

# The Lived Experience of Victims of Catastrophic Coastal Erosion

## A cycle of impact, consequence and recovery

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### التجربة الحية لضحايا تآكل الكارثي للساحل دائرة التأثير والنتائج والتعافي

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**ABSTRACT: Objectives:** Environmental hazards are part of the Earth's natural cycle and are ongoing within human history. When vulnerable situations meet environmental hazards, disasters occur where human and natural costs could be enormous. This study aimed to explore the experiences of the victims of coastal erosion during the monsoon season. **Methods:** Seven victims of catastrophic coastal erosion in the Kollam District of Kerala, India, were interviewed from December 2013 to February 2014. The study followed Edmond Husserl's descriptive phenomenological method. **Result:** These interviews constituted the primary data source. Three main themes with eleven subthemes emerged from these data. The main themes were impact, consequences and recovery. The subthemes were living in constant fear, escaping from the catastrophe; cataclysmic sea waves and their tumultuous behaviour, instant damage and destruction, the epoch of losses; agony and suffering; homelessness-helplessness-sleeplessness mixed with fear; government aid only in dreams; haunting memories; never-ending daily needs; first home and native land; and the desire to go back to the site of the disaster. **Conclusion:** From the derived themes, a phenomenon associated with coastal erosion evolved. The phenomenon is termed "Catastrophic coastal erosion: A cycle of impact, consequences, and recovery."

**Keywords:** Disaster Victims; Ecological and Environmental Phenomena; Natural Disasters; Oceans and Seas; Quality of Life; Qualitative Research; Tsunamis; India.

**المخلص: الهدف:** تعتبر المخاطر البيئية جزءاً من الدورة الطبيعية للأرض ومستمرة في تاريخ البشرية. عندما تواجه الظروف الهشة مخاطر بيئية، تحدث الكوارث التي من الممكن أن تؤدي إلى تكاليف بشرية وطبيعية ضخمة. يهدف هذا البحث إلى دراسة تجربة ضحايا الانجراف الساحلي خلال موسم الرياح الموسمية. **الطريقة:** تمت مقابلة سبعة من ضحايا التآكل الساحلي الكارثي في منطقة كولام بولاية كيرالا بالهند في الفترة من ديسمبر 2013 إلى فبراير 2014. اتبعت الدراسة طريقة إدmond هوسرل الوصفية الظاهرية. **النتائج:** شكلت المقابلات المصدر الرئيسي للبيانات. نتج عن هذه الدراسة ثلاثة مواضيع رئيسية وأحد عشر مسألة فرعية. كانت الموضوعات الرئيسية هي التأثير والعواقب والتعافي. والمواضيع الفرعية تمحورت حول العيش في خوف مستمر، الهروب من الكارثة، موجات البحر الكارثية واضطرابها، الدمار والأضرار الفورية، حقبة الخسائر، الألم والمعاناة، التشرد، العجز، الأرق الممزوج بالخوف، المساعدة الحكومية الغير متحققة: الذكريات المؤلمة والاحتياجات اليومية التي لا تنتهي؛ المنزل الأول والأرض الأصلية؛ والرغبة في العودة إلى موقع الكارثة. **الخلاصة:** من الموضوعات المشتقة، نشأت ظاهرة مرتبطة بتآكل السواحل. تسمى "تآكل السواحل الكارثي: دورة من التأثيرات والعواقب والتعافي".

**الكلمات المفتاحية:** ضحايا الكوارث؛ الظواهر البيئية والبيئية؛ الكوارث الطبيعية؛ المحيطات والبحار؛ جودة الحياة؛ البحث النوعي؛ تسونامي. الهند.

#### ADVANCES IN KNOWLEDGE

- The study helps understand the nature and dynamics of catastrophic coastal erosion and the problems encountered.
- The study's findings enhance understanding of how disaster management practices emerge.
- Critical analysis of the study might improve the implementation of disaster management strategies.
- This study can serve as a resource for researchers who are interested in exploring and describing this social phenomenon. The new dimensions and insights provided by this study could contribute to an in-depth study of coastal erosion.

#### APPLICATION TO PATIENT CARE

- This study helps create awareness and the early recognition of psychological trauma and the subsequent need for counselling services to address mental distress in victims of catastrophic coastal erosion.
- There is a need to integrate disaster management into primary healthcare and inculcate a minimum requirement of disaster management competencies and skills in healthcare professionals. Such skills would help them deal with vulnerable populations during the cycle of impact, consequences and recovery that result from catastrophic coastal erosion.

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- *This study can advise dialogue between decision-makers and vulnerable populations.*
- *The findings indicate a need for early crisis management and disaster mental health in the catastrophe-affected areas on a long-term basis.*

**C**OASTLINES ARE FAMOUS FOR THEIR NATURAL beauty and abundance of recreational opportunities. Half of the world's population is settled along shorelines and the number of people living along the coast is likely to rise in the coming decades.<sup>1</sup> In addition to inhabited settlements, coastlines also include trade establishments, agriculture and industry. Communities that reside along coastlines are exposed to specific coastal hazards such as coastal erosion, tsunamis, coastal flooding, hurricanes and the spread of infectious diseases.<sup>2</sup> Coastal erosion mainly occurs due to massive storms, strong wave action, rising sea levels and flooding. Human activities, including inappropriate and indiscriminate use of land, landscape alterations and the use of shore protection structures, are major triggers of erosion.<sup>3-5</sup> Additionally, the sea level rise and shifts in global climate have been found to increase global coastal erosion, resulting in the loss of valuable coastal land.<sup>6,7</sup>

India has a coastline of about 7,500 km of which 23–26% is eroding, with an average sea-level rise of 1.30 mm/year.<sup>8-10</sup> A 590-km stretch of the State of Kerala lies along India's southwest coast; 218 km of this coastline is eroding.<sup>11</sup> This stretch of Kerala has 221 marine and 113 inland fishing villages with an average population density of approximately 2,000 people/km<sup>2</sup>, making it highly vulnerable to coastal erosion.<sup>12</sup> Erosion destabilises and regularly destroys houses, businesses and community infrastructure, leading to long-standing economic and social consequences.<sup>13</sup> The vulnerability of beaches to erosion-associated catastrophe is higher in the monsoon months, and the intensity and frequency of such extreme events have increased due to climate change.<sup>14,15</sup> An impact assessment study conducted by the National Institute of Oceanography showed that the 2004 tsunami devastated the low-lying coastal areas of Kollam, Alleppey and Ernakulam, Kerala, leading to a loss of life and property. Due to the coast's geographical orientation, geomorphology of the landmass and the shallow water's bathymetry, the maximum intensity of the tsunami was observed in the Kollam district.<sup>16</sup>

Trauma, which is a stressor involving actual or threatened death, severe injury and loss of physical property, can be a direct result of catastrophic coastal erosion. It also threatens individuals' physical integrity.<sup>17</sup> The post-catastrophe symptoms of trauma include irritability, angry outbursts, recklessness, self-destructive behaviour, hypervigilance, problems

with concentration, sleep disturbance, persistent exaggerated negative beliefs, diminished interest in performing activities and the inability to remember important aspects of the traumatic event. The victims of a catastrophe also can display intrusion symptoms, namely recurrent and involuntary distress memories of the event, recurrent distressing dreams and flashbacks.<sup>18,19</sup> Research on victims' suffering after a major catastrophe is scarce. This research explores lived experiences after catastrophic coastal erosions during the monsoon season in India.

## Methods

A descriptive phenomenological approach was chosen to guide this study due to its support of exploring lived experiences through an in-depth examination of people's realities.<sup>20,21</sup> This study aimed to gather insights from those affected by catastrophic coastal erosion by detailing their lived experiences. Through an in-depth analysis of the data collected in this study, researchers can better understand the experiences of suffering in the aftermath of catastrophic coastal erosion events.

The researchers conducted in-depth interviews with seven families' elders who were affected by coastal erosion in the areas of Chavara and Panmana Grama Panchayat in Kollam, India from December 2013 to February 2014. The five female and two male leaders of the families spoke at length about their experiences during catastrophic erosion events.

Through the phenomenological inquiry method, knowledge of people's values, humanistic understanding and unique experiences is accessible through dialogue.<sup>20</sup> Bracketed interviews were used to mitigate the effects of personal ideas and assumptions regarding the effects of coastal erosion and separate the researchers from the participants' descriptions.

In phase one of the study, 100 heads of families in the affected area were surveyed using the Quality of Life Rating Scale (QoLRS), which the primary author developed to identify information-rich cases for phase two. The purpose of phase one was to validate the developed scale for the second phase. QoLRS is a 33-item three-point self-administered rating scale, which measures domains such as life satisfaction, material well-being, health, productivity, safety, family and social relation, support system and emotional well-being of the families residing in the coastal area. The

minimum and maximum possible scores were 33 and 99, respectively. The final content validity index of the QoLRS was 1 and the reliability coefficient was calculated by computing the Cronbach's alpha, which yielded 0.892.

Participants were considered for inclusion in the study if they could speak and understand Malayalam, the official language of Kerala, India. The QoLRS was given to the participants for self-rating. For those who could not read or comprehend, the items were read aloud and explanations were provided on how to score each item. After administration, the scores were arranged in ascending order and the heads of the family who obtained scores between 33–66 on the QoLRS were determined to reflect a poor QOL. In total, 48% of these respondents were recruited into the sample pool for phase two. A purposive sampling technique with set criteria helped to choose information-rich participants for phase two.<sup>22</sup>

In phase two, seven interviews were conducted with five female and two male heads of families. A priori sample size calculation was not used for phase two, as the study's design was emergent. Data saturation was noticed during the interview of the seventh participant; hence, the researchers stopped further data collection. All interviews were done in the participants' residence and the verbatims of the participants were recorded using a Sony-IC recorder (Sony, Tokyo, Japan), a portable digital recording and playing device. The interviews were conducted with the help of a semi-structured interview guide, which was developed by the researchers for the purpose of this study; the interview lasted for an average of one hour.

The data were analysed using Colaizzi's phenomenological method of data analysis.<sup>23</sup> Based on Colaizzi's strategy, face-to-face interviews were conducted using a pre-prepared interview guide. The participants were encouraged to express and articulate their experiences and recount incidents they underwent during the catastrophic event. The researchers listened to audio data on the Sony-IC recorder (Sony) using headphones and transcribed them verbatim. Another researcher transcribed and compared the data for possible deviations, thus establishing the validity of data transcription. The statements in Malayalam were translated into English. The researchers analysed each participant's verbatim account separately by reading the transcript thoroughly to extract the interview's general sense and significant statements about the catastrophic coastal erosion. The extracted statements were used to formulate the meaning of the phenomenon, and the researchers used this meaning to derive the code and categories for specific participants. After analysing each participant's data individually, the

researchers looked for possible connections in the categories across the participants and derived themes to describe the phenomenon.

Lincoln and Guba's trustworthiness criteria were used to establish the rigour of this study; the trustworthiness criteria involve determining credibility, transferability, dependability and confirmability.<sup>24</sup> The researchers conducted both of the phases of the study in the same locality, which helped maintain a rapport and mutual trust with the participants. The researchers spent more than one month in the field, observing various aspects of the research setting. They interacted with a broad range of people including political party leaders, voluntary self-help group members, non-governmental organisation (NGO) members, local self-government authorities and community leaders. The transcripts were categorised and then coded accordingly to ensure credibility. The data scripts were reviewed by two community psychiatry and nursing experts, respectively, and the researchers met the experts in person and reached an agreement on the core categories and theme. The researchers also did a member-check formally and informally with the participants to check the categories, interpretation and conclusion with their original data.

Ethical approval (IEC 528/2013) for the study was obtained from the Institutional Ethics Committee of Kasturba Hospital of the Manipal Academy of Higher Education in India. Participants were given detailed information sheets that summarised the study's purpose and methods, the participants' roles and responsibilities and issues related to consent, confidentiality and the right to withdraw. The forms also stated that the research centred on the experience of the victims of catastrophic coastal erosion.

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## Results

The demographic characteristics in phase one of the study showed that the mean age of the participants was  $54.19 \pm 12.59$  and only two did not have any formal education. Most of the families were nuclear (90%), and 68% stayed in tiled houses, while the rest were in concrete-roofed houses. The researchers interviewed seven participants (two males and five females) in phase two of the study. All participants were from low socioeconomic strata with a monthly income of less than 2,000 rupees. Among the participants, two were widows and the other five had a living spouse. All participants had primary education and did not have any formal occupation. Only one male participant was working as a fisherman, and the other female participants were housewives. All the participants lived in tiled houses, making them vulnerable to the

effects of coastal erosion.

In this study, the victims reported their experiences with catastrophe; these accounts constituted the primary data. Three main themes with eleven subthemes emerged from this data and were grouped under three themes: impact, consequences and recovery. Significant statements are in Table 1 and the subthemes derived from the data follow:

#### ***Living in constant fear***

On the Kerala coast, monsoons often bring fear to residents. Even though monsoons are seasonal, memories of past events have created a feeling of constant fear. The participants mentioned that they experience fear even at night and escaping from it is an enormous task. At the time of the 2004 tsunami, participants' houses were either thatched or tiled, making them vulnerable to rough waves. Additionally, walls and doors were not built to stop water from entering houses, so flooding affected those who slept on the floor.

Additionally, the previous impact of tidal waves had caused ongoing fear in participants' minds. One participant mentioned that the loud sounds of high tide waves caused tremendous fear, affecting her sleep during most monsoon nights. The fear created by the catastrophe affected them so severely that some of the participants would send their children to sleep in other houses at a greater distance from the coastline. This fear impacted participants' lives to such an extent that the family's seniors indicated taking turns watching the sea for rising waters.

#### ***Escaping from the catastrophe***

All the participants expressed experiencing the effects of coastal erosion over an extended time, and they took extra precautions during the monsoon season. They expressed difficulties and highlighted the additional health demands of escaping the effects of coastal erosion. Rising waters often occurred suddenly, and most participants did not have enough time to defend themselves. They were also aware that the extent of damage caused by the violent waves could be severe and life-threatening. One participant said that one time the waves had entered their house, and they had to seek safe shelter. Most participants expressed shock at seeing seawater come inside their houses, leaving them with no option but to abandon their homes, leave behind belongings and stay in temporary camps during the monsoon season.

#### ***Cataclysmic sea waves and their tumultuous behaviour***

Although people escaped from the rising waters, the sea waves encroached beyond the immediate coast and deposited sand in the surrounding areas,

including coastal inhabitants' homes. In a few areas, the sea walls were not built to stop strong waves, which one participant mentioned had grown increasingly violent and rough in recent years. Additionally, she mentioned that she had never witnessed disasters of this extent in the past. One participant mentioned that coastal erosion was rarely reported in the past and this violent, catastrophic form of erosion is a recent phenomenon along the coast of Kollam. Another participant said that the sea waves used to dump soil inside their houses and that sand mining is one reason for the encroachment of sand. At times, the sea became so violent that participants could hardly sleep at night. All the respondents lived near the sea since their childhood and they knew the sea and its general nature. It was only in the last few years that the sea had become violent and caused damage to livelihood. One participant recollected that once the waves rose to the height of his tiled house roof and damaged the roof and windows. The waves were seen as unpredictable and tumultuous.

#### ***Damage and destruction in the bat of an eye— The epoch of losses***

The damage and destruction caused by the sea waves was swift, sometimes destroying properties in seconds. The waves were described as taking away almost everything in their path. People indicated not having time to retrieve valuables, so they lost their houses and household articles, clothes, pets, cattle and important documents. After the initial wave-based damage, coconut trees were often uprooted due to strong currents. Some people even became homeless. One participant expressed that he lost everything he had earned from fishing. The loss was so devastating that the entire family lost hope and expected death at any moment. All participants described property damage as instantaneous and causing massive losses. All of them had lost their homes and had to seek refuge and safe shelters.

#### ***Agony and suffering***

Participants indicated going to safe shelters when the destructive waves struck. However, witnessing the loss of their homes and their belongings caused tremendous mental stress for the victims. They suffered great distress as they also had to carry older family members and children to safety. In one particular instance, a participant describing trying to take her ill mother to the nearest safe place, but her mother wanted to urinate on the way. This task proved difficult as they had lost their house along with its attached toilets. The situation proved similarly difficult for many female participants as they could not find private places to urinate or meet their bodily needs.

**Table 1:** Subthemes and themes derived from codes and selected participant quotes (N = 7)

Theme	Subtheme	Participants' quotes
Impact	Living in constant fear	Participant 1: (...) <i>The sea used to become violent many times a year. High tide used to hit our houses (...) It was a serious issue. We could not do any work at house calmly. We had a fear always.</i>  Participant 3: (...) <i>The sea came violently even inside our house. We were afraid.</i>  Participant 4: (...) <i>When I go for fishing, there will be my wife and children at home. They could not sleep as I was out in the sea. We sent our kids to some houses in the east. The rest of us would sit and watch the sea to find if the waves are coming.</i>
	Escaping from the catastrophe	Participant 1: <i>We were running, carrying that old mother (pause). When it came suddenly, we felt that anything might happen (pause) (...), so we thought about running to somewhere.</i>  Participant 7: <i>We were running for our life. We did not have a place to go with our children.</i>  Participant 3: <i>When the waves came suddenly inside our house, we were shocked and thought, "What is this?" (Pause) We lost everything (crying) (pause). We ran away from there.</i>
	Cataclysmic sea waves and its tumultuous behaviour	Participant 2: <i>Before, that is when the seawall was not built, violent sea waves used to come towards the shore frequently and destroy our houses; the waves used to hit our house.</i>  Participant 3: (...) <i>The sea came violently even inside our house. We were afraid.</i>  Participant 7: (...) <i>We were afraid to see the sea at that time. The sea will not be like this at that time. The water will rise and come towards the shore, taking away the sand. We are not new to this place. Our ancestors too lived here. The sea was not violent like this earlier.</i>  Participant 4: (...) <i>The leading cause of the sea becoming violent is these two companies. These companies were taking soil. As a result, the soil on top of the land started going down. The sea waves covered our house with soil (...) at night; we were able to hear loud sounds. We could not sleep at night.</i>  Participant 6: (...) <i>Suddenly, it comes inside. Our plates, glasses utensils were floating on water. It happened at night.</i>
Consequences	Damage and destruction in the bat of an eye—The epoch of losses	Participant 2: (...) <i>The waves used to hit our house. We lost the windows, our roof everything in a second.</i>  Participant 3: (...) <i>The sea came violently even inside our house. We were afraid. Our house was destroyed. Coconut trees fell.</i>  Participant 4: (...) <i>We lost everything; we felt that there is no need for living. We were waiting for death that was about to come at any time (pause). We lost everything that we earned from the sea. Can we control the sea or wind?</i>  Participant 7: (...) <i>It destroyed everything. The sea took all our belongings (silence).</i>
	Agony and suffering	Participant 1: (...) <i>When we left our house, my mom said: "I want to go to the toilet," (pause) the pain I felt that time (silence) (crying). It cannot be expressed through words. Unless we experience such a situation, we will not understand it—the pain (crying).</i>  Participant 3: (...) <i>Our mental state at that time (silence) it cannot be expressed through words.</i>  Participant 4: (...) <i>Just imagine our state of mind during that period when we lost all our belongings. We felt that there is no need for living.</i>
	Homeless, helpless, sleepless and blended with fear	Participant 3: (...) <i>We lost everything. I do not even want to recollect the experiences we had at that time. We lost everything (silence).</i>  Participant 4: (...) <i>At night we were able to hear loud sounds. We could not sleep at night. They could not sleep as I was out in the sea. When we lost our belongings and equipment, we were much worried and concerned about our future. I did not know what was going to happen. For many days we slept in our relation's house near the bank of the river.</i>  Participant 6: <i>When we had to run from our home, we had no idea about where to go (silence).</i>
Recovery	Governmental aid—Only in dreams	Participant 2: <i>After one week, when the sea withdraws, we would come back. The government also would forget about us.</i>  Participant 3: (...) <i>We did not get any help from the government; we did not get even a loan from the bank.</i>

**Table 1 (cont'd):** Subthemes and themes derived from codes, and selected participant quotes (N = 7)

Theme	Subtheme	Participants' quotes
Recovery	Haunting memories	Participant 3: <i>I do not want to recollect the experiences we had that time.</i> Participant 6: <i>I am afraid to look at the sea now.</i> Participant 1: <i>Even now, our thoughts are about the place and the church (...) It is so painful. The pain is heart breaking.</i>
	Down and out— Never-ending daily needs	Participant 1: (...) <i>We do not have money to spend every day.</i> Participant 4: (...) <i>We are short of money. We lost everything that we earned from the sea (sigh). We spend everything on our new house and medicines.</i>
	First home and native land—A desire to go back	Participant 1: (...) <i>We are not able to adjust to this place even now. Kovilhottam was good.</i> Participant 2: (...) <i>We are missing Kovilhottam a lot now. We still wish to live there. It was the Land of Holy Mary.</i> Participant 6: (...) <i>Sometimes I regret leaving that place. We did not wish to sell our land and come here. Our land was good for everything.</i> Participant 7: (...) <i>I left my house unwillingly. I wished to die living there. Even though all the others sold their property, I did not.</i>

Some participants mentioned that the mental pain they had suffered could not be explained and one could only understand their pain if they had undergone such situations in their own lives. Most of the participants described experiencing mental pain when they lost their houses or moved to a safe place. Some participants suffered from physical injuries while trying to rescue others and some participants described psychological pain when what they had earned in their lives was taken away by the sea. In both cases, agony and suffering deepened when they had full cognisance of the extent of their loss. Uncertainty prevailed and it was the start of their suffering.

#### **Homelessness, helplessness and sleeplessness blended with fear**

The participants were rendered homeless and expressed feeling perplexed and helpless. Most of the survivors initially went to a nearby convent or church and stayed the night. Most eventually left to stay in relatives' houses near the other side of the beach. Some participants expressed confusion about whether to remain in temporary living situations or go back to their own places. The roar of the sea interfered with sleep and frightened participant. Male members of the family described sitting outside temporary shelters holding vigil over the sea's condition. Most of the participants and their families had been earning a living by fishing, and they had to go back out to sea at night, all the time worrying about their family members who were in safe shelters.

Similarly, those in shelters were afraid for the men who went fishing in the rough seas. The participants were mainly concerned and worried about their future. Some participants said that they did not want to recollect their experiences concerning homelessness and feelings of helplessness.

#### **Governmental aid—Only in dreams**

Most of the participants described believing that government agencies would help them reconstruct their lost houses, and they applied for government assistance. However, the district administration evacuated the victims to safe shelters with minimal facilities and allowed them to come back to their houses only when the sea became calm. The participants eventually returned to the coast and rebuilt their houses with their own money.

#### **Haunting memories**

The events' memories were often disturbing and haunted the victims after years, even when they were out of danger. One participant mentioned that recollecting the experiences was painful and that they intentionally suppressed the images of the catastrophe. The events were so traumatic and painful that one of the participants mentioned in his statement that presently he is afraid to even look at the sea.

#### **Down and out—Never-ending daily needs**

Most of the participants had been earning money from fishing, and they did not have any savings for the future. With the ocean encroachment and resulting erosion, they lost their houses, fishing equipment, boats and personal belongings and were forced to spend money to build a new house. They had to borrow money from others to meet their daily needs.

#### **First home and native land—A desire to go back**

Most of the participants said that they wanted to go back to their previous homes and they were not accustomed to their current place of living. One participant mentioned that she wanted to die on the land where she was born. The participants were affectionate towards their homeland and some regretted leaving their homes.

The phenomenon that emerged from the analysis of the themes was ‘Catastrophic coastal erosion: A cycle of impact, consequences, and recovery’.

## Discussion

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This study explored the experiences of victims of catastrophic coastal erosion during the monsoon season on the southern coast of Kerala. The study provides details of the impact of coastal erosion and sea-level rise and the consequences of and recovery from sea encroachment on a vulnerable population. The findings reveal that the people residing along Kerala’s coast live under constant fear. A previous study reported ongoing fear of sea rise through the theme “experience of physical impact.”<sup>25</sup> The participants in that study said they were afraid and worried every time they saw ocean levels rise. A quantitative component of the research also found that 91% of the participants were worried about rising sea levels.<sup>25</sup> Vulnerability mapping and risk assessment of disaster-prone areas in the affected districts as well as awareness campaigns to sensitise vulnerable populations to what should and should not be done during disasters can reduce fear.<sup>26</sup> Such a training should focus on search and rescue, emergency first aid, temporary shelter, food safety, water and environmental sanitation, removal of dead bodies and carcasses, epidemic control, preparation of household kits and restoration of communication channels, roads and transport.

The erosion that occurs in coastal regions usually progresses to catastrophic levels. The impact of sea encroachment is beyond human imagination, and it only leaves devastation in its wake, causing immense loss of life and livelihood. The most devastating losses associated with sea rise are within communities that live along the coast among people who fish for a living; participants in this study described the challenging nature of ocean waves and the magnitude of the damage caused by them.<sup>27</sup> These findings are similar to a study conducted by Roxberg *et al.*, who found that the tsunami waves on Boxing Day in the Indian Ocean were powerful and destroyed the coastal population.<sup>28</sup> In 2018, Nair *et al.* found that almost 60% of Kerala’s coastline was eroding, warranting immediate protective measures.<sup>29</sup> In order to minimise the consequences of future disasters, steps need to be taken to reduce the vulnerability of the coastal population by strengthening structures’ disaster-resilient features, constructing permanent multipurpose shelters, conducting exercises related to lessons learned and revising standard operation protocols based on past experiences.<sup>27</sup> A study conducted by Abushandi and Abualkishik in Oman stressed the importance of detecting shoreline changes using

new technologies and projecting possible future changes in the coastline based on the acquired data.<sup>30</sup> Such an approach is critical to managing disasters associated with coastal erosion effectively.

Coastal populations are vulnerable to natural disasters, and the resulting suffering is an added consequence of these catastrophes. The current study’s findings are similar to those of Hatthakit and Thaniwathananon who described tsunami victims’ suffering in terms of physical pain, anxiety, depression and post-traumatic stress disorder.<sup>31</sup> One of the themes identified in the present research, (haunting memories) describes victims’ re-traumatising experience when reflecting on past incidents. Hatthakit and Thaniwathananon also found that traumatic experiences often come back in thoughts, memories and dreams.<sup>31</sup> Traumatic reminders include photographs and the occurrence of similar catastrophes and both were found to trigger unpleasant memories. The current study also highlighted the theme ‘damage and destruction in the bat of an eye—The epoch of losses’. This theme reflects the extent of damage and destruction made by catastrophic waves and is similar to the theme “back to zero,” which was derived by Hatthakit and Thaniwathananon.<sup>31</sup> In their study, the researchers found that Buddhist tsunami survivors whose houses and businesses were destroyed harboured feelings of having nothing or even less than nothing.<sup>31</sup> Baum and Fleming reported in their study that most people recovered fully from moderate stress reactions within 6–16 months.<sup>32</sup> The present study’s findings, however, suggests that haunting memories and re-traumatising experiences persist, even after several years. The current participants carried the burden of the experience with them and were sad whenever they talked about or remembered the traumatising events. In reflection of the importance of mental health support for helping victims recover from trauma, Raphael and Wooding discussed the need for readily available mental health services.<sup>33</sup> According to the Centre for Mental Health of the New South Wales Institute of Psychiatry, speedy recovery in individuals affected by natural disasters relies on psychological first aid, triage, debriefing, identification of risk factors and strengths, screening for psychopathology, interventions for stress syndromes and long-term follow-up.<sup>34</sup> The health professionals caring for disaster-affected individuals require an in-depth understanding of victims’ lived experiences. A systematic review conducted by Labrague *et al.* reported that nurses generally lack awareness of disaster management and are ill-prepared for disaster response.<sup>35</sup> Many health professionals still lack the necessary knowledge and skills to deal with disasters, pointing to an urgent need for disaster

preparedness content in the undergraduate curriculum and specialised training for healthcare professionals.<sup>36</sup> When disasters strike, many factors determine how successfully the individuals and their communities recover. Physical, socio-psychological and political factors affect the impact of the catastrophe and influence people's recovery.

## Conclusion

The study results indicate that the trauma of catastrophic coastal erosion follows a cycle of reactions to the event's immediate impact, followed by dealing with the event's consequences and recovery. If the disaster's initial impact is controlled, the consequences can be minimised, leading to faster recovery. Understanding the nature and dynamics of catastrophic coastal erosion along with mental preparedness of the vulnerable population is crucial to reducing the risk associated with the impact. Training and capacity building of all stakeholders involved in disaster management are essential for limiting natural disasters. Appropriate training needs should be provided to local self-help groups, NGOs and community representatives to reduce the severity of natural disasters' impacts. Specialised disaster management training for healthcare professionals needs to be included in their regular work. Integrating disaster management in primary healthcare settings and inculcating disaster management competencies and skills will help healthcare professionals deal with vulnerable populations. Such a move is crucial in minimising long-term consequences of natural disasters. Early recognition of psychological trauma and providing immediate counselling services will prevent unnecessary suffering in victims of catastrophic coastal erosion. The findings also suggest the need for ongoing, early crisis management and mental health support in catastrophe-affected areas. The practical implementation of disaster management practices requires frequent dialogue between decision-makers and vulnerable populations.

## CONFLICT OF INTEREST

Authors declared no conflict of interest.

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