

# Social capital for disaster risk reduction and management with empirical evidences from Sundarbans of India



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## ARTICLE INFO

### Article history:

Received 21 April 2016

Received in revised form

16 August 2016

Accepted 26 August 2016

Available online 27 August 2016

### Keywords:

Disaster

Disaster risk reduction

Social capital

Social network

Community

Disaster management cycle

## ABSTRACT

Social capital is a resource which is embedded in every community and it has been observed that it plays an important role in different stages of a disaster. Social capital can be crucial for a community to survive till outside help arrives, in event of a disaster, and many a time it is the only resource that the community can mobilize to respond and recover. This research paper reviewed the contribution of social capital with different empirical evidences from cases across the world and brought it into the perspective of the study area in Sundarbans, India. The study area is frequented by disasters like tropical cyclones and surges, it was observed that the network at the community level is crucial for survival of the community. It also was observed that social capital acts like an informal insurance in cases of small scale disasters. Social capital is more relevant in this remote study area as it compensates for the gaps in basic infrastructure and proper disaster management institutions. Thus, proper mobilization of social capital can really be an asset to communities living in remote hazardous area.

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## 1. Introduction

Disasters occur when the negative effects of the hazards are not well managed [1]. Earlier, disasters were sparse and considered acts of god, but in recent years the sheer volume and frequency of disasters has increased many folds [58]. Despite of the dialogues, discussions and considerable investment over the years, in the field of disaster risk management the losses due to disasters have continued to rise [55].

The increase of natural disasters is mostly related to increase in population, industrialization, climate change and development. Much of this “development” across the globe has been shown to increase people’s exposure to hazards by pushing them to live in hazardous areas adding to the vulnerability of the people, who may then also be forced to degrade the environment to survive [65].

Efforts have been taken to reduce vulnerability by various disaster risk reduction programs across the globe. It has been observed over time that there is more to disaster risk reduction than just structural or engineering measures. When a disaster strikes, it not only destroys buildings and infrastructure, but it also creates a huge loss of lives and affects the community adversely

[67]. For the communities living in hazardous areas other than structural risk reduction measures, it is important to develop non-structural measures too. Consideration of social aspects is one of the most important links in managing disasters at the community level at present.

It has been observed that social capital has played an important role in different stages of disaster risk management cycle, both in pre and post disaster scenario, especially at the community level where this invisible resource can be mobilized for the common benefit of the whole community [38].

Till now most of the research regarding disasters were based on the impact of disaster on the human and physical capital. The focus on the role of social capital on disaster risk reduction has been a rather less researched topic. Even though it is understood that social capital provides an important link to reducing risk, in most of the cases the importance of social capital in strengthening the community is overlooked. Social capital can act as a tool that reduces risk at the community level in the future. The objective of this paper is to make a review to illustrate the dimensions of social capital used in the context of disaster risk reduction and management drawing examples of evidences from different countries and presenting results drawn from the field study in the Sundarbans, India impacted frequently by tropical cyclones and surges.

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## 2. Role of social capital in disaster risk reduction

### 2.1. Social capital

In our everyday life, we are sure to have experienced that working in a group with mutual trust and coordination to achieve a common target is generally easier than working alone. Human beings are capable of achieving synergy in work when they work as a group and are capable of amazing results through their co-ordinated action [40]. Dynes [21] refer to this phenomenon as the aspects of social structure, which are of value to social actors as resources that can be mobilized in pursuits of their interests, this concept is popularly known as 'social capital'.

Social Capital is a new concept that has emerged into the social sciences field in the last few decades. The characteristics that define social capital were always present in a community much before the concept was termed by sociologists. Social capital has links with historical authors in social sciences like Dukheim, Simmel, Marx and Weber among many, and is also related to social exchange and psychological theories [17]. But it is argued by most contemporary authors that Hanifan was the first to use the term social capital in 1916, where he chose the term social capital to refer to 'goodwill, fellowship, mutual sympathy, and social intercourse among a group of individuals and families'

The modern concept of social capital took its current shape because of contributions from three authors: Pierre Bourdieu [12], James Coleman [18] and Robert Putnam [49]. According to Bourdieu [12], social capital is, 'the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition – or in other words, to membership in a group – which provides each of its members with the backing of the collectivity-owned capital, a 'credential' which entitles them to credit, in the various senses of the word.' On the other hand, according to Coleman [18], 'Social capital is defined by its function. It is not a single entity, but a variety of different entities having two characteristics in common: they all consist of some aspect of social structures, and they facilitate certain actions of actors – whether persons or corporate actors – within the structure'. Putnam [49] defined it as 'those features of social organization such as trust, norms and networks that can improve the efficiency of the society by facilitating coordinated actions.'

Fukuyama [23] termed social capital, 'as the existence of a certain set of informal values or norms shared among members of a group that permit cooperation among them' and according to Woolcock [64] social capital is, 'the information, trust, and norms of reciprocity inhering in one's social networks.'

Thus from all these definitions, it can be said that the theory of

social capital has varied intellectual roots. Social capital right now has diversity in its emphasis and is incredibly complex as social scientists and practitioners approach it from various backgrounds and disciplines, for various different kinds of applications. However, among the theorist the consensus remains that social capital consists of resources embedded in social networks and structures, which can be mobilized by its actors. It acts as a resource, which is embedded in the social structure, which provides assets for individual action [21].

In summary, social capital is seen as the actual and potential resources that stimulate multiple functions for mutual benefits carried by the members of the network bonded by a formal or informal social structure.

### 2.2. Theoretical background

As mentioned in the previous section the theory of social capital is complex because of the diversity in its emphasis and application. Therefore, a major discussion in the topic of social capital are the dimensions that contribute to its meaning. Many authors have discussed varied views about the dimensions that contribute to social capital and problems that arise because the concept is multi-dimensional [28]. One way of classifying the dimensions, as shown in Fig. 1 is structural and cognitive social capital. Structural social capital refers to the externally observable and relatively objective social structures, like networks in a community, institutions and associations, and also the rules and guidelines they symbolize [25]. On the other hand, cognitive social capital encompasses the intangible elements of a community, which are more subjective, such as shared values in a group, reciprocity, trust, and attitude and norms of behavior the group or community generally adheres to. Another form of classification is bonding, bridging and linking social capital, as shown in Fig. 2. Bonding social capital is a form of network, which denotes ties between people in similar situations, such as immediate family, close friends and neighbors. Bridging social capital is a form of network, which encompasses more distant ties of like people from other communities or groups. Linking social capital is a network which reaches out to people in dissimilar situations, such as those who are entirely outside of the community in a different power position, like the government organizations. This enables community members to leverage a far wider range of resources than what is actually available in the community [66].

Social capital can also be classified into relational and collective social capital, where relational social capital is defined as the accessible resources embedded in social networks that will bring benefits to actors and collective social capital is understood as a collective asset [12]. It basically refers to the features of social life

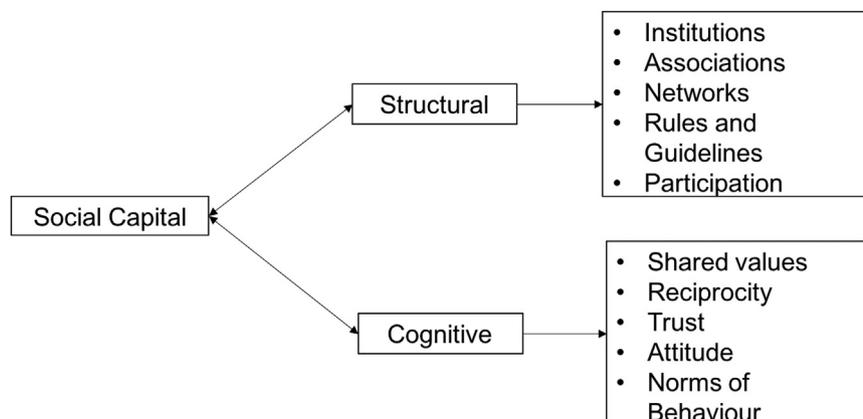


Fig. 1. Structural and cognitive social capital (compiled through literature review).

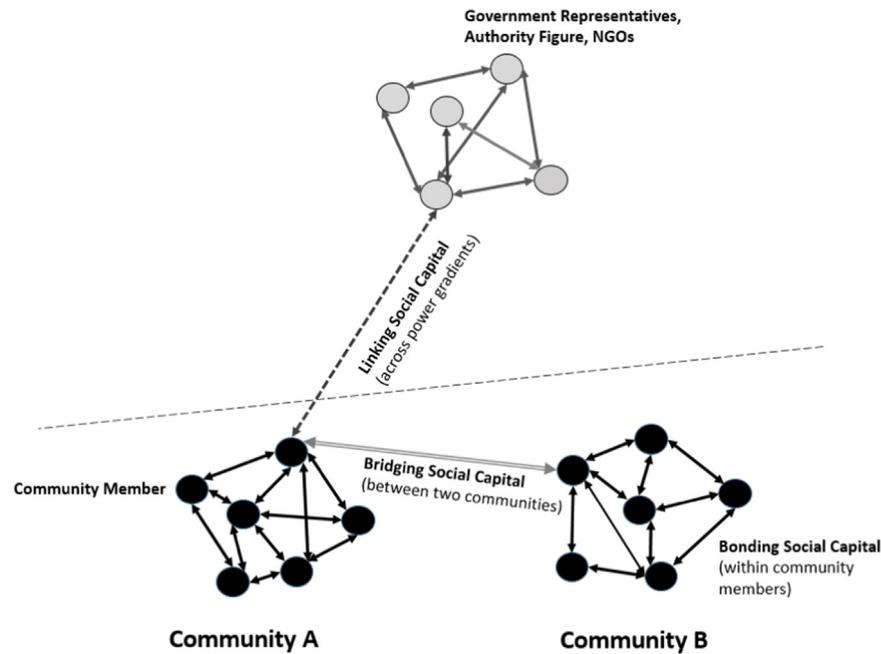


Fig. 2. Bonding, bridging and linking social capital (modified from Aldrich [2]).

in a well-defined group that enable its members to act together more effectively [25].

Despite all these positives social capital is often also considered a double-edged sword. Researchers, many a times are in such awe of the concept that they forget to focus on the negative aspects of it. Research also suggests that social capital can result in creating a barrier for social inclusion and social mobility, limiting individual growth, segregating rather than bonding communities and societies, increasing crime rate by facilitating it, reducing economic performance, affecting health and underachievement in education [7,61].

All these different ways of classifications have been used by researchers to analyze the contribution of social capital in their respective fields, namely issues related to family, health and medicine, education, democracy and governance, business and management as well as development issues. Over the years, there has been application of social capital in the research on various fields especially after the encouragement of the World Bank to use social capital to analyze developmental issues [14]. But there has been rather limited number of research studies on the concept of social capital and risk reduction to natural disaster [21].

### 2.3. Social capital in the context of disaster risk reduction

Now moving into the topic of social capital in the context of disaster risk reduction, it can be said that after some widespread disasters in the 1960s, most of the world got in terms with the threats natural disasters pose and from 1970 onwards the United Nations started understanding the importance of the pre-disaster planning to reduce the impacts of the disaster [60]. This is when the paradigm shift in disaster management started taking place from a more relief oriented reactive approach to a more proactive risk reduction oriented approach [33].

It is also important to note that a disaster has effects not only on the economy and infrastructure but has complex social impacts. Aftermath a disaster the normal social order is interrupted, which can lead to social disorder and conflicts. During the early 1990s there was an inclination to put more emphasis on the engineering aspect than the social aspects in the approaches to disaster risk reduction [42,43]. As observed in many countries, the disaster

management policy focuses mainly on the physical part of the risk and the social aspects are generally missing. It was witnessed in Kobe that the government had limited capacity to deal with a huge crisis like the earthquake of 1995. Individuals from the community, the neighbors were the ones who saved most of the victims right after the earthquake [46]. This shows considerations should be given to social aspects as well, for reducing the risk of the community. In disaster management, despite the involvement of the upper levels of the government, the delivery of the primary services in the most of the stages of the disaster risk management cycle remains with the local government and the community [45]. With the prevalence of recurring small scale disasters local government and institutions become vital for reducing the risk of the community in the area.

But the opinion has been slowly changing. Through the 'International Decade for Natural Disaster Reduction from the year 1990 to 1999 the significance of the social as well as engineering aspects were being gradually recognized. During the United Nations World Conference on Disaster Reduction, the Hyogo Framework for Action was adopted which was in action from 2005 to 2015, it was accepted that developing and strengthening capacities in all levels is very important and community participation systematically contributes to building resistance to hazards (UN-ISDR, 2005); [42,43]. And now, according to the Sendai Framework for Disaster Risk Reduction (SFDRR) [59], exposure of people and assets has increased much faster than vulnerability has decreased. This has generated new risks and a steady rise in disaster related losses especially at the local and the community levels. Recurring small-scale disasters and slow-onset disasters affect the community particularly with significant economic, social, health, cultural and environmental impact [59].

The SFDRR aims to achieve substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries by 2030. SFDRR's guiding principles particularly focuses on the importance of understanding the drivers of risk at the local level, and empowering local communities to be a key to reduce disaster risk [59]. In the priorities of action of SFDRR too, the role of local community has been given prime importance from enhancing collaboration among people at

the local level to disseminate information related to disaster risk to developing local risk reduction strategies and plans, taking feedback from the community regarding the same, assigning clear roles at the community level for disaster risk reduction and empowering the authorities at the community or local level by enhancing their capacity [59].

Thus it can be said that even SFDRR looks seriously towards the community to reduce risk. According to Dynes [21], disasters destroy all types of capital, human, economic, but social capital is the least damaged in a disaster. Several empirical studies have shown the importance of social capital and network in disaster management but very few studies have a comprehensive overview on how social capital helps in improving risk reduction [30]. Social capital uses its social network at times of emergency not only to provide financial support in the forms of loans and gifts for repairing property and but also to provide non-financial resources like helping in search and rescue, debris removal, sheltering, child care during recovery, emotional support, and information [6]. Social capital has a huge role to play in strengthening capacities at the community level for better risk reduction. Social networks and social associations are considered as the basic social units to respond to disasters [20].

Therefore, it can be said that social capital is one of the most important aspects in disaster management at the local level. With the paradigm shift in disaster management from a more reactive relief based to a pro-active risk reduction based approach there can be more focus given to it to reap its benefits at the community level.

#### 2.4. Empirical evidences from different countries

Researchers have tried to understand the different facets of disasters and the role social capital plays in it. Such empirical evidences are vital for further research and growth of the concept. This section will deal with such evidences from various countries in different phases of a disaster classified under bonding bridging and linking social capital.

Bonding social capital is the most commonly found social capital available to individuals in any area distressed by disasters [47]. Bonding social capital helps the community members to attain safety, get assistance from others in their network which was seen in the case of Nepal Earthquake of 1934 [9]. Higher level of trust is generated because of bonding social capital [6]. It was discovered that there was prevalence of preparedness among individuals who reported the highest perceptions of fairness and trust [51].

Close knit communities with good bonding enabled by community based institutions like churches and voluntary associations, were better prepared for solving problems on their own. They did not have to depend on higher authorities to solve their problems. It is done for the common good of the whole community [11,48]. In Rosenort and Saint Jean Baptiste in Canada, after the red river floods in 1997, it was seen that communities with involvement in civic organizations participated in flood preparation and response, and were less affected by the flood than other communities [26]. This was also showcased in United States of America where, membership and participation in the activities of the Mary Queen of Vietnam Catholic Church in New Orleans helped the community members overcome the difficulties created by hurricane Katrina, helped them rebuilt their community and engage in successful political action. Therefore, involvement in community based institutions can help the community members positively to adapt and cope to emergencies well [15].

Social capital helped the close-knit community with previous experience of disasters in Chennai were better prepared for disasters [35]. Prior to a disaster, bonding social capital helps

individuals to gather crucial information for preparedness and preventative action. The bonding between community members also provides the individuals with a perception of risk and gives them more motivation to take some sort of preventative action [22]. Like in a case from New Zealand, post-2010 Christchurch earthquake it was found that social memory of a disaster is very important in tackling impending disasters [62]. Prior experiences with disaster when passed on through the social network in a community can help the community prepare better for a disaster.

Social capital is most utilized during the response phase after a disaster [56,21]. In Mozambique after the flood in 2000, across two communities of Tsokate and Hoyohoyo, bonding social capital was present and working when the neighborhood, friendship and kinship offered local support to the community members being affected by the flood [52]. After the 1995 Kobe earthquake in Japan the people stuck under debris were rescued from collapsed buildings by fellow community members. Similarly, after the Japan earthquake and tsunami in 2011, it was observed that people in need were saved by the assistance of neighbors, friends, and family [2]. According to Allen [8], in the event of past disasters like bushfires, cyclones, storms and floods, Australians spontaneously chose to help those who were less fortunate. The local people came together to respond informally well before the authorities were able to do anything [8]. Similar cases were drawn from Myanmar and Taiwan where bonding social capital was the first thing the affected community members could resort to before of any help from the government could reach them [34]. This has also been observed after the Wenchuan earthquake in China in 1998, where most of the community members were rescued by relatives, neighbors and other people from the community [67].

Bonding among the community members enables people to help each other out in the times of need [54]. It was observed in Iwate and Miyagi prefectures, Japan that social capital had a role to play in the efficiency of earthquake debris and waste management [37]. In absence of support from the government in Australia post cyclone Yasi of 2011, local community and volunteer groups helped those in need with labor and machinery [8].

A large part of the information regarding relief received by the affected people is generally from relatives and friends. There have been many cases where the community members and relatives played an important role in providing actual relief or vital information of relief, for those affected by a disaster. According to Bhandari [9] social capital was instrumental in connecting people from different areas and social status, which then facilitated in providing access to essential resources for the affected families. Although the government was the main support provider, social networks played an important supplementing role in providing support to the victims [67].

An approach of relief distribution using the existing social network is not always as effective as it is sought to be, if the network is utilized only as “means” to provide aid [44]. It should be explored in many other ways. Like, it has been seen that the network is beneficial in providing emotional and mental support to those who need it at the times of distress [30,32]. Social network was also very important in maintaining the mental health of disaster victims in Wenchuan after the Sichuan Earthquake of 1998 [67]. As similar phenomenon was observed in Morpeth, England after the floods in 2009 [63].

Bonding social capital has helped community members in getting free housing, child care assistance, short term loans, and information from their core network members in post-crisis times mostly when it may not have been accessible from organizations such as the local government, professional childcare services, and other institutions [3]. After the Kobe earthquake in 1998, many survivors rather than seeking long term shelter provided by the government started living with relatives and close friends. Many a

times he neighbors and friends are the ones who provide the necessary resources for recovery after disaster, not government agencies or NGOs [3].

An observation from the St. Bernard Parish, states that within the first few years of Katrina the community members who had returned got self-reliant by relying on their own efforts and informal support from their family and their neighbors rather than waiting for the government [16]. In New Orleans, when 500 signatures were needed to restore electricity supply in the neighborhood, more than 1000 residents of the neighborhood of Village de L'Est signed the petition by the end of the day. Sometimes, communities with low social capital even with monetary support may find it difficult to recover. For example, in Mikura, Kobe the community could not coordinate regarding the debris removal because no one wanted to volunteer to organize the written agreements from property owners because of lack of bonding between the community members [3].

Although, most of the times bonding between community members seem affecting the community positively, there are also some cases where evacuation or displacement after disasters have had profound impacts on the members. Stronger attachments among community members can make such disruptions more distressing to the community members [47]. It can also be of less use in the recovery phase if social networks deteriorate. This is generally in the case when a considerable amount of population is evacuated from the potentially affected areas to a safer area where they are made to live outside their communities distant from their known ones [4].

Bridging social capital is also very important at times of emergencies. It complements bonding social capital. Bridging social capital was seen to be active in Mexico after the earthquake in 1985 where an overwhelming number of volunteers came for help, who were not even from the area. These kind of example reasserts how important social capital is [21]. In Shimokawaguchiura, Japan expansion of network using bridging capital was done by involving groups other than the firefighting groups, like the women's group and senior citizens group was done, thus increasing the community consciousness about disaster risk reduction [42,43]. A similar trend was observed in Bangladesh where to prepare the community about the threats from impending disaster, the volunteers used the local folk media to spread the awareness [41]. These volunteers joined in because of their ties to the community.

Furthermore, the bridging social capital has been seen to have success in a non-routine activity like job finding [24,32].

Linking social capital tries to utilize the connections with people in power. In Gunma prefecture of Japan, the local officials, and certain community members used their good network with the community to alert them about the impending typhoon in their area [29]. In Shimokawaguchiura, in Japan it was seen that a community with better initiative regarding impending disaster with help of the existing social capital and the local government took trainings, formed groups of fire fighters, created norms, and survived a disaster in a much better way than other communities [42,43]. According to various studies, social capital can help in faster recovery too. In the case of the Gujarat earthquake certain communities with better linkages with people of influence recovered faster than those who had less linkages [46]. Similarly, in the case of a community from Tamil Nadu which suffered the brunt of the Indian Ocean Tsunami of 2004, had more trust in the government with a leader taking the initiative for agreeing the government's recovery measures, recovered much faster than other communities where the leader did not trust the government as much [36]. One of the studies on the Sichuan earthquake of China showed that linking social capital is important for housing reconstruction. It was observed that during the recovery phase, a community member with a larger network can attain greater housing subsidy, get support for building temporary housing, as well as for direct monetary and material transfer after the earthquake, all of which are crucial for repairing and reconstructing houses [57]. Linking social capital is important in policy implementation [56].

Social capital is not always beneficial. It also has its own share of negatives like in Haiti, after the earthquake social capital facilitated access to shelter for some, also hindering access to such resources for others [50]. Similar observation has been made by many researchers. Aldrich [4,5] observed in a study following the Indian Ocean tsunami of 2004 that during the relief distribution, Dalits, Muslims and widows were left out by the caste councils responsible for its distribution.

To summarize, the figure (Fig. 3) below thus encapsulates, how bonding, bridging and linking social capital plays a vital role in the different stages of disaster risk management cycle from all the evidences that were discussed here. For simplicity, the cycle has been divided into four stages namely: preparedness, response,

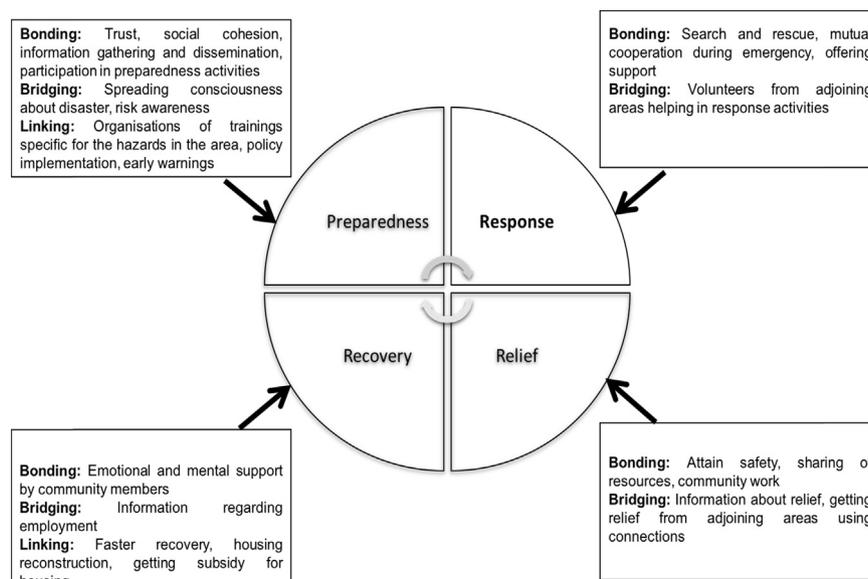


Fig. 3. Social capital and disaster risk management cycle (compiled using empirical evidences).

relief and recovery; where the preparedness phase deals with all the actions taken before the occurrence of a disaster to reduce its impact which also covers the mitigation measures at the local level, the response phase covers the time from the receipt of the early warning information to the time immediately after the disaster, whereas relief phase is the time after the immediate response till the recovery phase starts and recovery phase is the time taken by a community to recover from the impacts of a disaster.

The evidences are drawn from studies across the world, from developing as well as developed nations. There might be differences in the drivers of social capital across the countries but there is a lot of similarity in the way social capital works in event of a disaster. Observed from the evidences the primary foundation to bonding social capital is the trust, cohesion among community members, sense of place, and a feeling of altruism. In most of the empirical evidences bonding social capital was found to be the most abundant and useful in the early phases of a disaster, though it is functional in all the different stages of the disaster risk management cycle as well. In cases from across the world from Australia, China, Myanmar, Taiwan and Mozambique, people came out to help others in need before any help from outside arrived. Even if the countries belong to different corners of the world, the pattern in which people came forward to help others were very similar. While, bridging social capital doesn't help much the early stages just after a disaster. It takes time for help from outside to arrive through the bridging channels. Similarities can be observed how bridging social capital is used for risk reduction across the cases drawn in this section. Bridging social capital is seen to organize volunteers, enhance awareness, prepare the community towards impending disaster and give them access to jobs and opportunities that are outside the affected areas from examples from Mexico, Japan and Bangladesh. Bridging like bonding appear to play a role in all the four phases of a disaster. Whereas, linking social capital, depends on whether the community has linkages with people in the government or other power positions. It has been seen observed from these cases that linking social capital works in a similar way across developing and developed world if a particular community has access to these linkages. Across the cases, from Japan to India it was seen that if there is proper linking social capital it positively helps the community to recover. Linking social capital from the empirical evidences is visible only in recovery and preparedness phase.

There are cases where, the communities with access to more resources took more time to recover than a community with better social capital [4,16]. Therefore, if there are strong connections among members of a community and with others from outside their community, then there is a similar way how community members across developing and developed world would be benefitted by social capital for disaster risk management activities. Therefore, the current study might reveal some interesting facts linked with social capital that influences disaster risk reduction.

### 3. Study area

The South Asian region is particularly prone to tropical cyclones [53]. Most of cyclones originate from the Bay of Bengal. Over the years, Sundarbans is probably one of the most affected by tropical cyclones in this region. Indian Sundarbans located in the western fringe of the Ganges, Brahmaputra, Meghna (GBM) delta, is a cluster of 103 low-lying deltaic islands. It consists of 19% of the total area of Sundarbans with a larger chunk of 81% of area falling under Bangladesh. If we go back in history, the entire Indian Sundarbans used to be dense mangrove forest but over the years 54 islands were reclaimed for human settlement. The region hosts about 4.37 million people with a density of 957 per square

kilometer, this coupled with inadequacy of resources, extreme poverty and remoteness, make this place really difficult to survive in. Indian Sundarbans is an area divided into two district level administrative units and 19 coastal development Blocks. Gosaba is considered to have the lowest resilience among all the blocks in the Indian Sundarbans [19]. Gosaba is a cluster of islands and is the last known inhabited area after which dense forests of Sundarbans start. It is also not connected with mainland by any bridge. This area is one of remotest in the region and the infrastructure present in area is rather limited with no electricity, no paved roads and limited healthcare system in most of these islands. This particular study focuses on 'Satjelia' Gram Panchayat<sup>1</sup> (GP) in Gosaba Block in the Indian part of Sundarbans which was severely affected by Cyclone Aila in 2009 [31,10]. Satjelia is among the remotest villages in Gosaba with dense forests on three sides. The study area faces a perennial problem of breach in embankments along with a constant threat of being impacted by cyclones. It becomes really difficult to go in or out of the islands during the monsoon season. Support from the government in this area for disaster risk reduction is rather limited.

This area was completely uninhabited until the colonial powers brought in people to clear the area for agriculture and generating revenue. The people living in this gram panchayat are homogenous on the basis of their caste mostly belonging to the backward castes namely, scheduled caste and schedules tribes of India. There is hardly any hierarchical system in the community settled in this area based on their caste and economic background. Living together in isolation in a delta island and constantly being threatened by the wild animals particularly Royal Bengal Tigers and crocodiles from the neighboring islands, the islanders started depending on each other for safety, support and availing resources. To add to this common culture which is backed by the worship of the same gods like the 'Bon Bibi'<sup>2</sup> makes the community members be even more close to each other.

Although throughout the world there is a negative connotation attached to caste systems of India, caste system is actually a source of intra-caste bonding. It helps people belonging to the same caste to be really cooperative with each other and face the common problems together. This results in stronger connection and closer interaction among them.

Therefore, with the lack of adequate infrastructure, disaster management institutions, proper training and awareness programs, early warning systems, and remoteness of the island makes it an interesting study area to further the knowledge on how social capital can influence risk reduction of disasters.

### 4. Data and methods

This is a qualitative research based on field survey. The study is based on qualitative data from both primary and secondary sources. Primary qualitative data was collected through key informant interviews (KIIs) and conducting focused group discussions (FGDs). This survey was conducted in July–August 2014, almost five years after cyclone Aila. However, smaller scale disasters like breaching of embankments, sea-surge and the resultant flooding have been affecting the islands perennially.

Block Development Officer<sup>3</sup>, Pradhan<sup>4</sup> and Up-Pradhan<sup>5</sup> were identified as key stakeholders, who had good experience in the

<sup>1</sup> Lowest unit of local self government in India.

<sup>2</sup> Goddess of the forests in Sundarbans.

<sup>3</sup> The person in-charge of the administration of the Block (lowest administrative body of India).

<sup>4</sup> Head, Gram Panchayat (GP) (the local elected government body).

<sup>5</sup> Vice Head, Gram Panchayat (GP) (the local elected government body).

past cyclonic incidents. They served as the key informants. These interviews were conducted with the help of a checklist.<sup>6</sup>

To extend the investigation, data was gathered through two focused group discussions (FGDs) involving members of the community from the two villages under Satjelia Gram Panchayat. These FGDs also had a checklist<sup>7</sup> on which discussions were carried out. 20 members of the community were invited to join each of the FGDs. They were invited keeping in mind representation from all hamlets, age group (20–65 years), occupation and inclusion of women. 15 community members between the age group 26–65 years participated in the Satjelia FGD, including 4 women. There were 5 farmers, 3 fishermen, 3 shop owners, 3 laborers, and a teacher in the FGD. In the Dayapur FGD there were 18 participants, 6 of them being women. The participants were between the age of 24 and 62 years. There were 7 farmers, 4 fishermen, 4 shop owners, 2 laborers, and 1 bank official.

Secondary data was collected to understand the role of social resources that were used in the past in emergency situations. For simple and clear understanding the results of this research would look into the contributions of bonding, bridging and linking social capital in the different phases of a disaster risk management cycle with respect to social capital, as has been done by some disaster researchers in the past [6]. The data was used from KIIs, FGDs complemented with field observations and secondary data for triangulation. This has been done qualitatively to make replicable inferences to draw out key findings.

## 5. Results and discussions

Sundarbans as mentioned in the study area section, is very vulnerable to small scale to large scale disasters. The area has been affected by large scale disasters in the past, and there are recurring smaller-scale disasters that affect the area perennially. Extensive focus is generally given on large scale disasters because of the impact it produces, there is hardly much focus given to small scale and more frequently recurring disasters [59]. Generally, in the study area as well if a large scale disaster strikes, there is a lot of attention from the disaster management agencies and the humanitarian community and, aid and other forms of relief flows into the area eventually and since, the impact of small scale events is not as widespread, it doesn't attract the attention of the government and the aid agencies. Other than this, institutions dealing with disaster management are hardly present in Sundarbans to deal with sudden emergency situations. In areas like these even small scale disasters causes havoc in the life of many and slows down the growth of the region considerably. This section would first cater to the different drivers for social capital mobilization in the study area and then will focus on how social capital (bonding, bridging and linking) has been useful for disaster risk reduction in the study area.

The communities in Satjelia and Dayapur are quite homogenous as discussed before in the study area section. The community believes that low priority is being assigned to people's problems in the region. Their perception is that the people's needs in the delta appear secondary to those of the wildlife, since Sundarbans was designated as a world heritage site. It is a popular

belief that people outside Sundarbans neglect the problems of failing earthen embankments, salt water intrusion and storm surges that regularly affect the region and devastate the lives of community members living there.

Similar culture and problems over years has really increased the bonding among the community members. This bonding is enhanced by the presence of local level institutions, where there is a regular participation of the community members. Youth Clubs are a local level institution that is present in both the villages in the study area. Youth clubs by its name refers to a place, a building in case of both the villages, where the young generation of the community meets for recreational activities. But in the study area the youth clubs were not only a recreational spot for the youth but also a meeting point for adults. There were considerable number of members who were well past their 40s. These youth clubs facilitated activities like organizing local festivals, fairs, sports events, cultural activities and blood donation camps throughout the year. These events not only attract people from within the villages but also people from other islands and villages. In the sports events like football tournament and cricket tournament, teams even participated from outside of Gosaba block. These events not only gave chance to the community members to come together, but also helped them in making important links with people from outside their own community.

These youth clubs are kind of unique as they are only for the male member of the community. Although during the events such as festivals and fairs, females also participate, but their involvement is not as active nor do they take part in the decision making process, as their male counterparts. Other than the youth clubs, the male members of the society also gather at the local tea stalls regularly to converse and discuss about various different issues that are affecting them.

On the other hand, women are a part of numerous self-help groups (SHGs) that were formed more so, after the devastating cyclone Aila in 2009. These groups consist of only women. Some of these groups are registered, while others are not registered. The registered SHGs are linked with banks to deliver micro-credit to the needy in the villages. Other than that there is also internal lending among the members. These groups give financial support to the women of the community. SHGs in the area also organize trainings for women to enhance their vocational skills. They are trained to add value to the products that are already produced in the islands, like having better packaging for honey collected from the forests. SHGs have become instrumental in empowering women and bringing the women of the community a lot closer to each other. It also aids in flow of a lot of vital information through their networks.

There are also other institutions like the groups of farmers, fishermen, and the business cooperatives consisting of shop owners and businessmen from the villages. All these institutions furthermore provide the strength in the relationships between people in the same occupation, which is in itself quite strengthened because of common culture and background. Close interaction and membership in these groups enables everybody in these villages to know their fellow villagers very well. These linkages are the only resource that the community could heed to in cases of dire needs when there is no help receive from government or outside.

### 5.1. Bonding social capital

In the study area, before the monsoon season begins a lot of preparations are carried out at the community level as well as the household level to reduce any chance of a threat posed by the nature during and after the monsoon season. A noteworthy phenomenon that appeared during the FGDs and KIIs, in the study

<sup>6</sup> Some of the key points of the checklist were: types of hazards in the area, disaster risk management (Block level, GP level and community level), types of institutions in the region, role of institutions in disaster risk management, and strengths of the community.

<sup>7</sup> With key points like Types of hazards, institutions and groups present, benefit of these institutions, participation in community activities, disaster risk management (institutions, community, household level and from outside) and strengths of the community.

area, using bonding social capital, indigenous knowledge, skills and experiences are passed on from one generation to the other as well as from one community member to another. During the study it was also observed that the community members were involved in planting mangroves in some parts of the embankments which often gets breached to attain safety. As there is not much support from the government to concretize these embankments the community members keep a look out for the weaker sections of the embankments before the monsoon season starts and use their skill to voluntarily rebuild it or repair it, based on what is required to save their agricultural fields from inundation from saline water. Breaching of embankment due to storm surge or high tides is a common hazard in the region. All community members come together to solve these kind of potentially smaller scale disasters.

For cyclone early warnings other than the intimations received from the government the community members use indigenous knowledge to get a lot of indications from the nature like observing wind speed and size of waves in deep sea, strong wind from the east during summer or late fall, crabs climbing inside the houses, fishes jumping out of the ponds and river, dense clouds formation in the sky, herons flying in flocks, many dogs barking together, crows crowing in the night and cows growing restless. Once any community member observes these indications they try to spread the news among others in the community. Being a close-knit community the information flows very quickly throughout the community by the means to telephone calls and members personally reaching out to each other.

It was also observed during the study that the community members had the skill to safeguard their house from the high speed winds associated with storms and cyclones. They do it by hanging weights from the four corners of the roof during cyclone season, tying roofs to mud walls, installing extra poles for the house in cyclone season to give more stability to the house. It was pointed out that many a times when the young members of a household are out of the islands for work, the elderly are helped by the youth club members to fix their houses.

The community also believes in planting trees around the house which can minimize the damage from cyclones and storm surges. Coconut trees are especially planted with an aim to provide an alternative source of drinking water after cyclones and storm surges when the fresh water sources are compromised.

These set of specific knowledge and skills were developed by the community over the years while residing in these islands to adapt to the adversities that they are exposed to living in such a remote and dangerous area. With close linkages between elders and the youth, and also the bonding between community members these knowledge and skills have been passed on from one to another for survival.

The local administration could not correspond to various emergency functions right after occurrence of cyclone Aila in 2009 like evacuation and making the evacuation centers ready for the community in the islands. The community members responded by helping each other to voluntarily evacuate to the high schools in their area. As the community is so close-knit, members of the youth clubs knew exactly which houses had only elderly people and helped them to evacuate to safety.

This phenomenon was reflected in numerous smaller scale emergencies post cyclone Aila. There was hardly any help from outside and the community members came together to help those in need. During the FGDs, it surfaced that there were many instances when community members arranged for the boats and vehicles required to carry the injured people to the nearest hospital even at odd hours when the services were closed. Community members also voluntarily donated blood whenever required. The affected community members were taken care of, by their neighbors. The neighbors would voluntarily cook food, take care of

the daily chores of the affected people and also keep an eye on their kids.

Bonding among community members generates high level of trust [6]. This was reflected when certain members of the community who had reinforced concrete structures gave shelter to up to 300 other community members in the aftermath of cyclone Aila in 2009 and also shared the limited resources available to them. Aftermath of cyclone Aila, the community members were the first to respond. The member of the youth clubs was the most active in the island helped extensively in search and rescue of other community members after cyclone Aila in 2009. Help from outside took many days to arrive. There were also instances after Cyclone Aila, 2009 were the community members guided the relief workers towards fellow community members who were stranded further inside the islands. Activities like these have resulted because of the trust that exists in the community.

In the FGDs the respondents also mentioned that the close linkages and the trust helped a lot of people to come out of emotional and mental distress while recovering from Aila. Many of the distressed who had lost a lot in Aila were taken care of by others in the community. Community members would regularly go to the BDO's office to inquire about their pending relief allocations. Some of the community members turned into local heroes providing help out of the way to the others in the community like helping people to rebuild their houses. There were lot of instances like this where people shared their skills for the benefit of others in the community. This way the whole community benefitted.

## 5.2. Bridging social capital

Bridging social capital also provides benefits to a community which is similar to that of bonding social capital even though it is not as commonly available social resource as bonding social capital [27,6]. During the KIIs it was made evident that the GP members, being elected representatives of the local people understood the problems in the area very well. They have a special committee for disasters that hold meeting especially when there is an early warning received from the government. They are quite proactive about the threats they face from natural hazards. This committee makes sure that in the case of an impending disaster it needs to stock essential items. They can mobilize resources using their contacts with the local business cooperatives (the market), and using their linkages with the government. Early warning was also disseminated by the GP through the network of the youth clubs. In the case of an early warning received in 2013, when the cyclone didn't make a landfall in the study area, the GP with the help of the local market had already stockpiled essential items like dry food and water. Full preparation of the high school was also undertaken in the villages to be converted into make-shift evacuation shelters with the help of the member of the youth clubs. This kind of utilization of bridging social capital reduces the risk of suffering of the community considerably, in case of a future disaster.

Many a times, in the study area there is a feeling among the community members aided with their indigenous knowledge that there is a chance of a storm or cyclone. Since the early warning information from the Indian government is often not accurate and is delayed, according to the community members using bridging social capital some of the community members post cyclone Aila got to know from some volunteers about the early warning issued by Bangladesh government using its radio coverage. It is apparently more accurate than the early warning issued by India according to the locals. Now, many of the community member are using this information to keep track of cyclones during the cyclone season when they get an indication using their indigenous knowledge. This kind of phenomenon of getting novel sources of information using bridging capital was also experienced in the

study conducted by Hawkins and Maurer [27] in the aftermath of Hurricane Katrina.

Bridging social capital, build by the youth clubs through the events they organized helped the community members in getting help from the neighboring areas. Relief came in from the business cooperatives in the block headquarters in the aftermath of cyclone Aila in 2009. The volunteers who were working with the business cooperative were youth from adjoining areas who had participated in the various sports events, fairs and festivals organized in the islands by the youth clubs. These volunteers along with the business cooperative which also had linkages with the shop owners in the islands felt that their compatriots are in dire need of support and relief. Therefore, these volunteers and the business cooperative responded to cyclone Aila even before the government could move into the affected areas. They went deep inside the islands where many people were stranded and rescued them with the help of information from people on the embankments. Because of their close connection with the affected population they also distributed linguistically and culturally appropriate relief goods, making it easier for the community members to use.

After cyclone Aila, bridging network also enabled the community members to get material relief, including essential prescribed medicines which were not available in the islands, from their distant relatives and friends who did not live in that particular area during the recovery stage. These linkages also helped the community members with crucial information that helped them get jobs outside the Sundarbans. Relative and friends living outside the affected area had more access to the news of schemes that can help the people from the affected areas to recover faster. They then shared it among members of the affected community.

In cases of smaller scale disasters, there were also instances that came up during the FGDs, where the local shops provided groceries to the affected families on credit, without charging them any interest. This was possible for the local shops because of the support of their business partners from outside the islands, who along with the local shop owners understood the plight of the people and tried their best to help them recover.

### 5.3. Linking social capital

Lastly, linking social capital tries to utilize the connections with people in power. The community leader or the Pradhan from the study area has tried to leverage on the links he has with outer world using his political affiliation, contacts with the universities and media to lobby about their area specific problems, like getting concrete embankments, getting electricity, getting better health-care, and tailor-made trainings for disaster preparedness considering the local and ground realities. According to the Pradhan, slowly people outside Sundarbans were getting knowledgeable about conditions that community was living in. The Pradhan also mentioned that in case of a future disaster during the current term these linkages would be used to inform people outside about the actual situation in the island and get better relief for the community.

During the study, one of the embankments in the Satjelia village collapsed which lead to washing away of seven houses near the embankment. This event deeply distressed the families living in these houses. The community members showed great bonding and many of them came voluntarily to help the families salvage whatever essential items they could from their destroyed houses. The community members then helped rebuild the damaged embankment, and clear the debris over the course of next three days. The gram panchayat was quick to organize a meeting among its members and decided to provide the community meeting room for these families to take shelter. The gram panchayat also contacted a local SHG to cook food for these families. Other necessary

items were also made available as long as these families need to recover with the help of the local shops. The GP also used their linkages with the government to appeal for an aid for these affected families and to put more pressure on the government to concretize the embankments. This a great case to understand that social capital helps people to deal with smaller scale emergencies on its own and can acts like a form of informal insurance.

From all these evidences, it can be said that social capital has a positive influence in reducing the level of suffering of the community towards a disaster by contributing in various different stages of disaster risk management cycle and similarities can be seen between the empirical evidences from different countries and the ones observed in the field. Social capital plays a very significant role in reducing the risk of getting affected by large as well as small scale disasters, especially useful in areas where there are limited disaster management institutions at the local level. It helps in alleviating the suffering of the affected population considerably.

However, social capital has some negative aspects as well. It was observed that the community living in the island was homogenous in the terms of their caste but there were stark divisions made on the lines of their political affiliation. Some of the community members who did not support a particular political party (the number is very low) suffered by getting less relief and having lesser access to information than others. In the event of an impending disaster this fear of seclusion often persists among some of the community members.

## 6. Conclusion

This study focuses on understanding the role of social capital with respect to the different stages of the disaster risk management cycle and draws attention to the influence that it can have in reducing risk towards the hazard that the community is facing, especially when there is very low involvement of government in form of support provided in a pre and post disaster scenario.

It was observed that the different forms of social capital namely bonding, bridging and linking played a significant role in the study area during large scale disaster like cyclone Aila as well as smaller scale disaster afterwards. Bonding social capital was found in abundance in the study area because of the common historical background of the settlement, living in isolation, similar culture and presence institutions like youth clubs that acted as de-facto community centers. Drawn by these ties and institutions, there was a lot of dependence and trust, among the community members. This helped the community immensely starting from passing to indigenous knowledge and skills for risk reduction, preparing for impending disasters at the community level by helping out each other to safe guard the houses, repairing the weaker sections of the embankment and planting mangroves for the common good of the whole society and assisting the elderly and others in distress in the preparedness phase to passing of early warning information, helping in evacuation within the island, search and rescue in the response phase. In the relief phase bonding and trust among the community members resulted in some members to give shelter and share their resources with others in need. Lastly, the bonding among the community members helps them in getting emotional and mental support in the recovery phase [30,63,67,32]. This kind of social support generated by bonding among the community members and the experience of living in adversities, is essential for the survival of the community in such harsh conditions.

Complementing bonding is bridging social capital. Bridging is found between two communities, and institutions between two communities [6]. Though it was not as abundantly found in the study area as bonding social capital, it did play a significant role in the various stages of the disaster risk management cycle. Bridging

between different institutions working at the community level helped in better preparation and dissemination of early warning information, helped in volunteers from adjoining areas helping out in response activities, getting relief from outside and also helped in acquiring information regarding government relief. Bridging was essential to receive information and help from outside as has been also observed from the various empirical evidences [9,67,21]. The remoteness of the study area made bridging social capital especially important as it acted as a link to the outside world to receive further help and get access to job opportunities.

Linking social capital was sparsely present in the islands. The main linkages were between the head of the GP with the BDO's office, political party and educational institutions. The head of the GP wanted to access these links to spread awareness regarding the harsh and adverse conditions that the community was living in, with bare minimum resources and help from outside. These linkages were also sought to be used for guiding authorities to make tailor-made training and awareness programs for the area, rather than the generic ones which were deemed to be of no use for them. The head believed that capitalizing on these linkages can help in the development of the region and reduce the risk of disasters considerably.

Therefore, it can be said that social capital and the experience of dealing with adversities is vital for this remote community especially because there is absence of disaster management institutions and essential infrastructures. Since, the community members are well connected to each other many of their problems are solved internally with each other's help and cooperation, even at times of emergencies like a small scale disaster. In case of a full scale disasters, social capital helps the community to hold its own until help from government and other aid agencies arrives.

But unfortunately this potential role and contribution of local level social organizing enabled by social capital is overlooked by the policymakers [6,22]. This study, in no way downplays the importance of government and disaster management institutions, but tries to stress on matter that social capital can surely be used to complement the activities carried out by the disaster management institutions to reduce risk by giving these activities a more participatory approach and getting the inputs from the vulnerable community for better implementation. When considering participatory approach, policy makers and practitioners should utilize the existing social units, channels of communication and authority structure that are present in the area rather than creating new and ad-hoc ones. The efficiency and effectiveness of activities can be influenced positively by the use of traditional structure of the community rather than creating new ones [22]. Just the top-down approach can seriously hamper and damage how social capital acts as a resources for reducing the risk of and responding to disasters [13]. Thus, proper consideration should be given by the policy makers and practitioners towards using social capital in the future, especially when planning for policies and programs at the community level where social capital is inherent and can be mobilized with ease [39].

This being a field based research there were certain limitations of the study. First of which was the availability of only three key informants. It could have been better to have more key informants in the study. Another limitation was the low attendance of women in the FGDs. If there was more participation from women, the gender perspective could have been highlighted more. In the study are majority of the population had strong political affiliations, and any person from outside even if their purpose is to carry out academic research is kept under speculation and suspicion. This restricts the free flow of information from the local people as they often try to divert the attention of the researcher towards poverty and aid.

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