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#### **Authors**

Mishra, Sasmita  
Mazumdar, Sanjoy  
Suar, Damodar

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## Place attachment and flood preparedness

Sasmita Mishra<sup>a,1</sup>, Sanjoy Mazumdar<sup>b,\*</sup>, Damodar Suar<sup>c,2</sup>

<sup>a</sup>Asian School of Business Management, Shiksha Vihar, P.O. Chandaka, Bhubaneswar-754005, Orissa, India

<sup>b</sup>Department of Planning, Policy, and Design, University of California, Irvine, CA 92697-7075, USA

<sup>c</sup>Department of Humanities and Social Sciences, Indian Institute of Technology, Kharagpur 721 302, West Bengal, India

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### ABSTRACT

Does place attachment and the consequent emotional connections and ties that people have with environments affect their preparedness for natural disasters, such as floods? This study took up this research question for the understudied geographical region of Orissa, India. In particular, investigation focused on three kinds of place attachment, viz. economic, genealogical, and religious. Contextualized scales for place attachment and flood preparedness were developed for a survey. Data were collected from 300 residents in flood prone areas. Validity and reliability of the scales were established. Overall, place attachment was found to significantly influence flood preparedness. Hierarchical regression analysis was performed to determine whether the three factors of place attachment influence flood preparedness. Controlling for confounding effects of age and family type, regression analysis revealed that people having genealogical and economic place attachment prepared for floods, but those with religious place attachment did not prepare for floods. The implications of these findings for future studies are described.

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### 1. Introduction

This research deals with three interest areas: place attachment, flood preparedness, and Orissa, India, which is the physical context. Description of the knowledge in the two substantive areas and of the context is provided below.

#### 1.1. Place attachment

The connections between people and their physical environments have received some attention from scholars, who have proposed a number of concepts to describe the varied associations. These have included 'sense of community' (Sarason, 1974), 'sense of place' (Hummon, 1992; Tuan, 1980), 'place identity' (Proshansky, 1978), 'rootedness to place' (Tuan, 1980), 'place dependence' (Stokols & Shumaker, 1981), etc. Although these likely refer to different phenomena (Brown & Werner, 1985), these point to the close ties individuals have with specific places (Shumaker & Taylor, 1983). Two other terms are particularly relevant here: 'community attachment' (Hummon, 1992; Kasarda & Janowitz, 1974; Turner,

Nigg, & Paz, 1986), which could imply associations with a human community or that of a community to a place, and 'place attachment'.

In the literature, and the way used here, the concept of place attachment refers to the emotional bond between individuals, groups, or communities, and their physical environments (Low & Altman, 1992; Mazumdar, 2005; Mazumdar & Mazumdar, 1993, 2004). How such connections are formed has been the subject of some research (Hummon, 1992; Mazumdar & Mazumdar, 1993, 2004). Researchers have studied attachment to residential environments and claimed that place attachment creates feelings of comfort and security (Shumaker & Taylor, 1983), attachment to a second home (Jorgensen & Stedman, 2001), to "special places" (Eisenhauer, Krannich, & Blahna, 2000), and visitor's attachment to recreation and tourist destinations (Bricker & Kerstetter, 2000; Williams, Patterson, Roggenbuck, & Watson, 1992). Here, place attachment to flood prone areas and its effects on preparedness for floods is explored.

#### 1.2. Disaster/flood preparedness

##### 1.2.1. Disasters: location and geography

The various kinds of disasters, natural (e.g. earthquakes, floods, hurricanes, cyclones, tornadoes, tsunamis, mudslides, etc.) and human caused or technological (building, bridge, freeway collapse, and other breakdowns) have the potential to damage or destroy the

\* Corresponding author. Tel.: +1 949 824 5046; fax: +1 949 824 8566.

E-mail addresses: [sasmitamishra\\_iitkgp@yahoo.co.in](mailto:sasmitamishra_iitkgp@yahoo.co.in) (S. Mishra), [mazumdar@uci.edu](mailto:mazumdar@uci.edu) (S. Mazumdar), [ds@hss.iitkgp.ernet.in](mailto:ds@hss.iitkgp.ernet.in) (D. Suar).

<sup>1</sup> Tel.: +91 9437617829.

<sup>2</sup> Tel.: +91 03222 283626; fax: +91 03222 82270.

physical environment, the ties among people, and between people and their environments or to intensify them (Lindell, Prater, & Perry, 2006), to lead to outbreaks of diseases, and cause deaths. Disasters differ in their nature and characteristics and so it may not be wise to generalize from one kind of disaster to another.

The literature on disaster preparedness has taken a number of approaches, but has focused on prior information regarding impending disasters, frequency and severity of disasters, causes, effects of disasters and their reduction or mitigation, perception of risk, removing people from disaster prone areas, disaster preparedness, coping and adjustment, post-disaster rebuilding and return to normalcy (e.g. Dooley, Catalano, Mishra, & Serxner, 1992; Mulilis, Duval, & Lippa, 1990; Paton, Johnston, Smith, & Millar, 2001; Russell, Goltz, & Bourque, 1995). Preparedness focus has been largely on actions states can take and to a lesser extent on activities by non-governmental organizations (NGOs), local communities, families, and individuals. The assumption is that negative effects of disasters can be reduced through preparation. Much effort has gone into preparing people of disaster prone areas to withstand the effects of disasters.

Disaster preparedness is positively affected, though not very strongly, by age, marital status, children living at home, home ownership and length of residence in the same location, and previous disaster experience, among others (Dooley et al., 1992; Miceli, Sotgiu, & Settanni, 2008; Mishra & Suar, 2005; Mishra, Suar, & Paton, 2009). The general conclusion however, is that the level of household preparedness varies but is not very high (e.g. Drabek, 1986; Lindell & Perry, 2000; Miceli et al., 2008; Mileti & Darlington, 1995). A number of factors have been considered as to why this might be so, including hazard exposure, hazard mitigation, social vulnerability, risk perception, and government preparedness and assistance (Lindell & Perry, 2000, and others). Jackson (1981) claims that people living in earthquake zones with structurally inadequately-resistant housing perceive more risk and show readiness for disasters.

Vulnerability (hazard or structural), however, is not the only concern in preparedness behavior. Receiving less attention is flooding (among the few exceptions are Laska, 1990 on adjustments in New Orleans), whether local people are getting prepared, what psychological or cultural factors might impede preparedness, and how people's feelings about their place might affect their preparation for disasters (an exception is Miceli et al., 2008). Knowledge about possible disasters and cultural values and attitudes is likely to influence preparedness (Sims & Bauman, 1983). "Fatalism" has been found to inversely relate to adjustment. It has been seen as a personality characteristic (i.e. a psychological factor), as lack of awareness (Lindell & Perry, 2000), and the inability to have an effect (Turner et al., 1986, p. 167, 175–178), but not as belief or attitude.

### 1.2.2. Flooding

The location and topography of settlements makes them more or less prone to particular disasters. For example, living in low-lying areas close to rivers, lakes, and oceans increases the likelihood of flooding. Floods can be caused by nature (e.g. rain), wherein location and topography loom large, human equipment failure (e.g. dam) where too hazard proximity is important, or malfunction (e.g. water pipe breakage) where hazard proximity is not as obvious. Lewis and Kelman (2009) state that flood prone areas are increasingly being built on, and that developers (of developer-built housing) rarely inform residents of flooding risk.

Here, the concern is with flooding, caused by rains, and by rivers overflowing their banks. Among natural disasters, floods are probably the most widespread, occur in most countries, and cause the most deaths (Noji & Lee, 2005, p. 752). Up to 70% of flood related deaths occur in India and Bangladesh (Noji & Lee, 2005, p. 752).

Much of the disaster (especially flood) preparedness literature is based on studies in the West (among the small number of

exceptions is: Motoyoshi, Takao, & Ikeda, 2004), and so little is known about disaster preparedness in other parts of the world. Moreover, unlike developed countries, developing ones, such as India, face different realities before and after disasters (Persuraman & Unnikrishnan, 2000). Therefore, it will be useful to conduct studies in these understudied areas of the world.

### 1.3. Place attachment and flood preparedness

That people have special fondness for places, also known as place attachment, was pointed out long ago (Altman & Low, 1992; Relph, 1976; Tuan, 1974). It therefore appears likely that such place bonds would affect disaster preparedness and evacuation.

The effect of community ties on disaster preparedness has received attention, but the findings are not unequivocal. Bachrach and Zautra (1985) claim that those with strong community feelings are more prepared for disasters. Turner et al. (1986) assert that community bondedness increases preparedness and fosters action more than fear of potential disaster. Evans, Holmes, and Pooley (2004) conclude that people having more community attachment are more likely to deal successfully with adverse events such as cyclones. Tierney, Lindell, and Perry (2001) also note that preparedness was more likely when residents were socially linked to their community. And, Paton, Millar, and Johnston (2001) suggest that having a sense of community and feelings of attachment towards people and places encourage involvement in community response following a disaster. In contrast, Riad and Norris (1998) claim that individuals who intended to move were less embedded in the community (see also Kiecolt & Nigg, 1982; Duncan & Newman, 1975). Studies reporting a weak relationship between community attachment and preparedness attribute it to factors such as social fragmentation and limited opportunity to utilize social support networks within the wider community (Paton, Johnston, et al., 2001), and to unusual trust in government officials (Paton, Millar, & Johnston, 2001).

Few have taken up place attachment and disaster preparedness. Miceli et al. (2008) point out that objective measures of risk assessment and perception have received much attention, but cognitive and emotional aspects and how these affect risk perception have remained understudied. Studying post-disaster effects, not preparedness, Carroll, Morbey, Balogh, and Araoz (2009) examine broken bonds and meaning of home, not specifically place attachment. Drabek (1969) suggests that socio-cultural frameworks influence individuals' interpretation of environmental cues or warnings, but does not address place attachment.

The scant literature, the varied findings on community attachment, and the lack of focus on place attachment suggest that it may be useful to design a research project to uncover the relationship between place attachment and flood preparedness. It will also be useful to examine the context of a developing country.

Some researchers assert that attachment to place is based on two factors: 1) place dependency: the reliance on a place to provide properties and features that may support specific goals and desired activities (Schreyer, Jacob, & White, 1981); and 2) place identity, defined as "the symbolic importance of a place as a repository for emotions and relationships that give meaning and purpose to life" (Williams & Vaske, 2003, p. 831; Shamai, 1991). Consequently, their place attachment scales reflect these two factors. Kiecolt and Nigg's (1982, p. 138) study of earthquake evacuation included place in some of their dimensions of community attachment: (a) home ownership, (b) real home or just a place to live, (c) number of community groups one belongs to, (d) proportion of friends living in the community, and (e) length of residence in community. Factors such as rootedness or physical attachment, bonding or social attachment (Riger & Lavrakas, 1981; Taylor, Gottfredson, & Brower, 1985), and attachment to one's house, neighborhood and

city (Hidalgo & Hernandez, 2001; Mazumdar & Mazumdar, 1993) were also studied.

For others, components of place attachment include (1) genealogy, (2) economics, (3) cosmology, (4) pilgrimage, and (5) narrative (Low, 1992), and (6) religion (Mazumdar & Mazumdar, 2004). People from lower socio-economic classes, suggests Suttles (1968), develop stronger attachments to their dwellings and neighborhoods than do people from higher classes, perhaps because that may be their only dwelling where they may also earn their livelihood. In many places in the world people inhabit the same place for several generations, and this may lead to long-term place ties (Low, 1992). And, there may also be religious place attachment to a dwelling (Mazumdar & Mazumdar, 2004). Accordingly, it may be useful to construct a place attachment scale with some of these components.

## 2. This study

### 2.1. Physical context

This study is based in India. India's geo-climatic conditions make it one of the most disaster prone countries in the world. Twenty-four out of its 35 States and Union Territories are vulnerable: over 55% of landmass to earthquakes, 8% to cyclones, 5% to floods, and 70% of the land under cultivation to drought. These cause much harm and loss of life.

Floods are among the most recurrent and destructive natural hazards in India. Around 40 million hectares are prone to floods,

which affect on average 8 million hectares annually. The four monsoon months (June–September) receive 75% of the total annual rainfall, which leads rivers to flood their banks (HPCDM, 2001). Over 30 million people are displaced annually (Goldsmith, 2005). The most flood prone rivers are Brahmaputra, Ganga, and Meghana, and states are Uttar Pradesh, Bihar, West Bengal, Assam, and Orissa.

Orissa's Coastal Plain, the locus of this study, has a coastline of 480 km (Fig. 1). The area, referred to as the "Hexadeltaic region" and "Gift of Six Rivers" (Govt. of Orissa Portal, 2009), has deltas of Orissa's major rivers, Subarnarekha, Budhabalanga, Baitarani, Brahmani, Mahanadi, and Rushikulya. This landform of alluvial deposits is susceptible to storms, heavy rainfall, and severe floods in the river basins and deltas.

Economically, Orissa ranks the second lowest state in India and 86% of its population lives in rural areas. Their primary occupations are fishing and agriculture (mainly, rice and paddy cultivation).

The impacts of recurrent floods on this densely populated area are severe. People die; livestock perish; human settlements, including houses, are damaged or washed away; paddy and other crops are lost; and roads, bridges and infrastructure are damaged; public and private services are disrupted; the environment and the economy are disturbed. Among the recent floods, those of 1980, 1982, 2001 and 2003 were particularly severe (OSDMA, 2009). The flood of 2001 was the worst (Fig. 2); it affected 18,790 villages, around 9.678 million people, 102 deaths were recorded, nine million hectares of crops (14.83 million USD) were lost, and 250,615 houses were damaged (Architecture & development, 2009). These floods also cause intangible losses: they break down the socio-



Fig. 1. Orissa Physical Map. Source: [http://images.google.co.in/imgres?imgurl=http://www.travelindia-guide.com/maps/east/orissa\\_map\\_s.jpg&imgrefurl=http://www.travelindia-guide.com/orissa\\_details.php&usq=\\_Eyyj1UcMVzE01jUGHONWA322G4E=&h=434&w=596&sz=109&hl=en&start=28&tbnid=0ztH4j3eSQDhBM:&tbnh=98&tbnw=135&prev=/images%3Fq%3DOrissa%2BMap%26ndsp%3D20%26hl%3Den%26sa%3DN%26start%3D20](http://images.google.co.in/imgres?imgurl=http://www.travelindia-guide.com/maps/east/orissa_map_s.jpg&imgrefurl=http://www.travelindia-guide.com/orissa_details.php&usq=_Eyyj1UcMVzE01jUGHONWA322G4E=&h=434&w=596&sz=109&hl=en&start=28&tbnid=0ztH4j3eSQDhBM:&tbnh=98&tbnw=135&prev=/images%3Fq%3DOrissa%2BMap%26ndsp%3D20%26hl%3Den%26sa%3DN%26start%3D20) dt. 08.12.2009

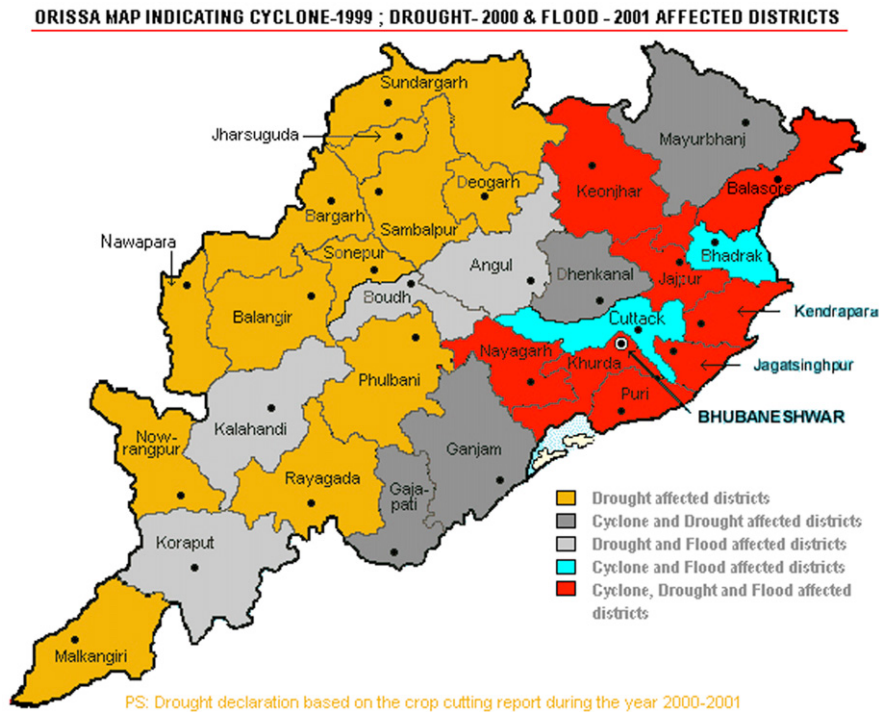


Fig. 2. Orissa Flood 2001. Source: <http://www.un.org.in/dmt/orissa/072001flood/maps/Affected%20districts-Drought,Cyclone,FLOOD%20copy.jpg>, dt. 27.10.2009.

economic set up and affect the place ties that define self and community (Erikson, 1976; Philips & Stukes, 2003).

These recurrent flood-caused tangible and intangible losses have led to calls for mitigation and preparedness actions by governmental and non-governmental agencies and communities. Several non-governmental organizations (NGOs) and funding agencies undertake a number of disaster management programs and attempt to mitigate disasters. Prominent examples are: Orissa Disaster Management Program (ODMP), Orissa State Disaster Mitigation Authority (OSDMA), United Nations Development Program (UNDP), and International Red Cross. In these, importance has been given to educating people and conducting mock drills in various Blocks and *Gram Panchayat* (village governance) districts, and constructing shelter houses.

After the 1999 Super Cyclone of Orissa, OSDMA, with the assistance of World Bank, Chief Minister's Relief Fund, Prime Minister's National Relief Fund, and Indian Red Cross Society Orissa Branch, constructed 97 Multipurpose Cyclone Shelters in 6 coastal districts. One or two shelters built in the jurisdiction of every *Gram Panchayat* are located at reasonable distances from the communities and are used as primary schools throughout the year, but during floods and cyclones can be used as shelters (Fig. 3). These have a capacity of 600 persons (3 sq. ft./person), are raised 1 m above high tide level, can withstand wind speed of 65 m/s, and have risk coefficient  $K1 = 1.08$ , terrain or height coefficient  $K2 = 1.05$ , and topography or relief  $K3 = 1.0$  as per Indian Standard 875 with specified normal load factors. However, these efforts and the general strategy of communicating information and risk do not necessarily lead to preparedness. It is therefore imperative to learn about impeding factors.

## 2.2. Socio-cultural context

In Orissa, with acute and widespread poverty, people depend on their ancestral possessions, particularly their land, house, and other physical property. Their livelihoods are place-dependent, which

suggests that there may be economic place attachment, which in turn could affect disaster preparedness.

People of Orissa (Oriyas), much like those in other parts in India, have a close-knit collectivistic culture (Triandis, 1996). Veneration of elders, deep reverence for their ancestors, and social embeddedness are important values. Families dwell in their ancestral places for three to four generations (Triandis, 1998). Ancestors' *asthis* (bones) are kept in a corner of the house. Moreover, by tradition they have to keep their ancestral symbols in one place for generations. When a newly married daughter-in-law enters the house, she is gifted with ancestral ornaments, which she is expected to carefully preserve and pass on to the next generation. This genealogical aspect could affect place attachment and preparedness for disasters.

People of Orissa's coastal region are mostly Hindus. In villages, people have a strong relationship with their Gods, nature, and fellow humans (Das, Mishra, & Das, 2009). Religion influences the affective connections people have with places (Mazumdar & Mazumdar, 1993). To Hindus, home is a sacred space with prayer rooms, and altars where gods/goddesses, spirits, ancestors, and divine beings are worshiped (Mazumdar & Mazumdar, 1994, 2008; Raglan, 1964). It is also a repository of sacred objects, artifacts, and icons (Mazumdar & Mazumdar, 2009). Thus, the house accommodates many functions of a temple (Mazumdar & Mazumdar, 1994; Raglan, 1964). Religious activities and rituals in the home and community also lead to development of attachment to the place (Low & Altman, 1992; Mazumdar & Mazumdar, 1993, 2004). This may influence disaster preparedness.

As the effects on flood preparedness of economic, genealogical, and religious place attachment have not received adequate attention, they are worthy of study.

## 3. Research question and method

This study investigates the research question: does place attachment (PA), and the consequent strong connections and ties with environments, affect flood preparedness (FP) in Orissa? More



Fig. 3. Cyclone Shelter in Orissa Source: <http://www.osdma.org/Photogallery.aspx?vchglinkid=GL025>, dt. 29.10.2009

specifically, is flood preparation by families in Orissa differentially affected by the three features of place attachment, economic, genealogical, and religious?

### 3.1. Survey

Based on this theoretical backdrop and with the socio-economic, cultural, and religious views and attitudes of Oriyas in mind, to answer these broad research questions, a survey instrument was designed that included scales for place attachment and flood preparedness in addition to questions on demographic and other information. The place attachment scale was developed to record the economic, genealogical, and religious links to place.

The questions were initially composed in English. To administer these in the vernacular language, they were translated into Oriya. To check the Oriya translation, dual-language experts translated them back into English.

### 3.2. Sample

The survey was conducted in coastal belt districts declared by the Government of Orissa as flood prone areas —Khurda, Puri, Cuttack, Bhadrak, Balasore, Jagatsinghpur, and Kendrapara districts (Fig. 1)—in July, shortly before the onset of flood season.

A purposive sampling procedure was used because it was important to include in the sample households in flood risk areas, close to riverbanks, with experience of flooding in the past, and from each *sahi* (or colony of households) in proportion to the number of households in that *sahi*. On reaching the flood prone village, the village head was contacted and briefed about the purpose of the study, and his/her consent was sought and obtained. 600 printed questionnaires were delivered to households willing to participate. They were informed about the purpose of the study, that their responses would be used for research purpose only, and assured that their individual responses would be confidential. One adult member (18 years of age or above) from each household was

asked to complete the survey. For illiterate respondents, a literate family or community member (not participating in the study) read the questionnaire and noted the responses.

The questionnaires were collected after a fortnight. Because the focus was on family preparations, the questionnaire could be filled out in consultation with others in the family. 300 completed questionnaires were returned, resulting in a 50% response rate. As Table 1 indicates, the respondents were ruralites, predominantly male, literate, mostly in economically productive ages. A vast majority were Hindus, from a variety of castes.<sup>1</sup> Approximately 70% were joint and extended families.<sup>2</sup> Almost half were from low-income category and lived in their own houses. Mean length of stay in the community was 35.46 years, and in the house (owned/rented) 31.66 years.

### 3.3. Measures and scales

#### 3.3.1. Place attachment scale

An important objective was to develop a Place Attachment (PA) scale for the Oriya context so that a) the items were simple, b) indigenous, c) included the three mentioned aspects of PA, viz. (i) economic, (ii) genealogical, and (iii) religious. Based on existing theory, empirical research (e.g. Riger & Lavrakas, 1981; Taylor et al., 1985), and discussion with some villagers, 25 questions were prepared. Reflecting feedback from experts, 18 questions were retained. Almost all questions were linked to place. Respondents of flood prone areas were asked to indicate the extent to which they

<sup>1</sup> The age-old Hindu caste system has four major castes – Brahmins, Kshatriyas, Vaishyas, and Shudras. In addition, the Constitution of India lists Scheduled castes and tribes, and the Mandal Commission (Govt. of India) in 1980 listed other (socially, educationally, and economically) backward castes and tribes.

<sup>2</sup> Joint family is used in India to indicate a multi-generational family with two or more generations living together in a house. Extended family is one with married sisters and brothers staying together. It is not uncommon to find a family that is joint and extended. And, there are nuclear families as well.

**Table 1**  
Sample profile

Variables	Groups	Percentage of respondents	
Age	18–35	64.3	
	36–55	28.3	
	56+	7.3	
Sex	Male	69.3	
	Female	30.7	
Family type	Nuclear	29.7	
	Joint	49.0	
	Extended	21.3	
Religion	Hindu	99.3	
	Muslim	.3	
	Christian	.3	
Caste	General caste	57.3	
	Other backward caste	17.3	
	Scheduled tribe	2.0	
	Scheduled caste	23.3	
Education	Literate	72.0	
	Illiterate	28.0	
Housing	Own	98.0	
	Rented	2.0	
Annual income (in Rs.)	Low: ≤5000 (\$ 104 approx.)	48.3	
	Middle: 6000–20,000 (\$125 approx.–\$415 approx.)	37.0	
	High: 20,000+ (\$415 above)	14.7	
Years of stay	In community	<i>M</i>	35.46
		<i>SD</i>	24.57
	In house	<i>M</i>	31.66
		<i>SD</i>	16.75

agreed or disagreed with each item by marking on a 4-point scale consisting of 'strongly disagree' (score = 1), 'disagree' (score = 2), 'agree' (score = 3), and 'strongly agree' (score = 4) (Table 2).

The first factor, genealogical dimension of place attachment, was explored through eight questions (Q. 8–15 in Table 2). These asked about the importance of the (ancestral) house, about memories of grandparents related to the place, obtaining inspiration from ancestors, receiving support because of the ancestral connections, belongingness in an ancestral place (*vita mati*), among others.

**Table 2**  
Item contents and factor structure of place attachment scale

Item	Rotated factor loading <sup>a</sup>			CFA: parameter estimates <sup>b</sup>		
	I	II	III	UNSTD	STD	CR
1 This place gives me bread and butter.	.11	<b>.76</b>	.08	1.00	.69	
2 At this place I have friends who can give me financial support.	.00	<b>.64</b>	.14	1.16	.772	11.83***
3 Here I can get loans easily.	.14	<b>.69</b>	.25	1.16	.792	12.10***
4 I cannot think of a place other than this because I have a fertile land here.	.12	<b>.79</b>	.09	1.22	.764	11.73***
5 This place provides me livelihood opportunities that no other place can offer.	.23	<b>.76</b>	.08	1.03	.632	9.886***
6 My business runs well here.	.33	<b>.72</b>	.02	.79	.524	8.301***
7 This is the only house that I have built.	.20	<b>.66</b>	.21	1.01	.688	10.696***
8 Because my forefathers were staying here, this place is very important for me.	<b>.73</b>	.26	.17	1.00	.743	
9 People know me by the name of my house only.	<b>.76</b>	.04	.18	1.00	.737	12.854***
10 I feel proud of staying at this place.	<b>.84</b>	.14	.04	1.12	.823	14.511***
11 I find memory of my parent/grand parent at every piece and corner of this place.	<b>.85</b>	.13	.14	1.11	.868	15.383***
12 I get inspiration by seeing the used places of my ancestors.	<b>.82</b>	.15	.03	.97	.794	13.95***
13 My forefathers were very well known persons of this place.	<b>.79</b>	.19	.13	1.03	.799	14.043***
14 Because of my ancestral place I get all types of support here.	<b>.67</b>	.20	.24	.87	.678	11.738***
15 This is my <i>vita mati</i> .	<b>.71</b>	.15	.23	.89	.719	12.516***
16 My <i>pooja</i> room is very important to me.	.23	.20	<b>.84</b>	1.00	.819	
17 I cannot feel contented without visiting our village temple/mosque/church once a day.	.19	.22	<b>.85</b>	1.06	.877	15.106***
18 The collective festivals organized here like Durga Pooja/Id/Christmas etc. are very important to me.	.22	.19	<b>.81</b>	.92	.777	14.159***
Eigenvalue	5.19	3.98	2.43			
Explained variance	28.81	22.11	13.50			
<b>Cumulative variance</b>	<b>28.81</b>	<b>50.93</b>	<b>64.43</b>			

\*\*\**p* < .001.

<sup>a</sup> The bold face values indicate significant loadings of items on the factor.

<sup>b</sup> UNSTD = Unstandardized, STD = Standardized, CR = Critical Ratio.

The second, economic dimension of place attachment, was the focus of seven questions (Q. 1–7). These related to the economic value attached to the place, friends there who could help financially, having loyal customers there, ease of loans in that location, place of livelihood, investing in building of home there, among others.

Three questions were designed to learn about the third factor, religious dimension of place attachment. These included questions regarding the importance of pooja rooms, daily visit to local worship buildings (such as temple/mosque/church), and importance of festivals (e.g. Durga Pooja/Id/Christmas) that grounded religion in place.

### 3.3.2. Flood preparedness scale

Following the Mulilis Lippa Earthquake Preparedness Scale (Mulilis et al., 1990) and items culled from suggestions appearing in flood preparedness brochures and web pages (see Bibliography) a 25-item flood preparedness questionnaire was prepared. Three experts in disaster research were asked to judge it. Twenty items agreed on by them were retained (Table 3). Questions included: Do you keep the following things ready before flood season: "make the radio sets fully serviceable"; "keep torch lights and candles ready"; and "do you know any shelter house nearby?" Respondents were asked to indicate the extent of preparedness on each item on a 3-point scale by checking either 'yes' (score = 3), 'unsure' (score = 2), or 'no' (score = 1). Respondents were also asked to rate the difficulty of preparing for each item on a five-point scale ranging from 'not at all difficult' (score = 1) to 'extremely difficult' (score = 5).

### 3.4. Analysis

Data were analysed with the help of SPSS and AMOS software. Exploratory factor analysis, confirmatory factor analysis, reliability testing, and correlation analyses were conducted in the scale development process, and correlation and hierarchical regression analyses were performed to find out the influence of place attachment on flood preparedness.

To remove the possible confounding effects of age and family type on flood preparedness these were controlled in the first step of hierarchical regression (Mishra & Suar, 2005). The reported age,

**Table 3**  
Flood preparedness scale

Items	Are you prepared?				Difficulty (1–5) <sup>a</sup>		
2.1 Do you keep the following things ready before flood season?	Yes	( )	No	( )	Unsure	( )	—
a. Make the radio sets fully serviceable.	Yes	( )	No	( )	Unsure	( )	—
b. Keep torch lights and candles ready.	Yes	( )	No	( )	Unsure	( )	—
c. A hurricane lantern filled with kerosene. Flash light and enough dry cells.	Yes	( )	No	( )	Unsure	( )	—
d. Keep ration for 5 days.	Yes	( )	No	( )	Unsure	( )	—
e. Keep ORS (Oral Rehydration Syrum) packets/alum (homemade substitute)ready	Yes	( )	No	( )	Unsure	( )	—
f. Keep dry foods and baby foods ready for at least 5 days	Yes	( )	No	( )	Unsure	( )	—
g. Store clean drinking water.	Yes	( )	No	( )	Unsure	( )	—
h. Keep first aid box ready.	Yes	( )	No	( )	Unsure	( )	—
i. Keep waterproof or polythene bags for clothing and valuables, an umbrella and bamboo stick (to protect from snake).	Yes	( )	No	( )	Unsure	( )	—
2.2 Do you participate in mock drills?	Yes	( )	No	( )	Unsure	( )	—
2.3 Do you have boats, plastic tyres or tubes for instant evacuation?	Yes	( )	No	( )	Unsure	( )	—
2.4 Do you know any shelter house nearby?	Yes	( )	No	( )	Unsure	( )	—
2.5 Do you know how to prepare temporary shelter houses?	Yes	( )	No	( )	Unsure	( )	—
2.6 Do you verify whether sand bags are kept on the riverbanks before the river overflows?	Yes	( )	No	( )	Unsure	( )	—
2.7 Do you participate in tree plantation on riverbanks?	Yes	( )	No	( )	Unsure	( )	—
2.8 Do you participate in community discussion regarding flood preparation?	Yes	( )	No	( )	Unsure	( )	—
2.9 Do you keep valuable things safely before a flood warning?	Yes	( )	No	( )	Unsure	( )	—
2.10 Have you made your house flood resistant (built a <i>pukka house</i> , increased the height of the base line etc.) as you are subjected to recurring floods?	Yes	( )	No	( )	Unsure	( )	—
2.11 Do you finish crop cutting before the flood season?	Yes	( )	No	( )	Unsure	( )	—
2.12 Do you attend meetings held by schools/NGOs/Govts. For the purpose of establishing flood preparedness?	Yes	( )	No	( )	Unsure	( )	—

<sup>a</sup> Difficulty response: 1 = not at all difficult, 2 = a little difficult, 3 = somewhat difficult, 4 = very difficult, 5 = extremely difficult

place attachment, and preparedness data were on a metric scale and family types were treated as dummy variables (presence of a family type = 1, otherwise = 0) with joint family as the reference group.

## 4. Results

### 4.1. Place attachment scale

#### 4.1.1. Test for validity and reliability:

4.1.1.1. *Exploratory factor analysis.* The 300 respondents' ratings on the 18 items of place attachment scale were subjected to exploratory factor analysis. Three factors were extracted, in accordance with the conceptualization, using principal component analysis method. To provide a meaningful interpretation of the factor loadings, they were rotated using varimax procedure. The first factor (genealogical) loaded significantly on eight items, the second (economic) loaded significantly on seven items, and third (religious) loaded significantly on three items. The three factors accounted for 64.43% of the total variance, implying high factorial validity. The rotated loadings and the eigen values extracted by each factor are shown in Table 2.

The alpha reliability coefficient for each dimension of PA was greater than .80: Genealogical place attachment with eight items (Cronbach alpha = .92), Economic place attachment with seven items (Cronbach alpha = .86), and Religious place attachment with three items (Cronbach alpha = .86). These implied high inter-item consistency within a dimension. High scores on each dimension indicated high attachment with respect to that dimension.

4.1.1.2. *Confirmatory factor analysis.* The factor structures obtained in exploratory factor analysis were further tested by confirmatory factor analysis (CFA), which tests *a priori* factor structure and goodness of fit of the resulting solution (Kline, 1998), to see whether the three dimensions of PA were different factors. CFA was carried out using AMOS 4.0 (Arbuckle & Wothke, 1999). In

the three-factor model, all factors were independent. The unstandardized and standardized regression weights of the items are given in Table 2. The critical ratios for weights were highly significant and ranged from low of 8.30,  $p < .001$  to a high of 15.38 suggesting high convergent validity of items in each dimension of the scale.

The Goodness of fit index (GFI) is analogous to squared multiple correlation ( $R^2$ ) in multiple regression. Comparative fit index (CFI) indicates the overall fit of the model relative to a null model, and Normed fit index (NFI) adjusts for the complexity of the model. These fit measures being close to .90, the recommended cut-off criterion (Bentler, 1990; Bollen, 1989), favored the three-factor model as conceptualized. The parsimonious fit indices of these measures (PGFI, PCFI, PNFI) that were less sensitive to sample size also favored the three-factor model. Root mean square error of approximation (RMSEA) indicates the approximation of the observed model to the true model, with lower RMSEA indicating better model. RMSEA (.10) was close to the required .08 for the three-factor model (Table 4).

### 4.2. Flood preparedness scale

For FP, each item score correlated positively and very significantly with the total item score. The correlations ranged from a low of .25,  $p < .001$  to a high of .64, indicating high internal consistency. The total score for difficulty of flood preparedness (DFP) had high negative correlation with total score of preparedness ( $r = -.76$ ,  $p < .001$ ), suggesting that people who experienced more difficulty

**Table 4**  
Fit measures of the model

$\chi^2$	$\chi^2/df$	GFI	CFI	NFI	RMSEA	PGFI	PCFI	PNFI
552.89	4.10	1.00	.98	.97	.10	1.00	.77	.76

The factors are treated as independent.



in preparing for flood were less prepared. This implied that the scale had high convergent validity. Because the questions were developed in concert with guidelines published by government and non-governmental organizations, experts and local people, content validity was high. Reliability coefficients on the current sample were high for preparedness items ( $\alpha = .80$ ) and perceived difficulty ( $\alpha = .76$ ) measures (Table 5).

4.3. Place attachment and flood preparedness

Descriptive statistics and correlations of variables used in the study are shown in Table 6. Results revealed that place attachment correlated significantly with flood preparedness. A detailed analysis revealed that although genealogical and economic attachment to place significantly correlated with flood preparedness, religious attachment did not.

The significant correlations of the three aspects of PA (Table 6) led to suspicion of multicollinearity among them. Therefore, each factor was entered separately in the regression analysis (see Table 7). Confounding effects of age and family type were suspected and hence were controlled in the second step of regression analysis (Mishra & Suar, 2005). As the regression analysis revealed, families with higher genealogical and economic place attachment were more prepared. Genealogical and economic attachment significantly explained additional 4% and 2% of variances respectively of flood preparedness. Similarly, excluding the effects of age and family type, overall attachment explained additional 3% of variance, further confirming the results. Religious place attachment did not explain any additional variance of flood preparedness implying that religious attachment did not influence preparedness behavior.

5. Discussion

Natural disasters have the potential to, and have, caused much loss of life, physical and social harm, and damage and destruction to property. For disaster preparation, saving lives and property have been important. Disaster response and management literature and activities have accordingly focused on risk perception and management, planning or lack of in building in risk prone areas, appropriate locations and construction techniques if people choose to live in high-risk areas, avoidance, delay and mitigation of effects, building of defenses and fortifications, safe houses and shelters, provision of information, warnings, and orders, evacuation possibilities, modes, plans, and drills, and preparedness for disasters, among others (e.g. Lewis & Kelman, 2009). These are important. But, it is also known that people do not always avoid high-risk areas (these may bring other advantages), prepare for, or evacuate even in conditions of impending disaster. Knowing why disaster preparation is avoided is important as these could affect the effectiveness of preparedness efforts by various agencies.

A simple conclusion from this research is that for Oriyas place attachment affects flood preparedness. Therefore, it is important to examine place attachment but also its components and complexities. A finer analysis of some components of place attachment revealed that for residents of the flood prone areas of Orissa, economic and genealogical components enhanced flood preparedness.

People of Orissa have strong familial/emotional bonds and deep respect for ancestors that continues for generations. This instills a feeling of genealogical rootedness to the place and probably makes them alert to disasters that have the potential of destroying their ancestral homes and artifacts. To be able to protect these materials they may be more disposed to prepare for floods.

Flood prone areas of Orissa are primarily rural. In these rural villages, people generally live in and use their ancestral property for

Table 5 Means, Standard Deviations, and inter-correlations of Flood Preparedness Scale items for the present sample

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1.00																			
2	.33***	1.00																		
3	.40***	.29***	1.00																	
4	.31***	.36***	.32***	1.00																
5	.16**	.25***	.17**	.18***	1.00															
6	.26***	.25***	.09	.36***	.14*	1.00														
7	.28***	.17**	.41***	.35***	.47***	.30***	1.00													
8	.25***	.18***	.30***	.47***	.40***	.39***	.46***	1.00												
9	.15**	.10	.17***	.17***	.44***	.37***	.40***	.37***	1.00											
10	-.01	-.03	-.01	.08	.23***	.10	.10	.10	.13*	1.00										
11	.04	-.09	-.17**	.08	.23***	.10	.10	.14*	.13*	.29***	1.00									
12	.00	.07	.12*	.12*	.06	-.10	.12*	.11	.05	.20***	.11	1.00								
13	.04	.01	.08	.12*	.06	-.08	.11	.11	.09	.23***	.11	.00	1.00							
14	-.05	-.05	-.00	.10	.10	-.11	.14*	.14*	.13*	.25***	.06	-.00	.23***	1.00						
15	.04	-.06	.08	.10	.14	.17**	.16**	.16**	.19**	.24***	.19**	.19**	.19**	.21***	1.00					
16	-.01	.08	.10	.10	.09	.23***	.34***	.36***	.24***	.18**	.14*	.21***	.21***	.24***	.25***	1.00				
17	.06	.11	.27***	.04	.06	.34***	.34***	.36***	.24***	.18**	.14*	.33***	.33***	.34***	.33***	.21***	1.00			
18	.22***	.13*	.30***	.04	.06	.34***	.34***	.36***	.24***	.18**	.14*	.33***	.33***	.34***	.33***	.21***	.06	1.00		
19	.06	.08	.19**	.21***	.28***	.28***	.28***	.28***	.21***	.21***	.21***	.21***	.21***	.21***	.21***	.21***	.21***	.21***	1.00	
20	-.02	-.04	.01	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08	1.00
M	2.59	2.63	2.77	2.47	2.01	2.32	2.37	1.91	2.31	1.41	1.59	2.00	1.97	2.40	1.92	1.97	2.38	2.03	1.75	1.65
SD	.80	.77	.61	.86	.97	.93	.91	.96	.91	.76	.90	.98	.98	.89	.98	.99	.92	.99	.95	.92

\*p < .05. \*\*p < .01. \*\*\*p < .001.

**Table 6**  
Descriptive statistics and inter-correlation between studied variables

Variable	1	2	3	4	5	6	7	8	9	10
1. Age	1.00	-.03	.03	-.00	.16**	.20***	.08	.22***	.15**	-.16**
2. Nuclear family		1.00	-.64***	-.34***	.02	.10	.02	.07	-.01	.07
3. Joint family			1.00	-.51***	.04	-.05	-.06	-.03	.23***	-.26***
4. Extended family				1.00	-.07	-.05	.05	-.04	-.27***	.24***
5. Genealogical attachment.					1.00	.43***	.44***	.75***	.20***	-.16***
6. Economic attachment						1.00	.43***	.81***	.23***	-.18***
7. Religious attachment							1.00	.71***	.05	-.06
8. Place attachment								1.00	.21***	-.18**
9. Preparedness									1.00	-.76***
10. Difficulty										1.00
<i>M</i>	33.96	.30	.49	.21	25.17	19.61	9.30	56.77	42.46	53.62
<i>SD</i>	14.04	.46	.50	.41	5.44	4.94	2.32	10.37	8.31	13.46

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

their livelihood. Agriculture and allied activities, such as paddy and wheat mills, are economic mainstays, though some operate small businesses. The vulnerability of this economic and ecological niche to recurring floods together with economic place attachment leads them to be more prepared to avoid sustaining major losses. This is in line with Paton, Johnston, et al. (2001) suggestion that people whose livelihoods were at stake support expenditure of public funds on hazard adjustment in their community.

Religious place attachment, however, did not seem to influence preparedness behavior. It is possible to speculate on the reasons for this. Reverence for nature (as opposed to mastery over nature) and belief in fate (the social/cultural/religious belief that one's life may be pre-charted) or divine plan may lead rural Hindus to remain in the place and to not actively prepare for floods. It is crucial therefore, to develop a more nuanced and fine-grained view of these concepts. The role of religion in attitudes toward preparedness has not received much attention. More research in this area is needed.

This research provides a peek into the emotional connections between people and environments as revealed by the concept of place attachment, and points to the need, in understanding disaster preparedness, to consider emotions, particularly emotional connections to place and belongings. These connections influence preparedness for floods. Even when faced with the possibilities of major losses and serious harm to self, some people are unwilling to change their deep-seated views about the environment, to move, or to take protective action. Understanding these is imperative.

This paper also offers a brief view of Oriya cultural conceptions and preferences. By taking up the study of both place attachment and flood preparedness in Orissa, it adds to the literature on both locational and cultural components.

This study's limitations, including predominance of male respondents, reliance on literate members, and few questions on religious place attachment notwithstanding, it provides glimpses into considerations that have not received adequate attention in

the literature, viz. emotions, place attachment, culture (Hoffman & Oliver-Smith, 2002), and religion that can have major influence. The earlier section described some of the complexities in that not all forms of place attachment have identical effects.

The findings of this research may not be widely generalizable. This is not a major problem. Though there is a propensity in the literature to de-contextualize this may not be very useful in disaster research. Village B can be prone to repeated flooding though an adjacent one, village C, may not incur floods. It would not be appropriate to generalize from village B to village C or vice versa. The findings of this study based in the Coastal belt of Orissa is applicable to that region, and following Lindell and Hwang (2008), possibly beyond. Both the place attachment and flood preparedness scales were contextualized with the Oriya and Indian context and concept of place attachment in mind. The validity and reliability of the scales were high, which imply that transferability of the scales and findings to other parts of Orissa and India, and, with caution and care, to other areas, seems possible and that these could be used in future studies. Findings of the study can help disaster planners in these contexts to be conscious of the need to understand more about resistance to preparedness.

There has been a tendency in the literature to rely on instrumental rationality for understanding the rationales of people's actions. Miceli et al. (2008, p. 165) claim that "all measures refer to a rationalist view of the construct of risk perception," and that this has led to a neglect of emotions. This research suggests that reliance on instrumental rationality alone may be inadequate in obtaining a more complete and thorough understanding. A different approach may be needed that permits investigations into "local rationalities" i.e. rationales used by local people, including "attachment rationalities" and the complexities of religious and belief based rationality. In addition to context, culture, and religious place attachment these need to be considered more fully. These ideas can be useful beginning points for future research.

**Table 7**  
Place attachment and preparedness behavior

Step	Independent variable	<i>B</i> <sup>a</sup>	<i>SE</i>	$\beta$	<i>R</i> <sup>2</sup>	<i>F</i> <sup>b</sup>	<i>R</i> <sup>2</sup> change	<i>F</i> change
1	Age	.09	.03	.15**	.11	11.75***		
	Nuclear family	-1.84	1.06	-.11				
	Extended family	-6.13	1.18	-.31***				
2	Genealogical attachment	.24	.08	.16**	.13	11.04***	.02	7.98**
2	Economic attachment	.34	.09	.20***	.15	12.51***	.04	13.33***
2	Religious attachment	.21	.20	.06	.11	9.13***	.00	1.14
2	Place attachment	.14	.04	.18***	.14	11.69***	.03	10.31***

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .<sup>a</sup> *B* = Beta, *SE* = Standard error of beta,  $\beta$  = Standardized beta.<sup>b</sup> In the first step, *F* value is against 2, 297 df, and in the second step against 3, 296. (Explanation: df is for numerator and denominator of *F* values respectively)

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