important for social resilience. They not only assist in times of need or emergency but also provide basis for community participation in various strategies for community

welfare and development. While the strength of networks like community samaj like in a fishermen's community is evident, the role of religious, cultural and faith based organizations is also vital. Presence of active non government organizations also strengthens the social fabric of the community and acts as glue. These networks can be used right from awareness generation to dealing with issues of adaptation to climate change. Social networks affect motivation and cooperation and are a basis for communication in communities. Such communication provides a system of feedback among stakeholders and allows for appropriate adjustments in behavior. The present networks in the communities can be strengthened for climate change adaptation measures.

Leadership and Governance:

Governance with respect to indicators like vision, participation, consensus, transparency, responsiveness, effectiveness and efficiency, accountability needs to be integrated at different levels which are possible only in poly centric government with supportive leadership roles played by different leaders. Though the samaj is very strong governance for the fishermen community, it also needs to be integrated at taluka level, at state level, national level and international levels since climate change is a global phenomena which call for global to local actions. This increases the resilience of the community.

Towards a conceptual Model:



This can be used for understanding the concept of factors contributing to vulnerability or resilience at the community level.

Based on the research findings, the following scale for SVI and SRI is proposed:

Sr. No.	Particulars	Community One	Community Two	Remarks
1. Geographical Location of the Community				
1	Nearness to sea (Arabian Sea)			
2	Nearness to Taluka Headquarters			
3	Ecosystem			
2. Community Resources				
1	Housing			
2	Water			
3	Drainage and Sanitation			
4	Health			
5	Education			
6	Occupation			
7	Legal Services			
8	Communication			
3. Hazards, Disasters and Climate Change				
1	Cyclones			
2	Floods			
3	Earthquake			
4	Depletion of Mangrove			
5	Coastal Erosion			
6	Sea Level Rise			
4. Vulnerability and Resilience				
1	Elderly			
2	Widows			
3	Special Need People			
4	Orphans			
5	Warning and Forecasting system			
6	Risk Knowledge			
7	Traditional Knowledge			

8	Livelihood diversity			
9	Disaster Recovery			
10	Disaster Preparedness			
11	Coastal and Marine Resource Dependency			
12	Learning from change			
13	Self Organization			
14	Supplementary and alternative livelihoods			
15	Migration Pattern			
16	Family and Kinship network			
17	Social Networks			
18	Formal and Informal Networks			
19	Ability of community to organize			
20	Attitude towards governance and Leadership			

The above simple method of scaling was used in the present study by the researcher. The same can be replicated at the community level by practitioners. It can be used by the local community people also for understanding the resilience of their community.

No weightage is provided to the indicators in the present study as it was beyond the scope of study. But the scale can be refined and weights can be assigned to the indicators and sub indicators. Another way is to create a 5 point scale for each indicator and ask the respondents to provide the ranks. The sum total of all the indicators can be used to assess vulnerability or resilience of a community.

Thus the above recommendations are made on the basis of the research carried out in the two communities. The indicators explored are used to map the vulnerability or resilience of a given community. Though they are not explicit in nature, they work well at the community level.

Strategy for implementation at the Micro level:

The strategy for implementation can be better explained with the help of different stakeholders as follows:

Government:

According to the three tier system of local government, the Gram Panchayat i.e. the village Panchayat is provided with powers under decentralization. The down up approach works for sustainable development as it is need based. The government can act as a connecting link between the community and various other players across the sections till the national and international level. This is the layer which is involved in need based planning for the various sectors at the community level. It should also act as facilitator and provide able leadership as part of the larger three tier system. Another important function would be of information dissemination and awareness. It acts as a channel of communication with major stakeholders.

Non Government Organizations and others:

Non government organizations along with other like civil society organizations, trusts etc have outreach functions. These organizations need to be given impetus in various adaptation programmes and empower them as the bridging social capitals. Moreover, the community based organizations though small in size can also be empowered by connecting them to larger networks of organizations. It is the medium to revive and revamp the village level preparedness and integrate it with climate change adaptation.

Academia:

The academia is a major stakeholder. Though at the micro level there are mostly primary schools and high schools, special awareness and preparedness programmes on climate change and climate change adaptation

can be undertaken with these. A variety of programmes like elocution competition, poster competition, project making competition, quiz, games on climate change, essay writing, zingles etc can be worked up for this age group. At the higher ladder, universities should be facilitated to carry out research at the community level by the local government or by other research institutions. These way young citizens can be nurtured as torch bearers of climate change adaptation.

Media:

Media has an important role to play. At the local level, apart from the local folk music and arts, the reach of modern means like cable television and television has increased many folds. Thus awareness regarding the issues, the interventions at the various levels etc can be easily conveyed through this. Another effective way is community radio where a community has its own programme. Print and electronic media are also found to be effective for information dissemination and awareness.

Industries:

Industrial houses or the corporate in the vicinity of the community play an important role as a part of their Corporate Social Responsibility (CSR) function. They generally work for different aspects of community development. Moreover, they also provide alternative employment opportunities for community people by skill upgradation. Under the new law, 2% of the total profit of industrial houses should be used for their CSR activities. Also industries too need to adhere to the new emission rules and regulations.

Thus the need of the hour is work with multi stakeholder partnership at various levels for effective climate change adaptation and resilience.

Emerging Role of Social Work Profession:

Over the ages, especially in the 21st century, Social Work as a profession is gaining importance. From vulnerability out look to a resilient outlook, the profession has developed by leaps and bounds. Social workers are occupying

important places right from as outreach workers to policy planners. From medical, welfare, education, disaster risk reduction etc to industry- they are all encompassing. The social work education with its base of values and code of ethics empowers a professional with required knowledge, attitude and skills. The exposure to real life situations through various field exposures and rigorous training in human services provides the cross cutting edge to a professional to devote to the field of practice. With the various methods of social work available, a professional has a wide variety of methods to choose one or even work with combination of such methods.

Closely linked to climate change adaptation is the field of environment management in which social workers have played a very strong role. Similarly in the past decade, social workers have also proved their worth by adapting to different roles in disaster risk reduction measures not only in India but across the globe. They participate in important activities from need base surveys to need assessments, to risk analysis, vulnerability assessment, awareness generation, research, working with different stakeholders to acting as policy and theory makers.

Climate Change and Climate Change Adaptation is an area where one needs to work in close association with human settlements in an era of uncertainties across various sections of the society be it at local level, at regional level, at national level or at international level. The sound knowledge of vulnerabilities and resilience at individual, household and community level equips a professional to work in the field. Climate change is an issue which has encompassed the entire world today. Thus there is tremendous need for social work professions in the field. They are the agents of change who act as catalysts for transformational learning, an important attribute in resilience theory and practice.

Scope for further research:

The present research is a totally new start in the filed by social work professional. A down up approach is the need of the present hour since each community in rural as well as in urban area will have to face the wrath of

climate change. Research is needed for communities involved in different occupations especially those dependent on natural resources like agriculture and fisheries. Also communities residing in different climatic zones will face differential impacts of climate change. The tools of disaster risk reduction can be used as a starting point to develop climate change specific tools for different climatic hazards like cyclones, storm surge, floods and Sea Level Rise. More and different indicators especially social indicators which are community specific also needs further research. A special focus on adaptation measures and the role of social indicators in the same also needs to be probed further. Social work professionals as part of their training of the profession at the academic level can also carry out community based researches at graduate, post graduate and doctorate level. Also the various schools of social work in the country with their vast experience of research in the field of social work can contribute their part.

Moreover, a multi disciplinary research is also needed for a complex subject like climate change. Thus researchers from different fields need to come together to understand the socio ecological systems and how adaptation and mitigation can be worked out.

India's national mission on strategic knowledge also provides scope for research in the field of climate change by research institutions and academic research.

Thus, this present study is a starting point and paves way for further research to be built upon either by replication or by value addition to the field with different dimension.