



# Leaving No One Behind

Lessons from the Kerala Disasters

**Mathrubhumi**

Cover: Aerial view of the floods that occurred in Kerala in 2018

Image: T.K. Pradeep Kumar, Mathrubhumi

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## Leaving No One Behind: Lessons from the Kerala Disasters

English I Collection of Articles

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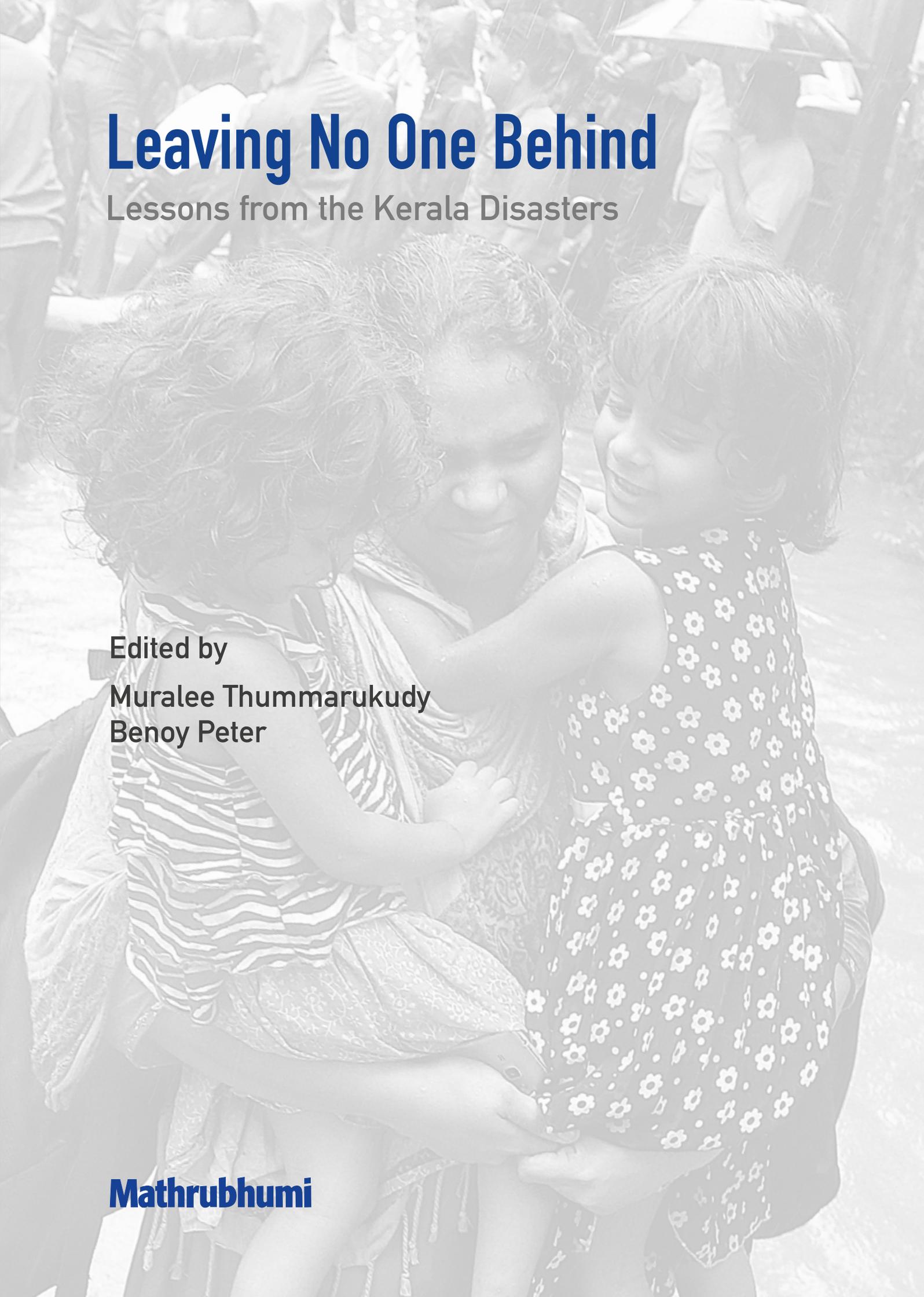
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# Leaving No One Behind

Lessons from the Kerala Disasters

Edited by

Muralee Thummarukudy

Benoy Peter

**Mathrubhumi**



## Message



The disasters of 2018 and 2019 that devastated Kerala busted the myth that the state is immune to catastrophic natural disasters. The havoc wrought on lives and the environment exposed the vulnerabilities of the sliver of land wedged between an eroding Western Ghats and a ravenous Arabian Sea, and subject to two monsoon precipitations. The calamities also brought into sharp focus the callous disregard of human beings towards nature and the lack of preparedness that transmogrified mere hazards into disasters. Millions were displaced, thousands lost their homes, and nearly five hundred people lost their lives, apart from loss of livestock and animals.

It is in times of such humongous disasters that the character and mettle of a responsible media is tested. It gives me immense pleasure to place on record that the media in Kerala lived up to its role. Apart from sensitive coverage, the house of Mathrubhumi, with the help of our constituents, has always co-ordinated and executed disaster response. We also envision initiatives to rehabilitate the affected populations. It is painful to report that we have even lost our staff, who went beyond the call of duty and whose memories we cherish.

Disasters impact people uniquely and even globally there is a dearth of quality literature on the impact of natural disasters on marginalised populations. Lessons learnt from the calamities are pivotal in evolving a more inclusive response and nurturing a resilient society. Being a leader in most of the human development indices among Indian states, lessons from Kerala have policy implications even at the global level.

Realising this societal dimension, Mathrubhumi approached Dr. Muralee Thummarukudy, chief of Disaster Risk Reduction and operations manager at UN Environment, to document the experience and glean lessons from the disasters. We are grateful to him for the expert guidance given to us in undertaking a study on the impact of such disasters on the marginalised, like the indigenous populations, the elderly, persons with disabilities, migrant workers, women and children. As I am given to understand, it is probably for the first time that the impact of natural disasters on vulnerable populations is explored in detail, even globally.

It indeed was a humbling moment to present the preliminary insights from the study and the role played by Kerala media during the disasters at the World Reconstruction Conference held in Geneva from May 13-14, 2019.

I congratulate the Mathrubhumi team, who extended their unstinting support to the Centre for Migration and Inclusive Development in collating and distilling the lessons from the Kerala disasters for the benefit of the international development community. I also thank all the experts for their valuable inputs. At a time when the world is getting increasingly apprehensive about climate crisis, I hope that the report triggers serious deliberations, especially on fostering a culture of inclusion and resilience.

A handwritten signature in black ink, appearing to read 'M. V. Shreyams Kumar'. The signature is fluid and cursive, with a prominent initial 'M'.

**M. V. Shreyams Kumar**  
Joint Managing Director  
Mathrubhumi



## Foreword



I am very happy that the report *Leaving No One Behind: Lessons from the Kerala Disasters* is being brought out by Mathrubhumi with support from the Centre for Migration and Inclusive Development. The state of Kerala has always considered itself a safe place, treating major disasters as those happening to other people. Ever since its formation in 1956, Kerala did not have to face major natural disasters. However, this myth was shattered in 2004 by a tsunami, but even then, people assumed it as a once-in-a-millennium freak incident. But starting from the cyclone Ockhi in 2017, Kerala has been relentlessly hit by natural disasters and it is time the state took note of how to manage them and get back to a resilient trajectory.

The biggest disaster in Kerala's recent history is no doubt the floods and landslides of 2018. The floods of August 2018 were so overwhelming that most people now do not remember that they constituted only the final act in a sequence of disasters that hit Kerala from June 2018 onwards. Unseasonal heavy rains had started in April 2018 and early floods were recorded in Kuttanad in June. By July, landslides in hundreds occurred in the high ranges and death toll started to mount. The floods and landslides in August 2018 affected large parts of Kerala, at one time directly affecting 5.4 million people, literally one in every six of the state's population. It was the most catastrophic disaster the Kerala state and the current generations have ever witnessed.

The response to the disasters from the Kerala society was also remarkable. Everyone from the chief minister down to the local administration rose up to the challenge. The whole population came together forgetting all the divisions of caste and class. The Malayalis abroad extended both financial and intellectual support, assisting in the rescue and relief operations. It also demonstrated the power of social networks and social media. The rescue and recovery efforts in Kerala were noticed globally and were featured as a special case in the World Reconstruction Conference that took place in Geneva in May 2019.

Yet, like every disaster, there are lessons to be learnt and for that, one needs honest assessments. The group of experts brought together by Mathrubhumi attempted a thorough analysis of the disasters, starting from examining the root causes to how they impacted the different segments of the society. How vulnerable were children, women, migrants, persons with disabilities, indigenous people and older persons? Did disaster preparedness, rescue and relief efforts reach them? Were they differentially impacted? What are the lessons to be learnt so that we leave no one behind? It is the first time in India that such a detailed study is undertaken. To the degree that I know, it is also the first time in the world that a report fully focusing on inclusion comes out after a major disaster. The level of granularity in the report as well as the visual details that augment the data makes it an eminently readable report.

As the report was about to be finalized, Kerala was again hit by another wave of floods and landslides. The issues highlighted in the report once again played out during the recovery, yet clearly there were also signs that we had learned from the past. Mathrubhumi, CMID and all the experts who have worked hard to prepare this report deserve special appreciation. The efforts of those who put the report together also deserve special mention and appreciation. I am happy to present this report to the international development community. I hope this report becomes a global benchmark for work on inclusion in the post-disaster settings. I also hope that the Government of Kerala examines the recommendations and incorporates the key elements into its own recovery plans.

A handwritten signature in black ink, appearing to read 'Muralee'.

**Muralee Thummarukudy**

Chief, Disaster Risk Reduction and Operations Manager  
UN Environment



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മുക്തം

## Preface



While setting up the Department of Disaster Management in Kerala way back during 2005-2006, and incubating the Hazard Vulnerability and Risk Assessment Cell and the State Disaster Management Authority, as the additional chief secretary, Department of Revenue and Disaster Management, Government of Kerala, I had earnestly hoped that the role of the Department of Disaster Management would be focused on the prevention of hazards turning into disasters and effective preparation rather than providing relief and succour to the distressed. However, my hopes started fading as I witnessed the way the Western Ghats became a pasture for earthmovers and the coastline the playhouse of the real estate lobby with the support of vested interests from various quarters. In 2007, efforts to clear the encroachments in the Munnar hills proved how daunting the task was and even as this report is released in 2019, the government's efforts to recover and protect such land have not yet made much headway.

The Department of Disaster Management has evolved over a period of 14 years. So have the natural disasters in the state. While the tsunami and cyclone Ockhi posed a threat to the Kerala coast, almost one in every six Keralites was affected by the floods and landslides of 2018. Nearly 5,000 landslides or landslips occurred and three-fourths of the villages in Kerala were flooded. The return of the landslides within a year in 2019 in a much more vigorous form is alarming. The gravity and scale of the landslides in Puthumala in Wayanad and Kavalappara in Malappuram district in August 2019 send clear signals calling for immediate actions to respond to the eco-sensitive nature of the Western Ghats region. The unprecedented ferocity of the floods last year is a distress call to action now.

As a member of the Expert Committee constituted to oversee the restoration of Dal Lake in Srinagar, India, I am conscious of the devastation humans can cause to the ecosystem. Be it the hills of Munnar or the lakes in Kashmir, issues pertaining to climate change, global warming and rising sea level can now be witnessed closer home. While all of us are exposed to the impact of such transformations, the impact on the poor and the vulnerable is manifold. It is in this context that this report assumes the seminal role of reinforcing the sustainable development agenda of not leaving anyone behind. Perhaps it is the first time even globally, the impact of natural disasters on vulnerable populations is examined in depth. As a student of sociology and a reviewer of this report, I have no doubt the wealth of data gathered and collated, and the knowledge unravelled by the team of experts are indeed formidable. The report fills an epistemic gap so essential for a rational and scientific analysis of reliable and accurate data that transports disaster management from the annals of the emotive and the speculative to an exactitude rarely witnessed before.

I congratulate the Mathrubhumi Group for commissioning such a unique study and thank Dr. Muralee Thummarukudy for providing guidance to my team at the Centre for Migration and Inclusive Development in preparing a report of international relevance on the Kerala disasters. This report brings out certain fundamental issues that not only Kerala, but the entire country needs to address as an inclusive society. The rising inequality in society will impact all sections leading to distress and trauma that would undermine overall governance and the quality of life.

The report clearly shows that the inherent vulnerabilities of the marginalised populations in Kerala were aggravated by the disasters pushing them further to the edge. Unless we acknowledge this and reach out to these vulnerable populations, we will be leaving them behind. The lessons learned from this assessment are not only pertinent in the Kerala context, but have strategic policy relevance in evolving inclusive disaster risk reduction strategies and solutions globally, ensuring that no one from the vulnerable populations is left behind in the context of natural disasters.



**Nivedita P. Haran, I.A.S. (Retired)**

Chairperson

Centre for Migration and Inclusive Development



## Acknowledgement

The Centre for Migration and Inclusive Development thanks the Mathrubhumi Group, especially M.V. Shreyams Kumar, joint managing director, for providing CMID an opportunity to take up such an important initiative. CMID also acknowledges the contributions of G. Anand, general manager, Human Resources, who made available every possible resource from the Group to bring out the best outcomes through the study. Our sincere thanks to Muralee Thummarukudy, chief, Disaster Risk Reduction and operations manager, UN Environment for his erudite guidance and inputs from the conceptualisation to the dissemination of this report.

We acknowledge the guidance provided by Nivedita P. Haran, chairperson, CMID, Ligy Philip, Department of Civil Engineering, Indian Institute of Technology, Chennai and Binoy Mattamana, Department of Civil Engineering, Mar Athanasius College of Engineering, Kerala, as reviewers of the report and Baishali Goswami, Balakrishnan Koyyal, Celine Sunny, T.I. Eldho, George Chackacherry, C. J. John, Josy John, Kavya Michael, G. Madhu, Pratheesh C. Mammen, K. Rajesh, Sabith Umer, Sandhya J., Seema P. Uthaman, Sreedevi S., S. Sreekumar and Vidya S. Chandran as contributors to the report.

We also thank Sekhar Lukose Kuriakose, member secretary, Kerala State Disaster Management Authority; Keshav Mohan, former director, Institute for Climate Change Studies, Kottayam; Santhosh P.V., head master, Government U.P. School Bavali, Mananthavady; Suma T.R., M.S. Swaminathan Research Foundation, Wayanad; Siby Munnar, Idukki; Sivankutty Ailarathil, president, Pandanad gram panchayat; Gopinath Parayil, Kochi; Ramachandran Menon (Ram), Impresario; Arathy Sebastian, Pandanad; Sasikala Rajasekharan, president Ranni gram panchayat; Shabitha K., chairperson, Welfare Standing Committee, Thavinjal gram panchayat; P.R. Radhakrishnan Nair, secretary, Palliyoda Seva Sangham, Aranmula; Krishnabalan Paliath, manager, Paliyam Trust; Suresh Kumar, volunteer coordinator, Compassionate Kozhikode; Prasanth N., Compassionate Keralam; Rajeev Pullyoor, principal-in-charge, B.Ed. College Nedumkandam; Anil Kumar N., Pazhassi Raja Smaraka Granthalayam, Mananthavady; members of the Kerala Sasthra Sahithya Parishad in Wayanad, Malappuram and Idukki districts, and all others who provided us with valuable insights and connected us to various resources across the districts in the state.

We thank Bijoy Jacob for his fathomless patience and brilliant support in the design and art direction of the report and Vidya S. Chandran, Department of English, Government College Mananthavady for her pro bono support in copy editing the report. Thanks to Sreekanth C., Beena Sivan, Balakrishnan Koyyal, S. Sreekumar, Arish Aslam, Paliyam Trust, Mad Moustache Photography, Salam Arrakal, Binu P.K., Savanan R.S., Arjun Pournamy and Anastes M. P., for contributing images taken/owned by them for royalty free use in this report.

CMID also acknowledges the support provided by the Mathrubhumi team across various units and verticals in Kerala who coordinated with various institutions within the Group to ensure that CMID has seamless access to the resources, facilitated the fieldwork and also travelled with the CMID team to various locations in Kerala for the study. We are also thankful to the local representatives of the Mathrubhumi Daily for their warm hospitality and support in capturing the grassroots realities by ensuring the last mile connectivity. CMID also thanks all the photographers and videographers of Mathrubhumi and other news agencies whose hard work during the disasters enabled us to communicate the experience of the disasters in a visually touching way.

I thank all our key informants and each and every person directly or indirectly affected by the disasters who shared their experiences with the expert panel members and the CMID team. Sharing their experience was painful not only for the affected, but also to the team members who were continuously exposed to the miseries in the disaster-hit areas. We are grateful to Anil Kumar K.N. and Bijoy M. Poulouse and other members of the Board of Directors, CMID, who provided the back-end support and advice throughout the study. Finally, I thank my colleagues Vishnu Narendran and Akhila M., whose relentless efforts to glean information, travelling across the state with the experts, helped CMID to capture and synthesise the lessons learned and present them in a cogent manner.

Thank you,



**Benoy Peter**  
Executive Director  
Centre for Migration and Inclusive Development





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## Executive Summary

Kerala, the Indian state in the southern peninsula, sandwiched between the Lakshadweep Sea and the mountain ranges of the Western Ghats, is renowned globally for its natural beauty. Larger than Bhutan in land area and with double the population of the Netherlands, Kerala ranks first among the Indian states in the SDG indices with exceptional achievements in human development comparable to developed economies. Ecologically strategic, the state harbours three Ramsar sites, wetlands of international importance. The Western Ghats are one of the major ecological hotspots in the world, rich in its biodiversity and highly under threat. Given its proximity to the sea with a coastline of about 600 km, presence of numerous rivers, lakes, backwaters and estuaries and 14 per cent of its total area susceptible to landslides, Kerala is highly vulnerable to natural disasters.

Between June 1, 2018 and August 19, 2018, the state received heavy rainfall, more than three-fourths of the average annual rainfall, and 42 per cent above normal expected during this period. The heavy downpour soaked almost the entire state and the government was forced to release water from 35 dams while the intense rains continued. Simultaneously, more than 5,000 landslides of varying nature and intensity occurred all over the state. The result was catastrophic, affecting almost one in every six people in the state. The disasters impacted three-fourths of the Kerala villages and temporarily displaced almost 1.5 million people. Nearly five hundred people lost their lives and the total damage and losses were estimated to be worth USD 3.8 billion. While Kerala was recovering from the shock of the devastating disasters of 2018, another spell of incessant rains resulted in heavy floods and landslides in August 2019. More than 60 per cent of the villages in Kerala were impacted. Northern Kerala districts, particularly Wayanad, Malappuram and Kozhikode were severely affected.

The Mathrubhumi Group commissioned a study to the Centre for Migration and Inclusive Development to understand the impact of the natural disasters on various vulnerable groups within the society. A pioneering attempt even internationally, the study, through qualitative research, explored the status of inclusion of the indigenous populations, older persons, persons with disabilities, women, boys and girls as well as migrant labourers from other states, from disaster preparedness to recovery. A panel of experts under the guidance of Dr. Muralee Thummarukudy, chief, Disaster Risk Reduction and operations manager, UN Environment, visited disaster-affected areas across 12 districts and conducted over 400 Key Informant Interviews, including interviews with members from the vulnerable populations. The data collection took place between January 19, 2019 and March 20, 2019. The study unravels the ecological vulnerabilities of the state and provides insights into the way human interventions have accentuated these vulnerabilities. The discussions and findings underline that the state needs to be better equipped for a changing climate. The need for integrated water resources management, better land use planning and risk-informed building codes is also highlighted.

The lessons learned from the disasters and the response reveal that irrespective of the group, all the vulnerable populations substantially lag behind and do not enjoy the human development that the state celebrates. In addition to that, these populations were severely impacted by the floods and landslides and their historical marginalisation has been further augmented and complicated. It was found that within each vulnerable group there were subpopulations with differential and layered vulnerabilities. The findings reveal that ad hoc measures to address the impact of the disasters on the vulnerable populations serve only as a partial solution, and do not address their historical vulnerabilities. What is really needed is farsighted and focused policy interventions to address the root causes of the vulnerabilities to ensure that the human development that the state claims percolates to the vulnerable populations also. Instead of claiming an edge over the less advantaged geopolitical contexts within the country, it is time Kerala examined how the state has failed the vulnerable populations within it. Taking cognizance of their inherent and newer vulnerabilities, substantial investments are needed to nurture inclusive and resilient communities where no one is left behind.





# Kerala and Natural Disasters

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# Kerala and Natural Disasters

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## Introduction

Kerala, the Indian state in the southern peninsula, sandwiched between the Lakshadweep Sea and the mountain ranges of the Western Ghats, is renowned globally for its advancement in human development comparable to the developed economies. Branded globally as 'God's Own Country', Kerala is listed as a 'paradise', among the '50 places of a lifetime', by the National Geographic Traveller. The state, renowned as the spice garden of India and the land of Ayurveda, is also known for its historic trade links with the rest of the world, and most recently, for the floods and landslides of 2018 and 2019, that devastated it.

Keralam, known as Kerala outside the state, was constituted as a state in 1956 as part of the linguistic reorganisation of Indian states, merging the two erstwhile princely states of Travancore and Kochi with the Malabar district of the Madras Presidency, the three Malayalam speaking regions in mainland India. Spread on a stretch of about 600 km with a varying breadth of mere 30-130 km, the state is a narrow strip of 38,863 square kilometres of land, just about one per cent of the country's total land area.<sup>1</sup> Geographically, the state is constituted of three terrains, the densely populated coastal lowlands where there are even areas metres below sea level, the undulating mountainous highlands and the midlands that separate the two.

The state has a coastline of about 590 km and a forest cover of 29 per cent of the total land area.<sup>2</sup> There are 44 rivers and 80 dams in the state.<sup>3</sup> The climate is

tropical and the state experiences three major seasons; March to May is summer, followed by the south-west monsoon that commences in June and goes up to September, and the north-east monsoon from October to December.<sup>4</sup> There are 14 major administrative divisions called districts, and the state is divided into 1,200 Local Self-Governments (LSGs), including 93 urban local bodies and 1,107 panchayats, where democratically elected people's representatives, 50 per cent of them women, steer local governance and development.<sup>5</sup>

## The Kerala Model

The Kerala model of development has received worldwide attention, with the state's substantial strides in human development comparable to many developed nations, without accompanying economic development. The state ranks first among the Indian states in the sustainable development (SDG) indices with exceptional achievements in enhancing the health outcomes, reducing hunger, promoting gender equality and providing universal and quality education.<sup>6</sup>

The estimated population of the state in 2016 is 34.6 million.<sup>7</sup> On the verge of a population decline, Kerala has the largest proportion of older persons among the Indian states in 2011 and by 2041, almost one in every four persons in the state will be 60 years and above.<sup>8</sup> The population growth rates in Pathanamthitta and Idukki districts of the state have already turned negative.<sup>9</sup> The state has a female to

Figure.1: Administrative Map of India by States



Map not to scale

Figure.2: Administrative Map of Kerala by Districts



Map not to scale





## Larger than Bhutan in land area and with double the population of the Netherlands, Kerala tops among the Indian states in human development

male ratio of 1,084 and a population density of 860 per square kilometre.<sup>10</sup> Kerala has the highest life expectancy at birth compared to the rest of the states in India. Designated as the first baby-friendly state in the world by the UNICEF and WHO, a child born in Kerala is likely to live 11 years more compared to Uttar Pradesh, the most populous Indian state.<sup>11,12</sup>

Although only nearly half of the state's population lives in urban areas, most of the rural areas of the state do not fall in the typical rural category of the rest of India and offer seamless access to education, healthcare and other services. The road connectivity and coverage of telecommunication also are exceptionally good in rural Kerala. Nine out of every ten men and women in the state are literate. Hinduism is the major religion followed by the people while the proportion of Muslims and Christians is much higher in Kerala compared to most of the Indian states. The state is

home to 36 indigenous populations, including five particularly vulnerable tribal groups. Much ahead of the other Indian states in its efforts to promote gender equality and empowerment of women and girls, Kerala is also renowned for Kudumbashree, its programme for poverty eradication and women empowerment.

### Economy

The Gross State Domestic Product (GSDP) of Kerala was USD 98.1 billion at current prices in 2017-18 (Quick Estimates) with a per capita GSDP of USD 2,844.3 for the period. Over 80 per cent of the workforce is engaged in non-agricultural activities, predominantly in the service sector.<sup>13</sup> Although there is limited industrial growth, information technology, tourism, mining, ship building, petrochemicals, wood processing, etc. are some of the industries in addition to the traditional sectors such as coir, cashew and

handlooms. Jewellery, marine products, spices, cashew and petroleum products are some of the commodities that bring major revenue from export.<sup>14</sup> Among the major Indian states, the unemployment rate among the educated is highest in Kerala.<sup>15</sup> At the same time, the wage rates in the unorganised sector in Kerala are the highest in the Indian subcontinent.

With its diaspora spread all over the world, migration plays a major role in the state's economy, impacting every household in the state directly or indirectly.<sup>16</sup> The remittances of Malayalis amount to almost one-third of the state's GDP and on its tiny strip of land, the state has four international airports, highest among the Indian states.<sup>17</sup> While the size of the Kerala diaspora is nearly three million, the state has also evolved as a major destination of migrant workers from some of the most deprived regions of the country. The estimated number of such migrants in the state

is over three million, who have become an indispensable part of the state's economy.<sup>18</sup>

The land of Theyyam, Padayani, Kathakali, Kalarippayattu, Chavittu Nadakam and many other art forms, Kerala is also known for its cultural heritage and art. Kerala's ritual dance drama Mudi yettu, and Kutiyattam, one of India's oldest living theatrical forms, are inscribed in the UNESCO list of intangible cultural heritage of the humanity.<sup>19</sup> The Kochi-Muziris Biennale of Kerala is one of the major art exhibitions and festivals of its kind in South Asia, attracting art lovers from all over the world. The monsoons, snake boat races, the backwaters, beaches and hill stations attract tourists from all over the world to Kerala. Renowned for its social reformers such as Ayyankali and Narayana Guru who vehemently fought against the caste discrimination, Kerala

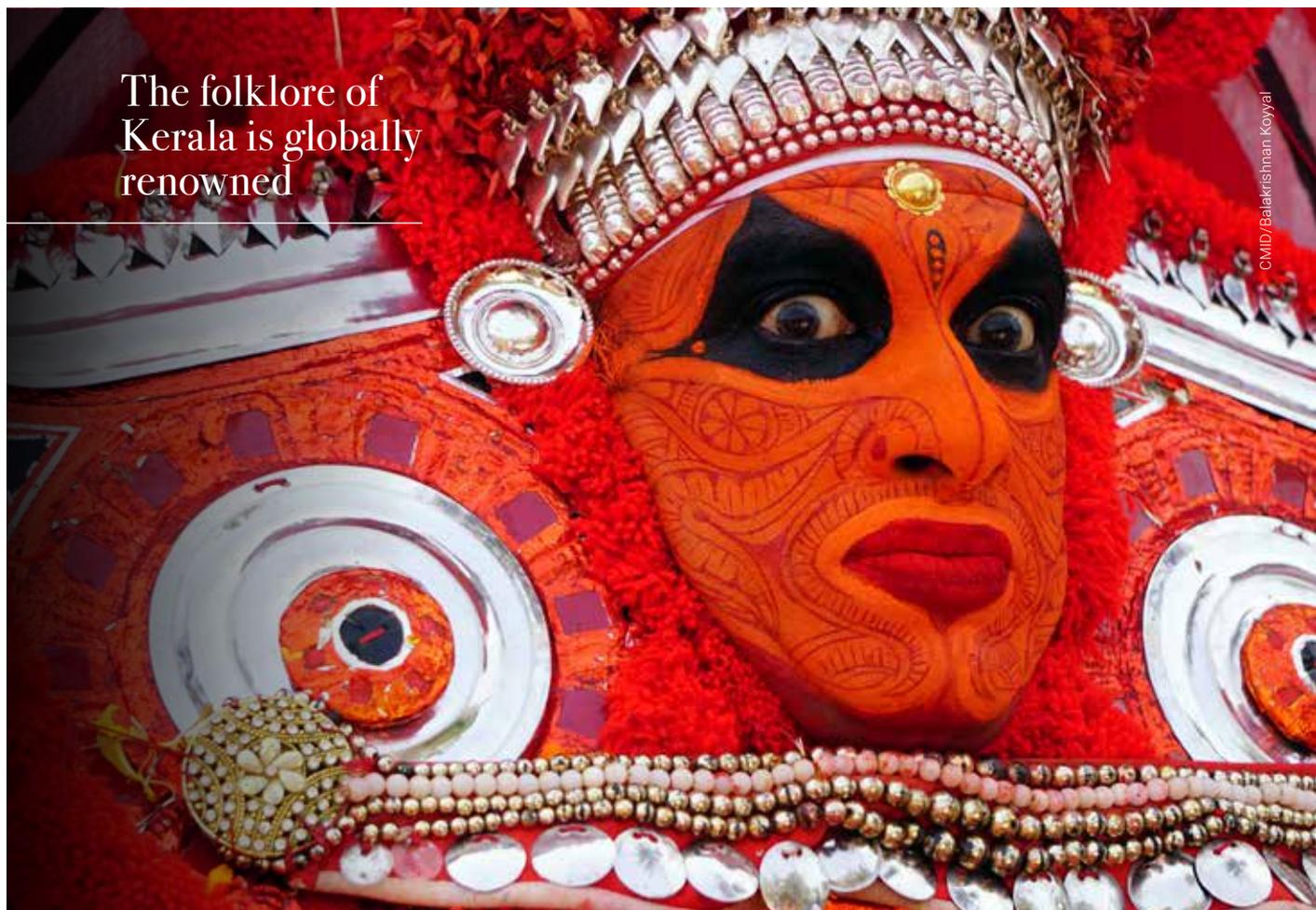
is also the birthplace of Shankaracharya, philosopher and exponent of the doctrine of Advaita.

The state is also popular for the wrong reasons too. Till recently, the state has been notorious for the frequent state-wide, day-long strikes by the political parties, popularly known as *hartals*, resulting in millions losing their day's livelihoods and public life coming to a standstill. The suicide rate of the state is one of the highest in the country.<sup>20</sup> Also, the labour force participation of women in Kerala is one of the poorest among the southern Indian states.<sup>21</sup>

Although ecologically fragile, the state's response to safeguard the environment is populist which is reflected in its response to the report and recommendations of the Western Ghats Ecology Expert Panel as well as the manner in which it modified the

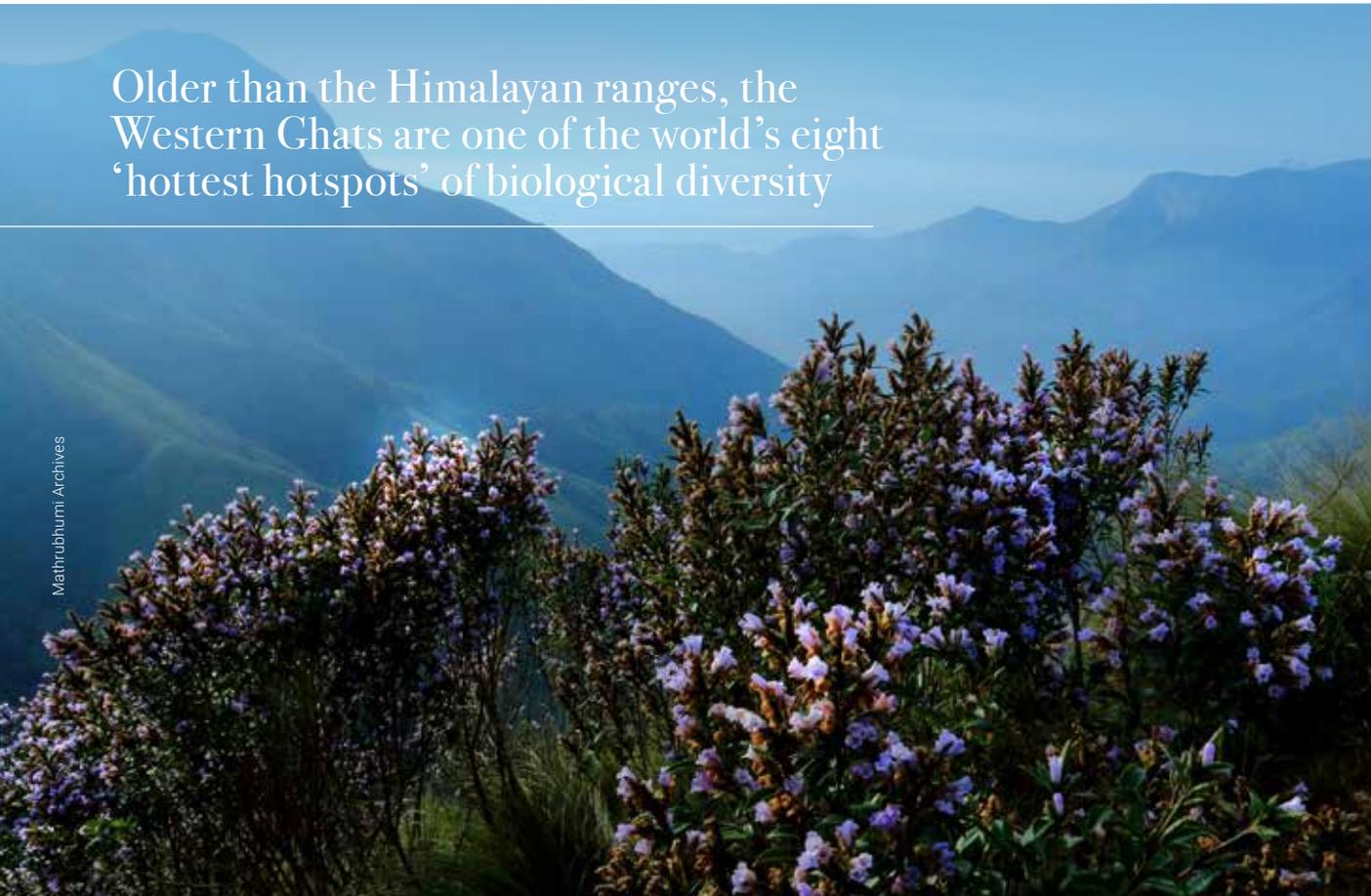
Although ecologically fragile, the state's response to safeguard the environment is populist which is reflected in its reaction to the recommendations of the Western Ghats Ecology Expert Panel as well as the manner in which it modified the regulations for the conservation of wetlands.

regulations for the conservation of wetlands. Extensive quarrying, removal of lateritic mounds and other development activities in eco-sensitive areas and poor management of waste pose threat to the ecology and environment of the state.



The folklore of Kerala is globally renowned

CMID/Balakrishnan Koyyal



## Older than the Himalayan ranges, the Western Ghats are one of the world's eight 'hottest hotspots' of biological diversity

Mathrubumi Archives

### Environmental Vulnerabilities of Kerala

Given its proximity to the sea with a coastline of nearly 600 km, presence of numerous rivers, lakes, backwaters and estuaries, and a considerable proportion of the total land area susceptible to floods and landslides, Kerala is highly vulnerable to natural disasters.<sup>22</sup> Vembanad Kol wetland that supports the third largest waterfowl population in India during the winter, Sasthamkotta lake, the largest freshwater lake in Kerala and Ashtamudi wetland are recognised as Ramsar sites, wetlands of international importance.<sup>23</sup>

The Western Ghats, the chain of mountain ranges in the highlands of Kerala, older than the Himalayan ranges, are one of the world's eight 'hottest hotspots' of biological diversity, rich in its biodiversity and highly under threat.<sup>24</sup> The Western Ghats are home to at

least 325 globally threatened species in the Red Data List of International Union for the Conservation of Nature.<sup>25</sup> The Kuttanad Wetland Agriculture System where rice cultivation is done in areas below sea level is the only such system in India, and is one of the Globally Important Agricultural Heritage Systems.<sup>26</sup> Kerala has the largest number of Ecologically Sensitive Localities (ESL) proposed by the Western Ghats Ecology Expert Panel.<sup>27</sup> A large number of dams in the state are also in these localities.

The state has one of the most densely populated coastal zones in the country, and more than half of it is susceptible to sea erosion according to the state disaster management plan. The plan also highlights that more than 95 per cent of the land area is also classified as moderate damage risk zone, susceptible to winds up to 140km per hour.<sup>28</sup> *Edavappathy* and *Thulavarsham*, the two monsoon seasons that soak the state

with heavy rains for months pave the way for floods and landslides. Nearly one-fifth of the total land area of Kerala is susceptible to floods.<sup>29</sup> In districts such as Alappuzha, more than half of the land area is vulnerable and floods occur almost every year.

Along the steep slopes of the Western Ghats, landslides are frequent, more so with the deforestation, mining as well as unregulated land development. About 14 per cent of the state's land area is susceptible to landslides.<sup>30</sup> Kerala falls in the seismic zone III and although minor tremors have occurred, the state has not experienced significant earthquakes.<sup>31</sup> Kerala also experiences drought and human interventions have accentuated it. The state is also vulnerable to cyclones as well as tsunami. Further, nearly 70 people die every year in Kerala due to lightning.

## History of Natural Disasters

Natural disasters, particularly the floods and landslides have played a key role in the evolution of contemporary Kerala. It was a flood in the river Periyar in 1341 that sunk the port Muziris into history. Muziris, the then vibrant port on the Spice Route where cargo vessels from West Asia, the Mediterranean and East Africa used to dock, was silted up and disappeared as a result.<sup>32</sup> The same flood is said to have shaped the emergence of Kochi as a major natural harbour in the south-western coast of India.<sup>33</sup>

Another deluge that occurred in 1924, popularly known as the great flood of 99 (1099 Malayalam Era) divides the memory of the nonagenarians of Kerala into before and after the floods of 99. The flood of 99 devastated Travancore, Kochi and Malabar regions. Munnar town was devastated and the Kundala Valley Railway, one of India's first monorail services, was completely destroyed.<sup>34</sup> Mountain Karinthiri was washed away and the road that connected Kochi with Munnar was destroyed forever. The vivid narratives of the flood of 99 are abundant in Malayalam literature. Another flood that occurred in 1961 also resulted in heavy damage.

The state is also exposed to droughts. Between 1871 and 2000, 43 severe or disastrous droughts have occurred in the state.<sup>35</sup> The tsunami that took shape in the Indian Ocean in 2004 ravaged Kerala also, killing over 170 people and completely destroying more than 6,000 houses in the coastal Kerala.<sup>36</sup> The cyclone Ockhi that occurred in 2017 also resulted in the death of nearly 60 people.<sup>37</sup> The floods and landslides in 2018 threw life out of gear and shattered almost the entire state. The landslides of 2019 in the Malabar region were more catastrophic compared to the 2018 landslides in the region.





Reuters/Sivaram V

## Major Natural Disasters in Kerala

**1341**

The Periyar flood destroys Muziris

**1961**

Floods and destruction by a 56 per cent-above-normal rainfall

**2004**

Indian Ocean tsunami ravages coastal districts

**2017**

Cyclone Ockhi takes a toll on the lives of fishers

**2019**

Floods and landslides shatter northern Kerala.

**1924**

The great flood of 99 devastates Travancore, Kochi and Malabar

**2001**

Landslides in Amboori claim 38 lives

**2013**

Floods and landslides spread havoc in Idukki district

**2018**

Floods and Landslides paralyse almost the entire state

## About the Report

This report, commissioned by Mathrubhumi and undertaken by the Centre for Migration and Inclusive Development (CMID), under the guidance of Dr. Muralee Thummarukudy, chief, Disaster Risk Reduction and operations manager, UN Environment, is a collection of invited articles by subject experts on the lessons learned from the Kerala disasters, with special emphasis on the 2018 floods and landslides.

The report summarises the vulnerabilities of the state of Kerala to natural disasters and provides a detailed narrative of the 2018 disasters, its impact and the overall response of various stakeholders. The report also summarises the initiatives towards recovery and reconstruction under the leadership of the Government of Kerala and draws a road map towards a resilient emerging Kerala (*Nava Keralam*). The root causes of the floods and landslides of 2018 also are analysed in depth by technical experts. It also gives an overview of the disasters that occurred in August 2019.

The unique contribution of this report is an attempt to explore the impact of the 2018 disasters on select vulnerable populations through qualitative research. It focusses on the impact of a natural disaster on various vulnerable groups within the society and addresses the question of their inclusion and exclusion from the perspectives of disaster preparedness to recovery. Challenges faced by the indigenous populations (tribes), the older persons, persons with disabilities, migrant labourers, women as well as boys and girls, are separately examined by experts.

This is the first time in India that such an effort has been undertaken and perhaps, the first time in the world too where the impact on the vulnerable populations is assessed separately and in detail. The team conducted over 400 Key Informant Interviews across 12 districts, including interviews with members from the vulnerable populations. The data collection for this segment of the report took place between January 19, 2019 and March 20, 2019.

Two expert consultations were organised as part of the study in the months of January and April 2019 in Kochi in which the subject experts from all over India participated. The articles were edited by Dr. Muralee Thummarukudy and Dr. Benoy Peter, executive director, CMID. Select articles were reviewed by the members of a national level expert panel who are well informed about the culture and landscape of Kerala.

The expert panel comprised Dr. Nivedita P. Haran I.A.S. (Retired), former additional chief secretary, Government of Kerala, who was instrumental in setting up the Kerala State Disaster Management Authority and who is also a sociologist; Prof. Ligy Philip, an expert in Environmental Engineering from the Department of Civil Engineering, the Indian Institute of Technology, Chennai and Prof. Binoy Alias Mattamana, an expert in Water Management from the Mar Athanasius College of Engineering, Kerala. Brief profiles of the contributors are provided in the report.







2

# The Floods and Landslides





## The Floods and Landslides of 2018

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The south-west monsoon, popularly known as Edavappathy arrives in Kerala by June and usually extends up to September. It contributes to four-fifths of the average annual rainfall of 3,000 mm in the state.<sup>1</sup> In 2018, during a span of 80 calendar days between June 1, 2018 and August 19, 2018, the state received 2,346.6 mm rainfall, more than three-fourths of the average annual rainfall and 42 per cent above normal expected during this period.<sup>2</sup>

The heavy downpour soaked almost the entire state, the rivers across the districts swelled and several dams reached their Full Reservoir Level (FRL). The government was forced to release water from the dams while intense rains continued. Nature's fury was augmented when over 30 dams simultaneously released water from the reservoirs across the state. The result was catastrophic. Simultaneously with that, more than 5,000 landslides of varying type and intensity occurred all over the state, and people in the hilly districts panicked as a lot of them had no clue which places were safe and which were not. Kerala witnessed the worst ever floods in the history of the state since the great deluge of 1924. This chapter summarises the events that led to a disaster of catastrophic proportions.

The south-west monsoon arrived Kerala on May 29, 2018, three days ahead of its normal date, and the rains got intensified as June progressed. The actual rainfall during June 2018 was 749.6 mm, 15 per cent more than normal. The hilly areas

in the state were the first to witness the disasters. The first major monsoon disaster was a landslide that occurred in Kattippara in Kozhikode district which took the lives of 14 people.

The lowlands were the next to feel the damage. The rainfall exceeded the normal levels by 18 percent in July also. By mid-July, Kuttanad region, which lies about 2.5 metres below sea level was inundated following the uncontrolled flow of water from several rivers, poor capacity of lake Vembanad to absorb the excess water and the constraints of the spillways in releasing this water to the sea. By the end of the month, Alappuzha and Kottayam districts were declared as flood affected.

The continuous and excess rainfall during June and July brought many reservoirs in the state to near FRL. During August 8-9, 2018, Malappuram, Wayanad, Idukki and Palakkad districts experienced a severe spell of rainfall and places such as Mananthavady, Nilambur and Munnar were affected. Northern Kerala particularly experienced numerous landslides. Places such as Vythiri and Mananthavady got flooded.<sup>3</sup> Eventually, authorities were forced to release water from many dams, adding to the severity of floods.

A twenty-four-hour functioning control room was set up in the state capital for monitoring the disaster situation from August 9, 2018. The National Disaster Response Force (NDRF) and other armed forces were deployed for rescue



operations. On August 10, 2018, the Idukki dam, the largest arch dam in Asia, began releasing water through all its five overflow shutters, for the first time in the past quarter century.<sup>4</sup>

With another severe spell of rains between August 14 and 19, the floods culminated into a deluge, impacting 13 of the 14 districts in Kerala, while the landslides devastated the hilly regions.<sup>5</sup> The state received 164 per cent above normal rains during August 1-19, 2018. While Kasaragod, Kannur and Thrissur received normal rainfall, all the other districts received excess rains ranging from 14 per cent to 92 per cent. In Idukki, Kollam, Malappuram and Palakkad districts, the excess rainfall was more than 50 per cent above normal.

The shutters of 35 dams all over the state were opened to release the water, which was unprecedented in the history of Kerala.<sup>6</sup> The disasters affected three-fourths of all villages across 14 districts in the state. All the areas near the floodplains of major rivers like the Pamba, Periyar, Chalakudy and Kabini were affected and a total of 65,188 hectares of land was inundated in the state. Many major towns of Pathanamthitta, Alappuzha, Ernakulam, and Thrissur districts were flooded.

The rise in the water level exceeded all expectations of the people. Several districts were flooded for two weeks or more and Kuttanad was inundated for nearly two months. The marine fishers of the state were deployed inlands for

the rescue operations. Although the discourses were mostly around floods, and the disasters of 2018 are popularly known as the 'Kerala floods' in various domains, major losses in terms of lives and properties were inflicted by the landslides. The landslide at Kuranchery in Thrissur district caused the highest number of casualties in a single landslide by taking away the lives of 19 people. After ten days since August 9, red alerts were called off for all the districts for the first time on August 19, 2018 when the rains declined.

Table.1: Rainfall data by district, Kerala, for the period June 1, 2018 to August 22, 2018

District	Rainfall (mm)		Percentage Excess
	Expected	Actual	
Thiruvananthapuram	672.1	966.7	44
Kollam	1038.9	1579.3	52
Pathanamthitta	1357.5	1968	45
Kottayam	1531.1	2307	51
Ernakulam	1680.4	2477.8	47
Idukki	1851.7	3555.5	92
Alappuzha	1380.6	1784	29
Thrissur	1824.2	2077.6	14
Palakkad	1321.7	2285.6	73
Malappuram	1761.9	2637.2	50
Kannur	2333.2	2573.3	10
Kozhikode	2250.4	2898	29
Wayanad	2281.3	2884.5	26
Kasaragod	2609.8	2287.1	-12
<b>Kerala</b>	<b>1701.4</b>	<b>2394.1</b>	<b>41</b>

Source: Central Water Commission, 2018



## Trajectory of Floods and Landslides 2018

May

June

July

August

29

The south-west monsoon arrives in Kerala, three days ahead of its normal date

14

Kattippara debris flow claims 14 lives, the first major monsoon disaster

17

Kuttanad in Alappuzha and many places in Kottayam flooded

26

Alappuzha and Kottayam districts declared flood affected

8

Intense rainfall; northern Kerala severely hit by landslides and mudslips

9

The Indian military and NDRF joins rescue; 24 dams release water

10

Idukki dam, one of the highest arch dams in Asia releases water through all five shutters



12

Kuttanad remains inundated even after a fortnight; 27 major dams release water

14

Another spell of heavy rains; 28,737 hectares of land remains inundated

15

Fisherfolk deployed for rescue; 35 dams release water; road, rail and air traffic hampered

16

Nearly 1,50,000 persons stranded rescued; central Kerala severely hit

17

Red alerts in all the districts except Kasaragod; 82,442 people rescued in a single day

19

Red alerts withdrawn; rains decline; floods recede; death toll crosses 350

21

About 1.5 million people displaced; the disaster declared a Level III calamity







## The Floods and Landslides of 2019

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While Kerala was gradually recovering from the shock of the devastating disasters of 2018, another spell of incessant rains resulted in catastrophic floods and landslides in August 2019. Except Thiruvananthapuram district at the southern tip of the state, all the 13 districts were again affected by the floods and landslides, although at a much lower scale compared to 2018. Several dams released water from their reservoirs and nearly 3,00,000 people were temporarily displaced. The state and central forces were deployed for rescue and relief.

Over 1,650 relief camps were opened across the districts. A total of 1,038 villages across these districts were declared disaster affected by the state. Northern Kerala districts, particularly Wayanad, Malappuram and Kozhikode were severely affected. Although much fewer, the landslides that occurred in August 2019 in the northern region were more fatal than the ones which had occurred in August 2018. A large number of houses were partially or completely destroyed in the floods and landslides. The total damage and losses are yet not clear.

From August 6, 2019 onwards, the northern districts were on high alert for heavy rains. Extremely heavy rains were predicted for Kozhikode, Malappuram and Idukki districts on August 8, 2019. All the districts in northern Kerala were expecting heavy rains. Two massive landslides occurred on August 8, 2019, one at Puthumala in Meppadi panchayat of Wayanad district, and another one in Kavalappara in Pothukallu panchayat of Malappuram district, both in a span of a few hours. In Puthumala, almost an entire village and several people were buried under the debris from the landslide.

In Kavalappara of Malappuram district also, a vast stretch of land turned into a burial ground, immersing dozens of houses and people in the debris. On August 9, red alerts were again declared in most of the districts. Several places in Kannur, Kozhikode, Malappuram and Palakkad districts were flooded. Heavy rains continued even on August 10, in northern Kerala. The low-lying areas of the state, such as Kuttanad also eventually got flooded, temporarily displacing people and damaging crops. By August 13, rains and floods started receding. The landslides and the floods in August 2019 took the lives of over 120 people.





## The landslides of 2019 were more fatal than the landslides of 2018

The return of the rain disasters within a short span of one year has thrown people into panic. This also complicated Government of Kerala's process of recovery from the 2018 disasters. Finding safe land for relocating the families affected by the 2019 disasters and also those who are in the vulnerable

zones, is complicated in the hilly areas. The initial lukewarm response of the Kerala society to the relief activities during the August 2019 disasters came as a shock to many, as it was contrary to the overwhelming response that the state had witnessed during the 2018 disasters. Two massive disasters in a

short interval of one year exposed the high levels of vulnerability of the state and also revived the discussions on the way the nature is being exploited in the state. It also triggered debates on the need to revisit the recommendations of the Western Ghats Ecology Expert Panel.

The return of the rain disasters within a short span of time has complicated the recovery process

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3

# Impact of the 2018 Disasters





# Impact of the 2018 Floods and Landslides

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## Introduction

The landslides and floods in Kerala during June to August 2018 directly or indirectly impacted almost everyone in the state. The state's economy, which was struggling to recover from the cumulative impact of the demonetisation that took place in November 2016 and the introduction of the new regime of Goods and Services Tax (GST) in 2017, was further crippled by the disasters. The total losses and damages are estimated to be about five per cent of the GSDP.<sup>1</sup> Kerala's economic growth rate was predicted to slip by 1.2 per cent in 2018-2019, according to conservative estimates.<sup>2</sup>

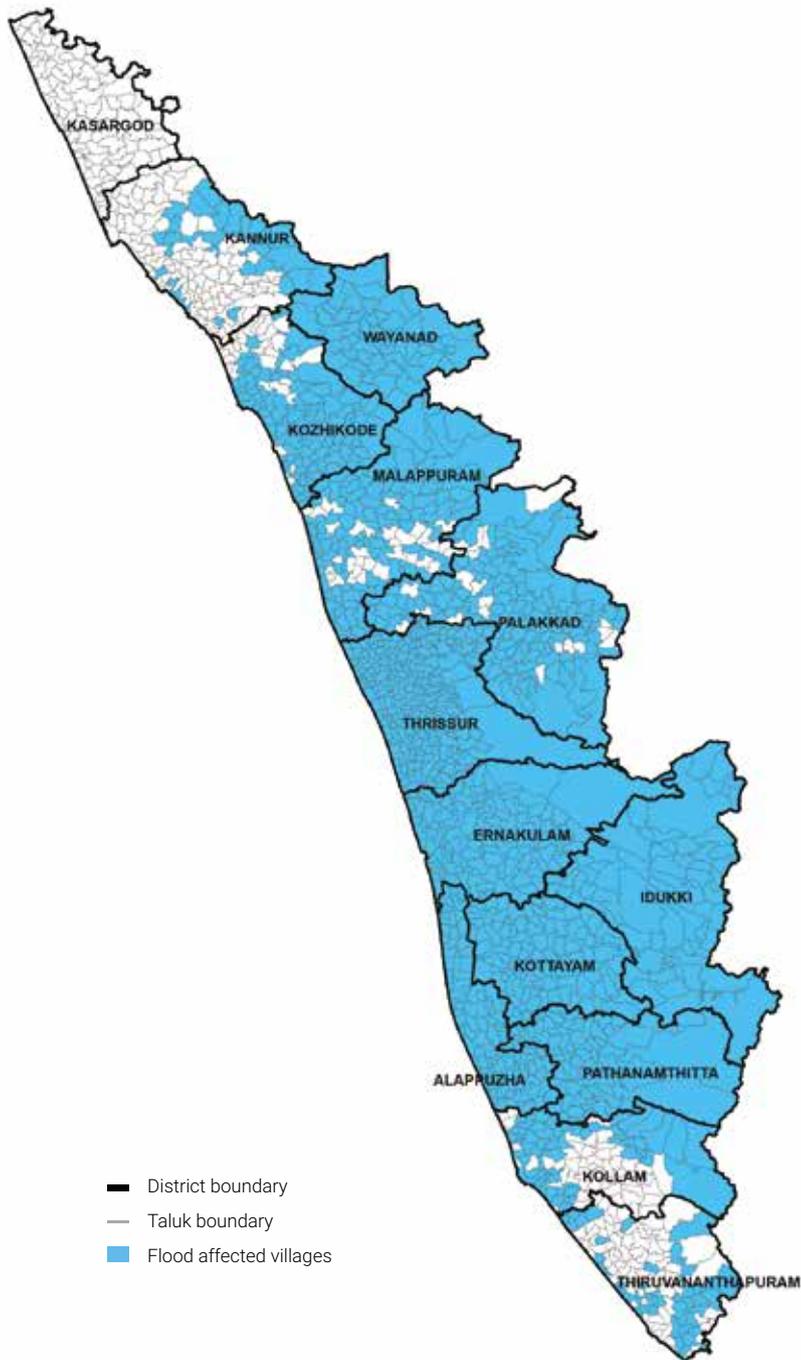
Over 5,000 landslides and landslips of varying intensity and nature shattered the state. The floods inundated over 65,000 hectares of land and impacted 1,259 out of 1,664 villages across the 14 districts in the state, displacing hundreds of thousands of people.<sup>3</sup> Wayanad, Thrissur, Ernakulam, Idukki, Kottayam, Pathanamthitta and Alappuzha districts were severely impacted. Nearly five hundred people lost their lives according to the government estimates. Besides, thousands of cattle, other domestic animals and birds perished. Over 2,00,000 houses were reported to be damaged and there was a massive

accumulation of all kinds of debris discarded by the people and strewn around by the disasters.

The road, water, rail and air transport were halted due to damage to infrastructure. Telecommunication networks, electricity and water supply were interrupted. Agricultural land and crops were destroyed. Industries incurred heavy losses and millions temporarily lost their livelihoods. Thousands were displaced from their homes forever as their settlements had become uninhabitable after the disasters. Around 51,000 hectares of agricultural land got damaged either by silt deposition or by landslides. This article summarises the impact of the landslides and floods on the state and its people. While this article gives an overview of the impact, subsequent articles in the chapter provide a detailed analysis in certain thematic areas. The effect of the disasters on the mental health of the affected population, how Kerala's heritage and culture were impacted and the probable chances of chemical contamination are examined separately. The impact of the disasters on vulnerable populations is investigated by subject experts, based on empirical evidence, in chapter four.



Figure.1: Villages affected by 2018 Floods, Kerala



Map not to scale

Source: Kerala State Disaster Management Authority



Mathrubhumi Archives

## Impact on Lives

While the official estimates reveal that 498 people lost their lives, the actual number could be much more. More than half of those who died, according to the government, were men and nearly a quarter were women. Children constituted about 15 per cent of the total deaths.<sup>4</sup> Many people lost their lives on being trapped in the debris flow. There were also cases of drowning during the floods. The disruption in transport, resulting in a delay of medical assistance also contributed to deaths which could have been averted. Existing health problems got worsened in the case of many people. In the initial state, loss /lack of access to medicines due to displacement, coupled with inability to keep up with the diet restrictions, also appear to have caused deaths. Several deaths occurred as the rescue teams did not have information about such people stranded inside the houses or could not reach out on time. People also died due to health conditions that resulted from the shock of witnessing the damage to their assets. There have also been

suicides after the disasters, particularly of farmers whose debts got multiplied and repaying abilities diminished due to the impact of the disasters. Deaths were also reported due to leptospirosis infections from the contaminated floodwater after the disasters. There were deaths due to accidents during the rescue and relief operations as well.

## Displacement

For the first time in the history of the state, over 1.5 million people were temporarily displaced and thousands were marooned in the floods and landslides. Around 5.4 million people were directly hit by the disasters, which constitute one sixth of the state's population.<sup>5</sup> Family members, including children, were separated from others for days without communication since phones got switched off. There was limited scope for recharging them due to power failure. Several boys and girls, including the youth, who were in hostels in cities had to vacate, but could not reach home due to lack of transport, damage to road/rail network or because

the native places were cut off due to overflowing rivers or flood. Family members also got separated during the rescue operations.

People were stranded on the upper floors or rooftops of buildings for several days without access to food, water and toilets. Tourists were stuck in remote locations as many resorts got cut off due to the landslides. There were also rare cases where older persons were left behind by other family members as they moved to safer places. Those who were at work at faraway places could not do anything as they were not able to reach home to help or save others. There was a shortage of food and panicked households went on stocking supplies, resulting in stockouts. There was utter confusion and trauma. Families in states such as Assam, West Bengal and Odisha lost contacts of migrant workers who had come to work in Kerala, leaving them panicked. The Malayali diaspora outside Kerala who could not contact the family members who were affected by the disasters also was traumatised.

All over the state, 12,251 relief camps were opened to accommodate the displaced population.<sup>6</sup> At several places, even camps eventually got flooded further displacing people. In low-lying areas like Kuttanad in Alappuzha district, which was flooded for several weeks, people endured longer periods of displacement. In the areas where landslides occurred and land was declared uninhabitable, hundreds of families were permanently displaced. Though most families were able to return to their homes after the water had receded, the displacement was much longer for people whose houses were permanently destroyed. Hundreds of families remain displaced after almost a year as they are unable to move into their new houses which are still under construction or because the land to build one is yet to be allotted or procured. A lot of them struggle to meet the daily expenses and in addition, pay rent for the

accommodation they have found on their own. In districts such as Wayanad and Idukki, even in September 2019, there were families living in camps or transit accommodations.

## Housing

The disasters damaged the human settlements and housing significantly. A total of 22,132 houses were damaged beyond repair and 1,04,636 houses were partially damaged according to the assessment of World Bank and Asian Development Bank.<sup>7</sup> The assessment by the United Nations estimates that 17,316 houses are to be rebuilt and a total of 2,34,233 houses were damaged.<sup>8</sup> During floods and landslides, houses collapsed or were damaged due to the high currents or being underwater for several days.<sup>9</sup> Houses were also damaged as trees fell on them. Besides, thousands of houses were impacted by the deposit of silt. At some places, the deposit was

several metres high inside the houses. There were also places where most parts of the houses were silted up.

While these statistics are based on two immediate assessments after the disasters, the damage to many houses got worsened afterwards, indicating that the actual number of houses damaged could be much more. Besides, several families whose houses were intact also had to abandon them as the place was found highly prone to landslides and declared uninhabitable. There were a significant number of people, including migrant workers, beggars and others who lived in rented buildings, shacks or were houseless. The impact on such people has not been documented in depth. Besides houses, toilets and bathrooms were also destroyed and open wells were damaged resulting in a WASH crisis. Over 3,00,000 open wells and nearly 1,00,000 toilets were



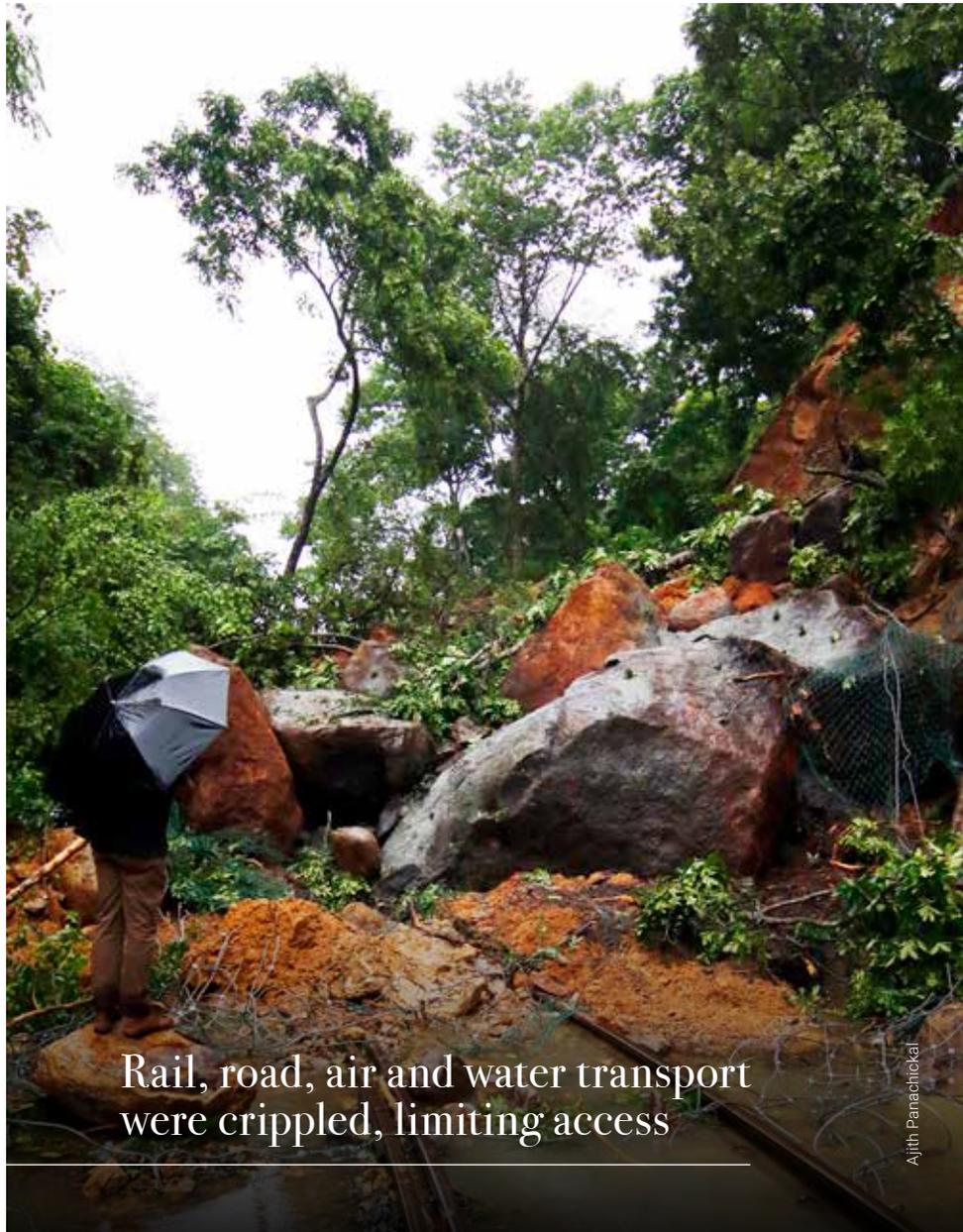
About 1.5 million people were temporarily displaced

damaged.<sup>10</sup> This complicated the access for persons with disabilities as well as older persons who had constraints in mobility. Hundreds of thousands of families also lost their household assets, including jewellery, household gadgets, equipment and furniture, clothes, certificates and other important documents. Many had to start from scratch after the disasters. Significant efforts had to be undertaken to clean the houses, wells and other property.

## Infrastructure

The infrastructure suffered highest of all damage and losses. The road network was crippled, and the hill districts were impacted more. This had also put severe constraints in the rescue operations as well as relief supplies, particularly in the case of several tribal settlements which were totally cut off. The assessment of government reveals that 2,004 km of State Highways, 13,246 km of major district roads and 580 km of National Highways were damaged.<sup>11</sup> The damage to the labyrinths of the rural road network, which play a significant and unique role in ensuring universal access, is not known which could be much more. Along with this, 36 major and 178 minor bridges, 362 culverts, 43 km length of retaining wall and 169 km of roadside drainage constructions were also damaged.<sup>12</sup>

At the peak of the disasters, the train services were disrupted all over Kerala as the tracks were either flooded or damaged by landslides. Rail traffic remained discontinued between Ernakulam Junction and Thrissur for several days due to the floods and trains from Ernakulam were rerouted through Thiruvananthapuram instead of Palakkad. Several other trains started from or terminated at Thrissur. The Cochin International Airport was flooded and was closed for more than two weeks. The power supply was disrupted in the state as the five major hydroelectric power generation stations and fourteen small hydel stations were impacted. A total of 22 power substations, 10 power transformers,



**Rail, road, air and water transport were crippled, limiting access**

Ajith Panachickal

and 10 major transmission corridors were disrupted in the disasters.<sup>13</sup> Over 1,00,00 electric poles were damaged and millions of people had no electricity for several days according to the government data.

Damage to power supply in turn disrupted the water supply as pumping of water and process of purification were interrupted. Besides, several intake points as well as water treatment facilities were also damaged. Damage to the water supply systems severely impacted the availability of drinking water. One-fifth

of the state's population experienced disruption in piped water.<sup>14</sup> Kerala which predominantly depends on well water faced an acute shortage of drinking water as wells were either damaged or filled with heavily polluted water. The disruption of road network also impacted the supply of bottled water or movement of water tankers. Over 450 public health facilities in the state were also fully or partially damaged.<sup>15</sup> Thousands of government offices, documentation, movable and immovable property and community-owned assets were damaged or lost in the disasters.



Meatrubham Archives

## The River Pays Back!

The story of the revival of Varattar, a dead tributary of the river Pamba, which once flowed with all its glory connecting Alappuzha and Pathanamthitta districts, offers important lessons in disaster risk reduction.

Due to the continuous exploitation, sand mining, land encroachments and dumping of waste, the nine-kilometre-long river had been reduced to a stream and at many places it had become marshy tracts.

The government, with the participation of the local population, revived the river which was on the verge of extinction, through effective campaigning and interventions. The movement entitled as *Varatte Aar* was wholeheartedly accepted by the people. Though the initiative was only aimed at reviving the river in such a way that a pathway is created to resume the flow of water, the people's participation rejuvenated the entire river.

During the deluge of 2018, Varattar acted as a natural flood control mechanism. It cushioned the damage from the floods in several places like Idanad in Alappuzha district by providing room for water flow. Further increase in water level in these areas would have resulted in water engulfing even the rooftops where people who were stranded in the flood had taken refuge. This would have substantially increased the number of casualties in the area.

Although even Varattar got flooded, it was very evident that the river saved the land and the lives of many.

## Environment and Biodiversity<sup>i</sup>

The disasters had a huge negative impact on the biodiversity of Kerala and the already fragile environment. The Western Ghats, a major biodiversity hotspot in the world, were severely impacted. The wetlands and Kole lands were also badly affected by the deposition of silt and pollution. A rapid assessment by the Kerala State Biodiversity Board revealed significant impact on the ecosystems and catastrophic loss of biodiversity.<sup>16</sup> The impact on the biodiversity largely depended on the changes in the habitats and the period of inundation. Nearly 30 species of aquatic birds of Thattekkad bird sanctuary in Ernakulam district were impacted.<sup>17</sup> The Panamaram Heronry in Wayanad district, home to many threatened birds, was flooded destroying their habitat. Breeding sites of the purple

frog, an endangered species, were destroyed at places.<sup>18</sup>

Inundation due to floods resulted in displacement of wild animals and birds. Several wild animals including tigers and elephants died in the disasters. Changes are observed in the distribution pattern of species and there is a lower presence of butterflies, moths and dragonflies whose larvae got washed away in the floods. Amphibians and reptiles like frogs and snakes were adversely impacted by the disasters. The tadpoles were washed away and later perished as the water dried up. Snakes spotted during the post-disaster cleaning process of buildings were killed on a large scale.<sup>ii</sup> The catch of native fish was found diminished and invasive fish species were reported in several waterbodies. There has been a depletion in groundwater level and the rivers got dried up soon after the flooding. Large-scale death of

earthworms was observed in Wayanad and decline in the presence of clam is noted in lake Vembanad. Spread of species like African snail and invasive plants was very evident after the disasters.

In the hilly terrains affected by landslides of varying nature and intensity, there has been a washout of topsoil. This has reduced the soil fertility and quality in places like Idukki and Wayanad where people primarily depend on agriculture. There was massive riverbank erosion due to the disasters. New waterbodies and sand deposits were formed and changes in the course of rivers were noted. Loss of riparian vegetation was evident. Various kinds of tubers that the tribal communities consume got ruined in the disaster. There was widespread pollution as plastic, electronic waste and bio-waste were strewn around by the floods and debris flow.

i Summarised from the report of the Biodiversity Board, Kerala

ii Field observation



## Livelihoods

The disasters threw hundreds of thousands of households into misery. While the loss of livelihood was substantial in the affected areas, it was a huge blow to the majority of those who were part of the informal economy. More than 90 per cent of the workforce in Kerala are part of the informal economy.<sup>19</sup> The agricultural labourers and other daily wage workers, marginal farmers, street vendors, those engaged in petty businesses, workers in cottage industry and migrant workers were

some of the groups who were severely affected. The assessment by the World Bank and Asian Development Bank revealed that six major livelihood sectors- agriculture, livestock, fisheries, coir and handloom, industries and tourism, have incurred a total loss and recovery costs of USD 543 million, affecting over one million households.<sup>20</sup> It is estimated that 100 million person days were lost due to the disasters, causing an income loss of over USD one billion.<sup>21</sup> The loss of land, crops and poor yield accentuated the miseries of the farmers.

The majority of those who had died in the disasters were men and a lot of them were the breadwinners of their families. Their deaths have a serious impact for the livelihoods of the families. A significant number of such deaths were accompanied by loss of property, compounding the impact. The deposition of silt in low-lying areas and soil erosion in the highlands not only destroyed the crops but have also turned the land uncultivable for a long period, impacting the lives of farmers disproportionately, especially the marginal farmers. Though the silt deposited in the paddy fields of



B. Muralikrishnan

## Stung by Misery

Shivan, a 65-year-old woodcutter from Kanjoor, in Ernakulam district was bitten by an insect while he was wading through the floodwaters. His family was moving towards the relief camp as their house got flooded. After a day in the camp, he suffered from acute pain in the leg and was taken to a hospital. His left leg started swelling with the wound getting bigger and pus spreading all over. He had to spend two months in two different hospitals following this.

The family incurred over USD 7,000 towards his treatment, which put them into debt. It was after six months of the treatment that Shivan started walking, slowly and with much difficulty. He is unable to pursue his job as a woodcutter anymore. His son, who is an auto-rickshaw driver is now the sole earner of the six-member family.



COVID/Binu P.K

## This Rescuer Needs to Be Rescued

An electrician by profession, 24-year-old Joseph Antony was engrossed in the rescue operations in his hometown in Kainakary in Alappuzha. After saving several lives by moving people to relief camps on a raft, Joseph and others decided to save a few cows stranded in the floods. They guided the cows into the raft to take them to a safe place. The raft swayed in the winds and while they were trying to prevent it from hitting someone, Joseph's right hand got jammed between a coconut tree and the raft. His right thumb got amputated on the spot in the accident. Joseph underwent two surgeries and was hospitalised for a week. A right-hander, he is unable to do his job as an electrician anymore. He has not done the required follow-up treatment due to financial crisis as he did not get any government support. It still pains and the rest of the fingers are losing sensitivity. To support his family, he takes up all odd jobs that he can do without the thumb.

Alappuzha district has improved the yield in the successive crop after the floods, the increase in production would only suffice to pay back their debts in the case of many of them.

The farmers of Idukki, Wayanad and Malappuram districts who lost their lands have sunken deeper into misery which has long-term implications.

Many of those who lost their land will be rehabilitated by the government in small plots of land, sufficient only to construct a house, forcing them to become agricultural labourers. The farm labourers who were predominantly women or people belonging to Scheduled Castes or the Scheduled Tribes, lost their livelihoods.<sup>22</sup> The daily wage workers who are mostly from lower income

households were out of a job for several days and a lot of jobs that they would have got were taken up by the volunteers, negatively impacting their earnings and subsistence. It is estimated that about 2.3 million migrant workers from other states were rendered jobless for several weeks augmenting poverty in their native households.



## Not Let Down by the Disasters

The streets of the hill station Munnar provide the daily bread for many. Selvi, a 53-year-old street vendor is wise enough to sell items that attract both tourists as well as local customers. She sells vegetables and tender coconuts for the last twelve years in Munnar. During the 2018 rains, her house, located in the New Colony got flooded and she had to take refuge in her ancestral house in Tamil Nadu and could only return after three months. She had to spend a lot of money to clean up and restore her house. Since she went to Tamil Nadu, she could not apply for the immediate assistance of USD 143 provided by the government of Kerala. Neither did she know anything about the scheme.

It was not for the first time that monsoon had hit her life hard. In 2013, a landslide took her house and the lives of her brother's two children. The compensation they had received, about USD 360, was spent to construct a new house. Selvi, a widow and mother of two daughters is living all by herself in Munnar. Both her daughters got married and have settled elsewhere. Other than the profit from her business, Selvi receives USD 16 per month as widow pension from the government. Selvi has restarted her business six months after the disasters shattered her life for the second time. She is unwilling to be let down by any disaster. Selvi is a name that goes well with resilience.

The factories and other industrial units which were impacted by the disasters remained closed for a long time, depending on the nature of the damage. The informal and contract employees in such establishments whose payments were based on the number of days of work, suffered. The damage to vehicles such as auto-rickshaws rendered those who earned a living by driving such vehicles unemployed. The government's decision to cancel cultural events resulted in a loss of potential

employment for artists and others who depended on such events for livelihoods. The livelihoods of tourist guides, workers in the hospitality industry, those in the transport sector and those engaged in commercial activities at the tourist destinations were also severely affected as a result of the reduction in tourist inflow. There were also people who met with accidents during the disaster, rescue or relief operations, resulting in injuries or impairments which had implications for their livelihoods. The relocation,

particularly in the hill districts resulted in a lot of people getting displaced from their livelihoods also.

The self-employed without any insurance protection, or those who had not registered as an industrial unit with the government, were severely hit. A lot of such entrepreneurs were women. For example, those who were into animal husbandry, predominantly women, suffered an income loss as the domestic animals and birds perished in the

disasters. The artisans and those in the cottage industry such as the handloom societies, whose stock for the Onam festival season was damaged, incurred severe losses. The free supply of relief materials resulted in a loss of business for the local vendors, who also had lost a significant portion of their stock in the disasters and were struggling to recover. Beyond the material losses, the long-term repercussions of the livelihood issues are turning out to be a matter of concern, which, if not dealt with care, would aggravate the existing deprivations in the Kerala society.

## Impact on Tourism

Tourism contributes almost ten per cent of Kerala's GSDP.<sup>23</sup> On an average, annually, Kerala welcomes over one million foreign tourists and around 1.3 million domestic travellers.<sup>24</sup>

The industry provides livelihoods to over one million people of Kerala. With a Nipah outbreak earlier in May, 2018, the tourism sector already had a setback with reduced number of domestic and international tourists visiting the state. With the disasters hitting hard during the peak festival season, the tourism industry, which generally thrives during this period, came to a standstill. The year 2018 was very special for the tourism industry in the state as *Strobilanthes Kunthianus*, a flower popularly known as *Neelakurinji* in Kerala, which blooms only once in twelve years, was due to spread a violet carpet over the Munnar hills in Idukki district. Due to the floods and landslides, the number of tourists got significantly reduced and Munnar was cut off from Kochi for several days, making the region inaccessible to tourists. The panoramic view of

*Neelakurinji* blooming over the hills was a missed opportunity for the majority of the tourists. Besides, due to incessant rains, the flowers did not last long this time as they generally do.

The boat races and the Onam celebrations in Kerala were cancelled due to the disasters which also impacted the revenue from tourism. There was a substantial reduction in the number of visitors to the lake Vembanad, rendering the workers of the houseboats jobless. The disasters adversely affected the income of hotels and restaurants, resorts, small-scale businesses, and the livelihood of people associated with the sector. Several restaurants and resorts cut down their staff and many were closed down. This also impacted street vendors, taxi drivers, tea shops and souvenir shops.



The disaster was a big blow to the tourism industry which contributes almost ten per cent of Kerala's GSDP

## Total Damage and Losses

While accurate estimates are not available, the rapid assessments by the Government of Kerala and the United Nations reveal a total damage and loss worth USD 3.8 billion.<sup>25</sup> Damage comprise almost 40 per cent of it. The

estimated damage and losses in the housing, land and settlements are about USD 916 million. The total damage and losses in the agriculture, fisheries and livestock sectors are worth USD 1,022 million and USD 195 million has been the

damage and losses in the infrastructure. The estimated effect on employment and livelihoods is USD 1,480 million. A total of USD 4.4 billion is estimated towards the recovery needs.



Ajith Panachickal

### Pandanad

Pandanad, a panchayat on the banks of river Pamba in Chengannur taluk of Alappuzha district was one of the worst-affected panchayats. All the thirteen wards of the panchayat were affected and over 4,000 houses were completely submerged. River Pamba cuts through the middle of the panchayat making both sides vulnerable to floods. Though floods are not new to the area, the residents had never experienced one with such

intensity in all their lives. The water level reached up to sunshade in most of the houses after the reservoirs Kakki, Anathodu and Kochupamba, part of the Sabarigiri hydroelectric project began releasing water.

The situation in Chengannur, especially in Pandanad went alarming during August 18-19, 2018, when thousands were stuck on the rooftops without food or drinking water and

rescue boats were not able to wade through the gushing waters. The reluctance of the residents to leave their houses during the initial days, hoping that the water would recede fast was one major reason that worsened the situation. The condition was similar in other flood-affected parts of Chengannur like Edanad, Nakkada, and Thiruvandoor. It took more than a week to bring the situation under control in Pandanad.



## Chalakudy

Chalakudy in Thrissur district was another area severely hit during the 2018 Kerala floods. Incessant rain, along with the release of the high volume of water from both Parambikkulam and Sholayar dams resulted in the already full Peringalkuthu dam built across the Chalakudy river to overflow and

submerge the entire banks of the river. Major centres of Chalakudy town, be it the Government Taluk Hospital or the market, got submerged for several days. Chalakudy market was the worst hit since the traders of rice, provisions and vegetables had extra stocks, keeping the upcoming festival days in mind. Water rose up

to almost three metres in the market. The Government Taluk Hospital also suffered significant damage. The administration had to deploy the Navy, Coast Guard and NDRF in addition to the fishers, Police and other local officials to rescue thousands of stranded people in Chalakudy and nearby areas.





## Aluva and Paravur

Aluva and Paravur taluks in Ernakulam district suffered huge losses during the 2018 Kerala floods. The situation further worsened in these taluks, which lie on the banks of the river Periyar, following the release of water from Idukki and Idamalayar dams. Heavy rains along with the over-flooded Periyar river almost completely submerged Aluva town. Road and rail services through Aluva were temporarily suspended. Other severely affected areas in

the Aluva taluk during the floods included Thottakattukara, Thuruthu, Desom, Kalady and Nedumbassery. The situation was similar or rather grim in Paravur taluk. Some parts of the taluk were completely cut off from the mainland for several days. The handloom sector based in Chendamangalam in Paravur suffered severe losses during the deluge. Paliyam Heritage Museum, a cultural hotspot and part of the Muziris heritage project also encountered

extensive damage in the floods. Vadakkekara, Chendamangalam, Kunnukara, Karumaloor, Alangad, Kottuvally, Eloor, etc. were some of the areas severely affected by the floods in Paravur taluk. Floods did not spare the luxurious river view constructions, built in the close vicinity of the Periyar river. Hundreds were stranded in both of these taluks and thousands were in relief camps for several days. Many houses suffered complete destruction or severe damage.





P. P. Binoy

## Cheruthoni

Idukki reservoir, one of the highest arch reservoirs in Asia comprises three dams; Idukki, Cheruthoni and Kulamavu, built for the Idukki Hydroelectric project. Among these dams, Idukki dam is for storing the water and the other two are for routing the water to the powerhouse for generating electricity. Out of the three dams, only Cheruthoni dam has shutters and the torrential rain led to

its opening after a gap of 26 years, to release the excess water. Cheruthoni town that lies downstream of the Idukki reservoir was the first area to be affected by the flow of water. Buildings including the public bus stand, shops and houses on the riverbanks collapsed or were severely damaged when the water gushed down from the reservoir. Many of the constructions that got damaged

were unauthorised ones in the construction-free zone under Idukki Township Area Development Scheme. Cheruthoni Bridge that connects Thodupuzha - Puliyanmala State Highway was also severely damaged. Many of those who lost their houses in Cheruthoni were temporarily residing at the nearby residential quarters of the Kerala State Electricity Board even in July 2019.



Mathrubhumi Archives



V. P. Ullas

## Kuttanad

Kuttanad, a region spread across both Kottayam and Alappuzha districts has the lowest altitude in the country. The place lies several metres below sea level, which is a rare phenomenon and is considered as a Globally Important Agricultural Heritage System by the Food and Agricultural Organisation. Known for its extensive paddy fields, Kuttanad is also a major flood-prone area in Kerala. The floods of 2018 battered the region extensively. Water from the first flood of July 2018 had

not receded completely when the second flood hit Kuttanad in August making the lives strenuous across the region. Destruction of the outer bunds<sup>iii</sup> in several areas due to heavy rain made the situation worse in Kuttanad. Hundreds of hectares of paddy fields got inundated and thousands in the region had to live in relief camps for several months. Motor pumps in the paddy fields that were supposed to draw off the water also got destroyed in the

heavy flooding. There are certain pockets in Kuttanad like R-Block where human habitation is impossible anymore. However, people are still staying in temporary shelters on the bunds since the government and the residents are yet to reach a common ground on resettlement options. Kainakari, Pulinkunnu, Kavalam, Nedumudi, Chambakulam, Thakazhi, etc. were some of the worst-affected panchayats in the region.

<sup>iii</sup> A series of bunds protect the below- sea- level farmlands of Kuttanad from saline water intrusion and floods.



PTI

## Wayanad

Wayanad district, a hilly terrain located 700 to 2,100 metres above mean sea level along the Western Ghats is home to one in every three persons from the indigenous population in the state. The wetlands, the shola forests and several other ecological features of Wayanad play key roles in determining the climatic conditions of the district. It is also a major tourist destination in the state given the lush green environment and pleasant weather. There has been

a steady growth in the reclamation of the wetlands in the district for the construction of buildings and cultivation of crops like banana and tapioca. Unscientific construction, deforestation and mining across the hills in this ecologically fragile land, along with the heavy rains, devastated the district. The release of water from the Banasura Sagar dam, the largest earth dam in India, created havoc. Numerous landslides occurred in the district subsequent to heavy rains

and land subsidence occurred in a lot of places. Several places were also inundated due to the floods. One-third of the net cropped area in the district was damaged.<sup>26</sup> The district got isolated for several days as the Ghat roads were destroyed. The disasters resulted in massive destruction, displacing people, including indigenous populations, permanently from their settlements as the places were declared uninhabitable, being highly prone to landslides.



T. K. Pradeep Kumar





# Impact on Mental Health

Seema P. Uthaman and C. J. John

The 2018 floods and landslides were some of the worst natural disasters that Kerala had ever witnessed. Several families lost their loved ones, assets as well as their livelihoods. Many were geographically isolated and panic-stricken, being separated from significant others. In the rescue phase, acute anxiety was the predominant reaction as the people were struggling for their lives and safety. They had to vacate their houses, leaving behind valuables. Rare incidents of leaving behind older persons/the bedridden were also noted.

Despite the relative physical safety, the life in the relief camps was unfamiliar to many, which in turn caused mental distress. Lack of adequate space and privacy were also major issues at the camps. Many were in a state of shock, having witnessed and gone through the disaster. The reactions of the people ranged from mild to severe. Those who were already under psychiatric treatment when the disaster had struck, were significantly impacted. Adherence to treatment was a challenge for them. Many lost their medicines and prescriptions while shifting to camps. The stress caused by the disasters exacerbated the symptoms and many had a relapse. Cases of deaths were also reported.

The survivors of landslides went through intense trauma compared to those who survived the floods. Several landslide survivors had the agonizing experience of witnessing their family members being swept away before their very eyes. Many had to recover the dead bodies of their significant others from the ruins. A lot of homes were severely damaged and, in some cases, barely any traces were left behind. For a people whose social aspirations inevitably feature own houses and expensive assets, the sight of damage was unnerving, triggering emotional reactions close to bereavement and loss.

Women, children, older persons and persons with disabilities were more affected as they were dependent on others. There were lots of houses where older persons were the only residents, as their children lived elsewhere, many outside the state or country. This segment of population posed unique challenges in the initial stages of rescue. Many were unwilling to come out of their homes and had to be coerced for evacuation. Their children in various parts of the world panicked as they were helpless to intervene.



PTI/A. S. Sathesh

With a few exceptions, the relief camps were traumatic for persons with disabilities, access to toilets being a major issue. Many were forced to find shelter in the homes of relatives or friends. They were also psychologically more impacted than others and need psychosocial support on a sustained basis.

The gender norms in the society also have accentuated mental health challenges in the post-disaster scenario. The glorification of masculinity, which prevents letting out emotions in public, has taken a toll on the emotional wellbeing of men. Deaths due to panic attacks were reported during the rescue phase and suicides were reported in the post-disaster phase. Aggravated fear and diffidence were observed among several women.

There are several subpopulations with elevated mental vulnerabilities. Farmers who experienced severe crop loss, people who lived on land without any title deeds, those who had debts prior to disasters, female heads of households, and children who lost both parents in the disasters are some of such vulnerable groups. There are also people who experience multiple vulnerabilities in the categories mentioned above.

The mental health initiatives across the state seemed to have lost momentum as they reached the rehabilitation phase. The activities launched in the initial stages were abandoned midway. The interventions were mostly ad hoc with no uniformity in the form and content of the psychosocial care provided. Adherence to standard protocols was limited. Due to lack of handholding support and proper monitoring, the

volunteers who were in the forefront of psychosocial interventions lost their way. Data on survivors who needed ongoing psychosocial care was not available, which made the follow-up difficult.

Even those who had intense anxiety and concerns about the future during the impact phase of the disasters seem to have slipped into a pathological pseudo-resilience trap in the rehabilitation stage. Many have slipped into a resigned mindset in which they accept that government will not do anything more. This attitude is a product of public perceptions that evolved from the past experiences of lack of sustained interventions during disasters. Those with resources to mobilise funds in some way have rebuilt on their own, causing added economic strain. Both fatalism and the pseudo-resilience will not stand ground on being confronted with further

crises like a loan recovery demand or other unforeseen economic setbacks. The vulnerable people in the community with a potential for depression, suicide or alcoholism are scarcely taken note of. The real challenge lies in reaching out to them and preventing such mental health issues.

## Towards a Better and Inclusive Response

Disasters are known to cause serious physical, economic, social and emotional consequences in the life of those affected. The mental health of populations exposed to disasters is a well-recognised public health priority.<sup>1</sup> The emotional reactions depend on the nature and severity of the disaster, the intensity of the person's exposure, adequacy of social support available, age, gender, marital status, displacement status, separation from family/primary support group and personal losses

of the survivor. The psychosocial impacts tend to last for long and can be disabling for many. Therefore, providing psychosocial support is very crucial for recovery. The physical losses usually get immediate attention, whereas the emotional trauma caused by the losses goes mostly unnoticed.

There has been a strategic shift in the disaster management policy orientations from a relief-centred approach to a holistic one, emphasising on prevention, preparedness and mitigation. Psychosocial care has been recognised as the need of the hour and an essential component of the process of recovery following disasters. The mental health intervention needs vary with the phase of the disaster and also with the intensity of exposure. Once basic needs have been taken care of in the relief phase, the need for providing emotional support becomes the primary

The mental health initiatives across the state seemed to have lost momentum as they reached the rehabilitation phase. The activities launched in the initial stages were abandoned midway. The interventions were mostly ad hoc with no uniformity in the form and content of the psychosocial care provided.

goal. This is extremely important, as by this time, the survivors start reflecting upon what they have been through, and how they have survived. They also start realising their losses and go through the associated trauma.



Sidheekul Akber

## Recommendations

Kerala has the highest suicidal risk among the Indian states.<sup>2</sup> Despite having a mental health disorder prevalence of 11.36 per cent, mental health assumes low priority in the state.<sup>3</sup> The compounded nature of the mental health issues in the post-disaster scenario in the state calls for immediate attention and interventions. It is hoped that the following recommendations contribute to a better and inclusive response in this direction:

### **Graduate from response to prevention:**

The existing disaster management system in the state is largely response centric. Preparedness for disaster is an integral part of disaster management. Not just the government, the entire Kerala society needs to gear up for this.

### **Evolve mental health intervention protocols for disasters and set minimum standards in psychosocial care:**

There is a need to formulate a disaster intervention protocol for

**The compounded nature of the mental health issues in the post-disaster scenario in the state calls for immediate interventions. The concerned authority should prescribe and regulate the minimum standards of the psychosocial care to be provided during the various phases of the disaster, so as to ensure the quality.**

each geographical area, taking into consideration of the needs identified during the floods and landslides in Kerala. Provisions for psychological first aid should also be included. The concerned authority should prescribe and regulate the minimum standards of psychosocial care to be provided during various phases of the disaster, so as to ensure the quality.

### **Ensure that psychosocial interventions are tailor-made:**

The psychosocial needs of different groups may vary. The intervention needs of child survivors of disasters are totally different from that of the elderly population. Hence, after individualising the needs of the disaster-affected area and population, appropriate psychosocial interventions must be formulated to cater to groups with varying vulnerabilities.

### **Prioritise sensitising key stakeholders:**

The preparedness and efficiency of the response of the system depend on how sensitive it is to issues such as mental health. Hence it is important to sensitise the administrative systems to the relevance of the mental health aspects in disaster preparedness. Active collaboration among various international, national, regional and local organisations and institutions of eminence in mental health can increase the quality and efficiency of disaster preparedness programmes, training and research.



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**Reduce stigma and discrimination by promoting public awareness:** Keeping in mind the stigma against expressing mental health needs and accessing mental health services, the public should be sensitised to the mental health impact in the face of disasters and also on the importance to seek support. The cluster of emotional and behavioural symptoms is to be perceived as normal reactions to abnormal stress that needs healing. It is also recommended that

the affected community be mobilised through frontline workers such as accredited social health activists (ASHA), Anganwadi workers, Kudumbashree volunteers as well as representatives of the Local Self-Government (LSGs) institutions.

**Undertake needs assessment surveys and foster research and documentation related to mental health:** While those who were not directly impacted by the

floods and landslides have overcome the disasters, the impact will be long-lasting for those who were directly affected. Hence the state now needs to thoroughly assess the service requirements in order to plan the next stage of interventions. In order to develop indigenous literature related to psychosocial care during disasters in the Kerala context, it is essential to undertake research and document the psychosocial interventions.







# Exploring Culture in the Light of the 2018 Disasters

Balakrishnan Koyyal

Natural disasters have the ability to cause extensive loss and destruction to a community's cultural heritage.<sup>1</sup> When a disaster strikes and relief operations are in full swing, saving lives and properties is of high priority. In such a charged situation, talking about culture may sound awkward. Again, protection of cultural heritage has traditionally been attributed low priority by disaster managers. There is no doubt that the protection of life and property should always be a priority, but it is unfortunate that the value of cultural loss and the need for its protection are generally not considered in most disaster plans.

The cultural landscape of the post-disaster Kerala is drastically different. The scenario immediately after the disaster hit Kerala was so heart-breaking, in all spheres. In the cultural space, the air was thick with scenes of total or partial damage to and destruction of precious cultural artefacts, documents, rare books and manuscripts, damage to monuments, washing away of workplaces with all valuables in many of the traditional artists' villages, total loss of or damage to age-old costumes and ornaments used for performances and cancellation of almost all cultural events.

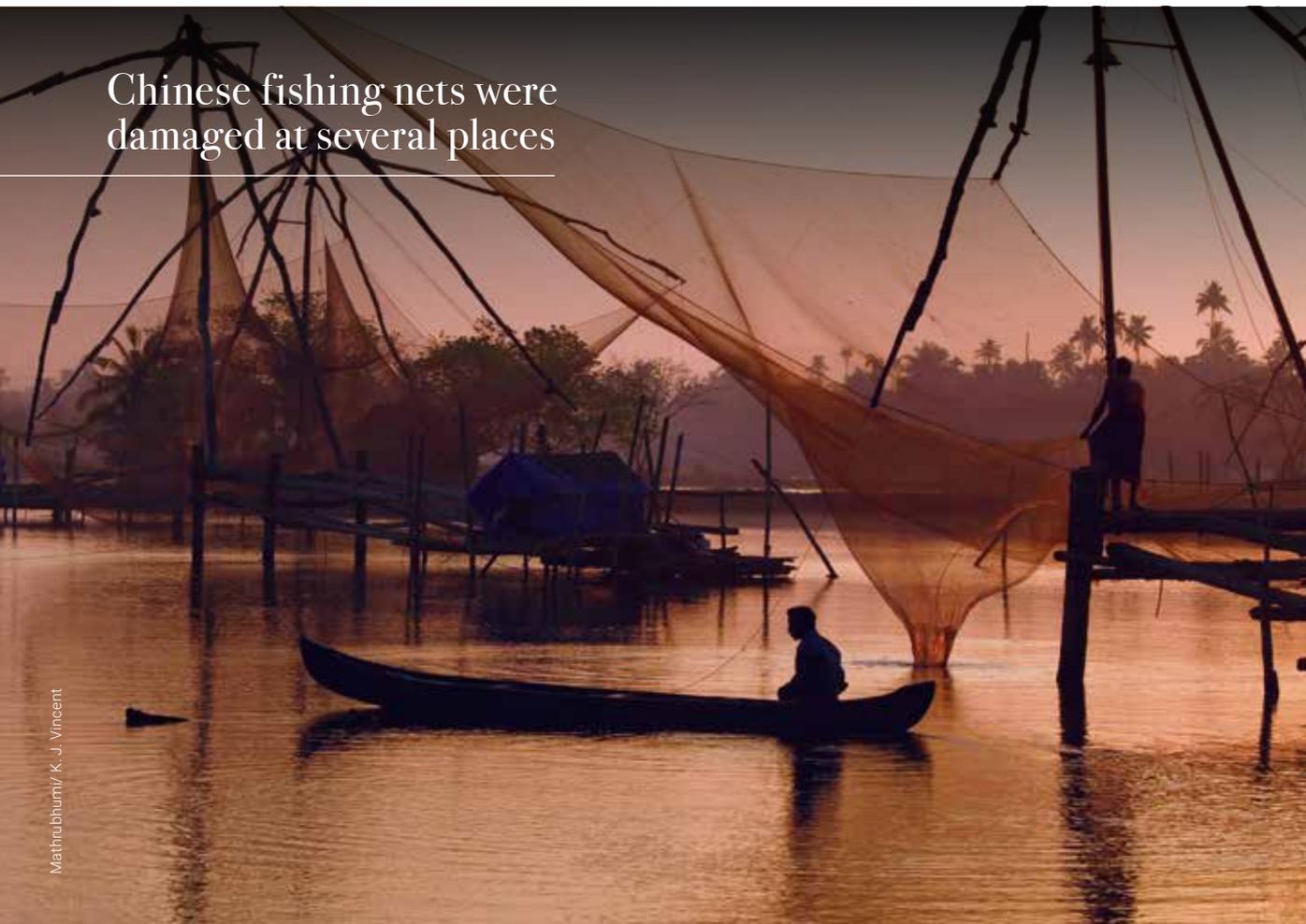
The saddest part is that many of the documents and material culture lost are lost forever. They can never be reconstructed. Their value cannot be assessed in terms of money. There exists a critical information gap and

lack of understanding concerning how to handle the issue of prevention of damage to cultural life and properties in the course of a disaster.

In the floods and landslides, Kerala has incurred catastrophic losses in the movable and immovable properties as well as tangible and intangible heritage assets. It also has an impact on the cultural life of Kerala. Heritage monuments such as temples, churches, mosques, palaces and other buildings were damaged. The disasters also affected sacred groves, sanctuaries, Chinese fishing nets and other culturally and ecologically significant assets. The post disaster needs assessment by the United Nations evaluated a monetary loss of USD 10.7 million and estimates a recovery cost of USD 11.4 million for the various tangible and intangible heritage and museum sites in Kerala. However, the report itself points out the limitations to quantify the immeasurable losses in terms of employment, tourism and other significant losses which might have a long-term impact.<sup>2</sup>

It is likely that the loss and damage of century-old houses, artefacts, palm-leaf manuscripts and other property inherited and preserved by individuals and families were unaccounted. The attempt in this article is not merely to bring to notice the extent of severe damage and destruction to cultural life and properties, but to set a debate in motion so as to have a possible paradigm shift in the disaster

## Chinese fishing nets were damaged at several places



Mathrubhumy K. J. Vincent

management policies and plans to focus on the prevention of damage to the extent possible, along with the present practice of preservation in the aftermath of total destruction.

### Onam in the Relief Camps

Onam is one of the most important festivals of the Malayalis world over, celebrated during August-September every year. The festival assumes huge cultural significance in Kerala and is celebrated during a period of ten days in reminiscence of the mythical golden past of Kerala. This is the time when the Malayali diaspora comes back to their roots to celebrate the festival with family. The older persons in empty nests look forward to Onam in the hope of meeting the other family members, particularly children and grandchildren of the family who live in other states or countries or

live elsewhere in the state. Throughout the state, cultural events are organised by both the government as well as other entities. The schools are given a week's vacation and 'Thiru Onam', the prime day of the festival is a state holiday. It is during such vacations that children get an opportunity to spend time with their grandparents and cousins.

The market is live and thrives during Onam and it is popularly known as Onam Season where there is a shopping spree. It is a traditional practice to offer *Onakkodi*, new clothes to the family members during the season. Shopping festivals during Onam transact business worth billions, not only in garments but also in the case of every household item and equipment. Onam is also a time when the cottage industry items, handloom cloths and other Khadi artefacts are sold in large scale. Onam

also attracts a large number of tourists from all over the world to Kerala, bringing revenue to the hospitality industry. Anticipating peak business, the industries had accelerated production, markets were accumulating new stocks and every sector was gearing up for Onam celebrations in August 2018 too.

The disasters struck in August, a week before Onam, when millions of families were getting ready to celebrate the festival season. The disasters temporarily displaced over a million people and threw Onam festivity out of gear. Thousands of families were in relief camps, depressed about the damage and loss. Families cut down their expenses and a lot of them cancelled plans to visit native places. Cultural events including major boat races were cancelled and shopping festivals had limited visitors. The industries, shops

and establishments incurred heavy loss in terms of business as well as damage to stock/shops. The older persons and grandchildren lost an important opportunity to spend time together.

The 2018 Onam also demonstrated the cultural resilience of Keralites. Even in the relief camps, people in their own ways attempted to celebrate Onam. Floral decorations were made in front of several camps. Competitions and *sadya* (feasts) were also organized in many places. Such efforts also helped alleviate the grief and distress of those who were affected by the disasters.

### Mass Cancellation of Cultural Events

The basic rhythm of every human life lingers around the culture imparted to them. Be it popular, traditional or indigenous, culture finds its expression

mostly in dance, music and other forms of art. The natural response to any disaster is to cut down the cultural events, especially the performing arts, with immediate effect. This is ideal and sensible too for a short while. But when its duration exceeds, the consequences cannot have an alleviating effect, rather it worsens the entire cultural landscape. Firstly, some blissful music can be more healing than a thousand words of consolation for a disaster-affected population. Keeping connected to the rhythm of one's own life could be a pill of relief for them and culture offers a vibrant space for resilience and resistance too. Secondly, for a larger section of people whose livelihood depends on culture and related domains, the cancellation of cultural programmes had a catastrophically negative impact on the income, especially during a festive season like Onam. It is with their earnings from a few months between

**For a larger section of people whose livelihood depends on culture and related domains, the cancellation of programmes had a catastrophically negative impact. It is with their earnings from a few months between August and April that they eke out a living for an entire year.**

August and April that they eke out a living for an entire year. The artists and performers who are in the limelight are few and the majority who work behind the curtains are the victims of such actions. Though the livelihood of entire Keralites got affected by floods, the livelihood losses in the area of culture can lead its practitioners to choose other areas of occupation, which could



T. K. Pradeep Kumar



Ridhin Damu

## Untold Stories

An alumnus of renowned Kerala Kalamandalam, Ajith Kumar from Kannur district, is a talented performing artist, professionally trained in percussion instruments, particularly mridangam. He is also a singer, has been teaching music and also performing as an accompanying artist of maddalam, edakka and other percussion instruments. The remuneration Ajith gets as an accompanying artist for various performances is the chief income of his five-member family including old parents. Except a few, the majority of the performing artists in the state including Ajith, do not have assured regular income throughout the year. It is the season starting from Onam and lasting for nearly nine months that fetches the majority of them a substantial revenue with which they cope with the lean periods when opportunities are limited. Immediately after the disasters, the cultural programmes scheduled in the entire state were cancelled throwing the performing artists into utter misery.

Being the chief earning member of the family, the struggle for survival forced Ajith to desperately look for some other job and he managed to get one, unconnected to his artistic experience, in a private company. During work, Ajith met with an accident and fractured his right shoulder. He had to undergo surgeries at multiple hospitals due to complications in his first surgery immediately after the accident. Not only his resources got severely drained, but he was also rendered jobless for several months together. Besides, the impairment caused by the accident and multiple surgeries on the shoulder have resulted in constraints in performance. Kalamandalam Ajithkumar's experience is not a story in isolation. There are hundreds of artists and their families who suffered due to the mass cancellation of cultural events after the disasters. Many of them were forced to do odd jobs for a living.



## Floods shattered the lives of the artisans of Aranmula who make metal mirrors

B. Muralikrishnan

eventually lead to the age-old traditions, arts and knowledge transferred from generations to generations to perish. Such an impact in a culturally rich state like Kerala can create a huge void.

### Impact on Tribal Communities

Tribal communities in various places suffered extensive losses as a result of floods and landslides. Determining the damage, especially the cultural damage in the tribal belt is an uphill task. In almost all places, their means of livelihood were badly affected, leaving a negative impact on their cultural life. Most of their festivals like Pongal, Koothu and Kalavoot went without any celebration. For example, because they were economically hit, the Muthuvan tribe of Noorangarakudi colony in Idukki district were not able to celebrate their annual Pongal festival in 2018 which they generally celebrate for seven to ten days. Minimum rituals were conducted at the *Vanakali sthana* (seat of the tribal deity),

such as offerings to their ancestors. Similarly, the Mannan tribe of Kodakallu colony in Adimali were not able to celebrate their annual Kalavoot festival, as they did not have any regular income after the disasters.

The annual Koothu festival of the Muthuvan of Chinnappara did not take place as their conditions were miserable. Many families from tribes for whom agriculture is part of their identity were displaced and their land was declared uninhabitable. This has complicated the land alienation of tribal communities and resulted in several families with acres of agricultural land relocating to plots of few hundred square metres where only a house can be constructed.

### Impact on Aranmula Mirror Artisans

Aranmula is a village in the Pathanamthitta district that assumes a special place in the cultural heritage of Kerala. Aranmula Mirror, popularly

known as *Aranmula Kannadi* is a rare kind of mirror made of metal, the only metal mirror available in the world. It is an exclusive cultural heritage of Aranmula with a Geographical Indication (GI) Tag. The village, where the artisans' workshops were situated was ruined by the floods. There are approximately 25 metal mirror making units and most of them were severely hit by the floods and the machinery was washed away.

Preparing for the forthcoming Onam season, the artisans had gathered a large stock of raw materials which were flushed away by the floodwaters. Most artisans also had a good number of half-finished mirrors which also were damaged or lost in the floods incurring huge losses. According to the artisans, repairing the damaged mirrors would take more time and expense than making newer ones.

The silt left by the floods has added an additional layer to the agricultural lands of Aranmula, from where the artisans

used to collect the rare type of clay suitable for making the moulds of the mirror. This, along with the damage to their houses and property put the artisans to great distress and misery. A brief assessment of the artisans' village in February 2019 gave the impression that the destruction caused to this intangible cultural heritage cannot be fully reversed. Efforts to revive the industry which was shattered by the floods were minimal as evident from the assessment.

## Aranmula Snake Boats and Feast

The temple town of Aranmula is also famous for its decorated snake boats and delicious *valla sadya*.<sup>i</sup> Aranmula, situated on the banks of the river Pamba is renowned for its annual boat race popularly called as *Aranmula Vallamkali*, one of the world's major River Festivals. The snake boat race along with *Valla*

*sadya* takes place in the month of August-September every year. A snake boat is nearly 30 metres long with over 100 oarsmen rowing to the rhythm of traditional songs called *vanchi pattu*.<sup>ii</sup> In Aranmula boat race 52 *palliyodams*, snake boats of religious significance take part, and over 5,000 oarsmen row the boats. The snake boats are decorated with traditional golden lace, flags and colourful umbrellas.

Thousands of people, including international tourists gather on the banks of the Pamba to watch the snake boats glide swiftly through the water. Floods re-wrote the story in 2018. As the Pamba river that nurtured their cultures all on a sudden got swollen, breached its banks and gushed towards the doorsteps of local residents, Aranmula village that attracted thousands of boat race lovers was literally devastated. The entire cultural activities came to a standstill as

a result of the disasters. A considerable part of the village population was in the relief camps during Onam.

Out of the 52 *palliyodams* in Aranmula, three were fully damaged and another 42 suffered partial damage. Most of the boathouses were also damaged out of which seven were completely destroyed. Given the acute shortage of *thachans*<sup>iii</sup> specialised in snake boats, the repair of the boats may take a long period to complete. Also, the total damage to the boats can be fully assessed only when they are deployed in the waters. Though the people had received prior alerts from the authorities, shifting the boats to safer places was not possible as they were very heavy.

Out of about 480 *valla sadya* bookings only about one-fifth were conducted. The remaining bookings had to be cancelled. The organisers at their own expense



## The snake boats of Aranmula were damaged

i Annual feast provided in connection with the rituals of Parthasarathy Temple, Aranmula

ii Traditional boat songs

iii Highly skilled traditional carpenters



Many monuments of historical importance were affected

Paliaum Trust

refunded the money to the devotees whose bookings were cancelled. The cancellation of the cultural events also significantly impacted the local population whose livelihoods were dependant on these events. The deluge also caused severe damage to the museum maintained by the organisers of the events. Many of the artefacts were destroyed forever. Almost all the metal artefacts were affected as they lost their original texture, which could not be reinstated.

### Damage to Paliam Palace

The state government designated Paliam Palace as a museum as part of the Muziris Heritage Project. The palm-leaf scriptures of the palace contained some of the great Sanskrit and Malayalam literature of the times. The water reached a level of nearly 1.5 metres inside the museum, ruining

the manuscripts and other artefacts kept inside. More than 40 manuscripts were damaged. Archaeological experts have recovered the damaged manuscripts with great effort. The pages of handwritten books got completely destroyed. Though preliminary restoration was carried out immediately, further preservation of the flood-affected properties may take time.

### Chavittu Natakam of Gothuruth

Gothuruth is a small town in Ernakulam district where the colourful theatre art Chavittu Natakam, a folk theatre, was born in which the actors stamp their feet on the wooden stage to make loud noise while they perform. Chavittu Natakam stands out majestically for the attractive makeup of the characters, their elaborate costumes, detailed gestures and well-defined body movements in

As the Pamba river all on a sudden got swollen, breached its banks and gushed towards the doorsteps of the residents, Aranmula village was literally devastated. The entire cultural events came to a standstill. The boat fest was abandoned and only a few of the *valla sadyas* took place.

tune with the rhythmic playback music and complementary percussion. A sizeable proportion of the traditional costumes maintained by different theatre groups in Gothuruth has been thoroughly damaged by the floods. Also, for a long time all the bookings were cancelled, adding to their plight.

## Chendamangalam Handloom

Chendamangalam, in Ernakulam district is famous for its centuries-old handloom industry. Of the five handloom societies, the three in and around Chendamangalam were the worst hit. Their decades-old looms, machines and stocks of clothes were damaged.

## Impact on Libraries

According to an estimate of the State Library Council, over 200 libraries were damaged in the disasters in various districts of the state. Over 2.5 million books were damaged in various libraries. The total loss is estimated at USD 17 million. The collection of rare books lost cannot be quantified or assessed as such. The Chendamangalam Public Library lost most of its collection of books. Its roof was flown away when the rescue helicopters were on their rounds. Many rare books were there among the damaged collection. In addition to the damage to the library, book collections, manuscripts, letters, photographs, etc. by individuals were also damaged.

A sizeable proportion of the traditional costumes maintained by different Chavittu Natakam theatre groups in Gothuruth has been thoroughly damaged by the floods. Also, for a long time, all the bookings were cancelled, adding to their plight.

## Ancient Civilization Revealed

An interesting post-flood development took place on the banks of the Pamba near Edayaranmula, a few kilometres from Aranmula town of Pathanamthitta district. Immediately after the floods,



The handloom societies of Chendamangalam incurred huge losses



## The floods revealed the remains of the Pamba Valley civilization

in September 2018, people engaged in fishing spotted some terracotta artefacts stuck between the roots of uprooted trees, on the banks of the river Pamba. The fishers had apparently come across a major archaeological site. The materials unearthed included male and female figurines, snake heads, bust of a man and a twin female terracotta statue, totalling 48 pieces. As a follow-up, Archaeology Department in December 2018 launched an exploration of the ancient Pamba Valley civilization.

### Recommendations

The floods and landslides that had occurred during 2018 and the response to the disasters offer important lessons on the impact of natural disasters on culture and heritage. It is heartening to note that the Rebuild Kerala Mission Result Framework also proposes

preparation of a disaster management plan for the protection of cultural heritage and sites of historical and religious importance. Focussed interventions are required to mitigate the impact of the disasters and prevent such catastrophic effects. Following are some of the recommendations in this regard:

#### **Undertake a thorough audit of the impact of the disasters on culture and heritage:**

Although most of the post disaster assessments and evaluations have touched upon issues related to the impact on culture and heritage of Kerala, detailed and in-depth analysis has not been done. Undertaking a thorough assessment of the impact by thematic areas may be of utility. Commissioning an explorative study to understand the impact on the culture and heritage of the tribal communities in Kerala could be an example.

#### **Measures for the proper restoration of the damaged cultural assets and sites:**

The value of cultural assets and concern to preserve them depend on how informed and sensitive the custodian is. In the absence of such understanding, there is a likelihood of poor/delayed investment in the proper restoration of the damaged properties. Besides, lack of resources for the same may result in the deployment of cheap labour and poor-quality material for the restoration work. Measures should be taken to avoid such compromises and proper restoration of the partially damaged cultural assets should be ensured.

#### **Revise Disaster Management Plan (DMP) with emphasis on prevention of damage and preservation of cultural life and properties:**

Detailed guidelines need to be compiled, outlining measures/ protocols to safeguard, preserve and

prevent damage to cultural life and properties and incorporate them in the available DMP not just from the point of tourism, but from the perspective of transferring knowledge and assets to benefit subsequent generations. This has to be done through a consultative process involving all stakeholders.

**Map, sensitise and equip key stakeholders to understand and implement the DMP:** It is important to map key stakeholders, sensitize them and build their capacity to understand and execute the DMP. A detailed list of cultural institutions and installations, both public and private, storing/exhibiting cultural artefacts and other cultural properties should be incorporated in the DMP. Disaster intervention teams such as Fire and Rescue as well as managers of institutions and volunteers should be given training to promote awareness as well as to enhance their skills to execute DMP.

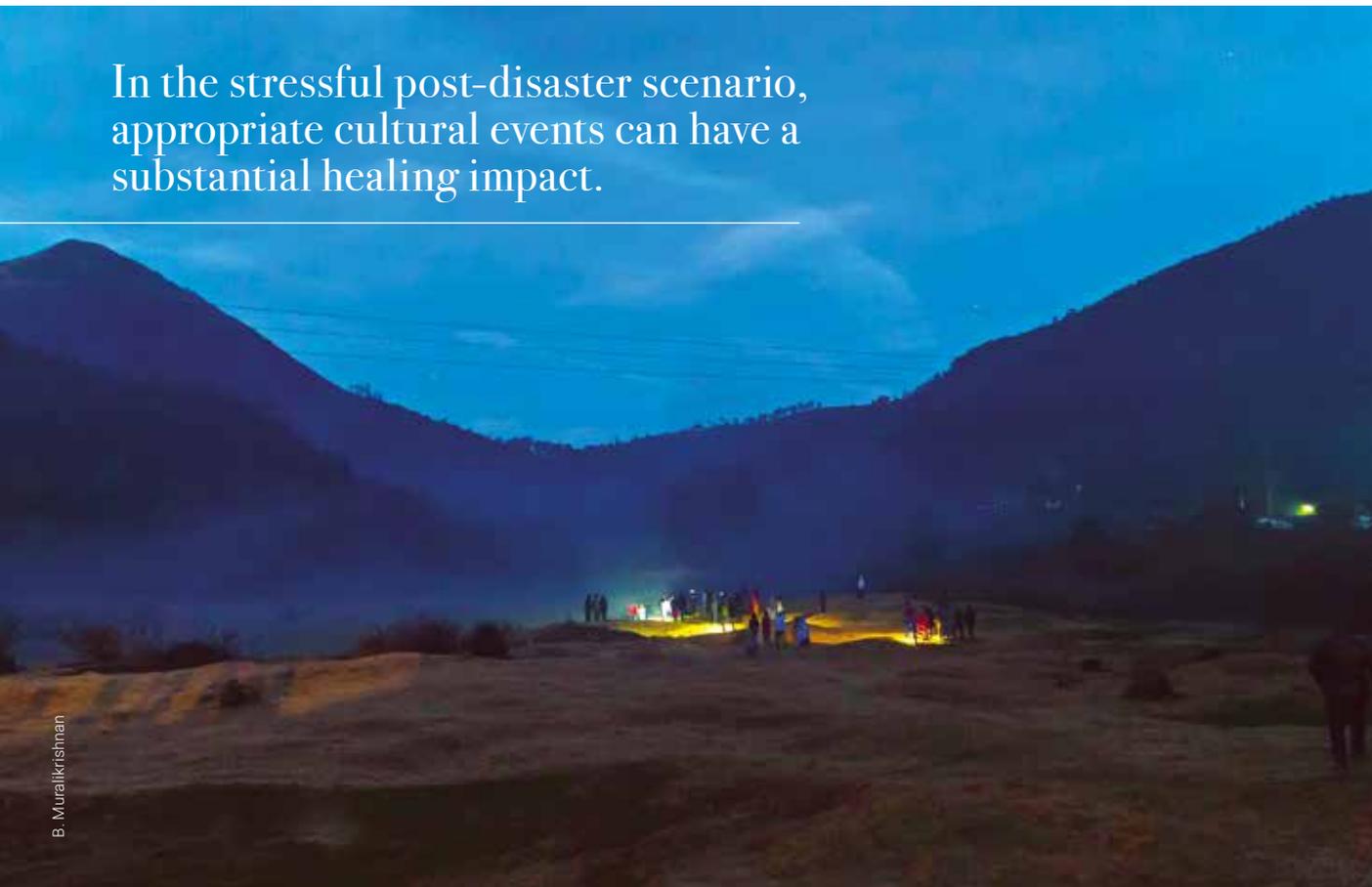
**Document and preserve the cultural assets and heritage leveraging technology:** There is a need for documenting and preserving the cultural assets and heritage and archive them in such a manner that the future generations benefit from it. Measures have to be taken to digitize the documents, manuscripts, audio, video and other relevant material and experience so that they can be safeguarded.

**Setting up archives, museums or similar institutions should be undertaken after thorough feasibility analysis and ensuring safety measures:** Care needs to be taken at the time of selection of site, design measures, etc. while setting up buildings and structures of cultural institutions like museums and archives. Measures should be taken to provide fire-and-safety mechanisms and ensure adequate insurance coverage. Private players also should be encouraged to follow such practices.

**Cultural events have significance even in the post-disaster scenario:** In a stressful post-disaster scenario, appropriate cultural events can have a substantial healing impact. Cancellation of cultural events en masse after the disasters can be disastrous for the performing artists who also are part of the affected population.

**Leverage the network of volunteers of public libraries in Kerala for disaster mitigation:** Kerala has a wide network of libraries, with a highly socially committed volunteers. Volunteers of such libraries should be given training in disaster management, including the cultural modules.

In the stressful post-disaster scenario, appropriate cultural events can have a substantial healing impact.









# Chemical Contamination in the Flood-Affected Areas of Kerala

G. Madhu

## Natural Disasters and Chemical Contamination

Chemical contamination against the background of natural disasters is given top priority in disaster management plans owing to multiple reasons. On the one hand, there is the increasing urbanisation and industrialisation to support a thriving population. On the other, the world is waking up to the fact that natural disasters can only increase in intensity and frequency against climate change and global warming. Many industrial units in the developing world are also close to waterbodies and human habitats, adding to the gravity of the situation. For the first time in its history, Kerala woke up to the alarming prospect of chemical contamination, during the floods in 2018. Though instances of contamination and accidents have been reported from the industrial belt in Ernakulam district earlier, prospects of chemical contamination triggered by a natural disaster were till now ruled out. This paper examines the possibility of chemical contamination from storages and pipelines located in the vulnerable industrial areas during the August 2018 floods in Kerala.

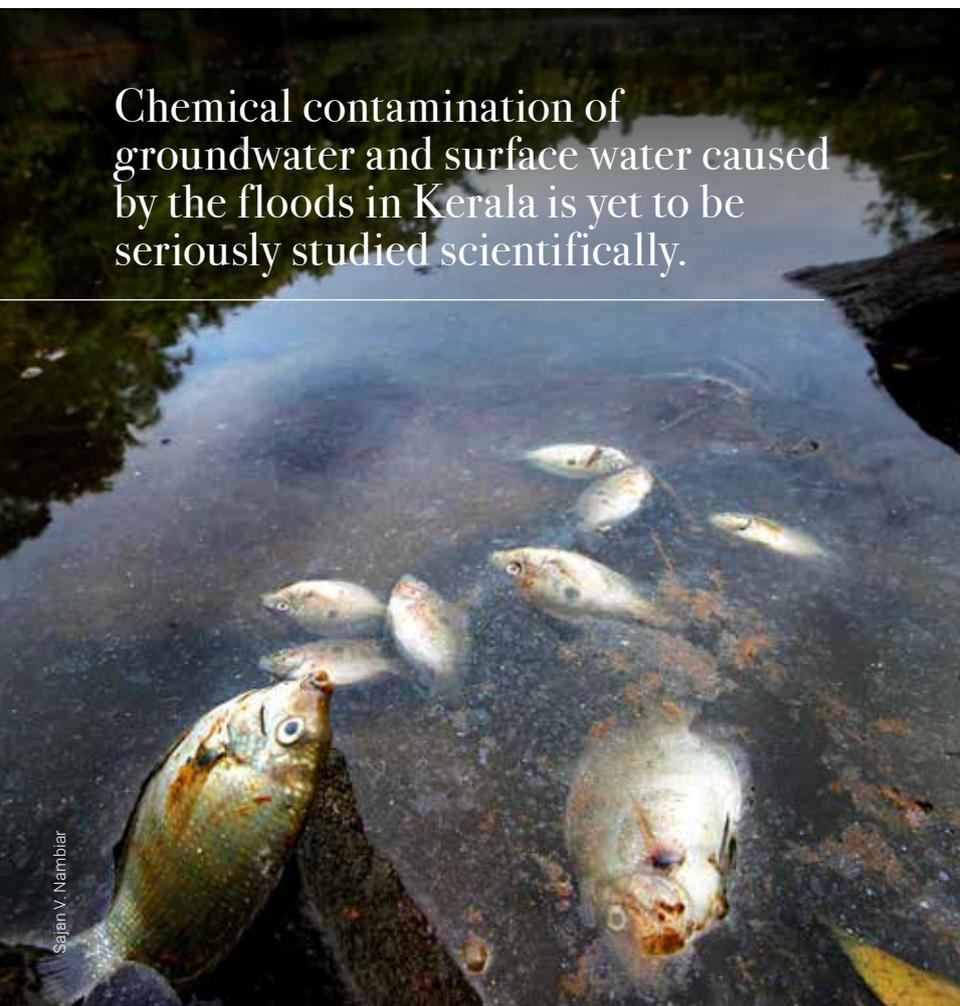
Chemical contamination can be triggered by various natural disasters like floods, earthquakes, devastating storms or tsunamis. Chemical contamination caused by floods has the prospect of rapidly spreading into vast areas of

human habitat polluting water sources including groundwater. The chemical storages and pipelines carrying hazardous substances located in the floodplains are especially vulnerable to damage by flood. Displacement of chemical storage tanks and rupturing of pipework, toxic runoff, toxic reactions and fire, damage to power supply causing process upsets resulting in runaway chemical reactions, release of waste from chemical plants, mines and storage ponds, etc. are some of the reasons for chemical release during a flood. Chemicals in floodwaters may contaminate drinking water sources and, as floodwaters recede, may get deposited on farmland and in buildings such as homes and schools.<sup>1</sup> Contaminated farmland may remain unfit for agricultural use for many years.<sup>2</sup>

## Contamination during the 2018 Kerala Floods

Low-lying areas along the rivers in Kerala were flooded in August 2018 due to heavy rains within a short duration. The release of water from the dams aggravated the situation. This made some key facilities more vulnerable to chemical releases which include the industries that use or produce chemicals, fuel stations, warehouses and pesticide shops located in the flood-affected areas, laboratories in educational institutions, agricultural land where pesticides and weedicides are widely used and the hazardous chemical storages and

## Chemical contamination of groundwater and surface water caused by the floods in Kerala is yet to be seriously studied scientifically.



Sejan V. Nambiar

pipelines in the Udyogamandal, Edayar and Ambalamugal industrial areas of Ernakulam district. Among these, the Ambalamugal industrial area was not affected by the 2018 floods.

Ernakulam district, the industrial hub of Kerala, was heavily affected by the floods. The district has 861 chemical-based industrial units as per the records in 2017.<sup>3</sup> The Eloor-Edayar belt, the largest industrial cluster in Kerala, close to the river Periyar is identified as one of the toxic industrial hotspots in India with a global impact.<sup>4</sup> The area was heavily affected by the 2018 floods. There is every chance that the chemicals stored in the open or in storage impoundments in the industrial areas of Udyogamandal and Edayar got released into water during floods. However, there is only

one confirmed report in this regard. The officials of the Kerala State Pollution Control Board confirmed that a limited quantity of sulphur stored on the premises of a Government of India enterprise in the Udyogamandal Division got washed away. Also, the hazardous chemicals deposited in small quantities on the pavements and open areas may also have got leached.

The Kuzhikandam creek that leads to the river Periyar, adjoining the factories that manufacture pesticides and other chemicals in Udyogamandal industrial area has been regarded as a toxic hotspot. A study of the Kuzhikandam creek in 1999 had revealed that the creek and surrounding wetlands were polluted with DDT, Endosulfan and over a hundred organic compounds.<sup>5,6</sup>

A proposal to remediate the creek has been under consideration for a long period. The water and sediments from the overflowing creek during the floods may have contaminated the surrounding wetlands which in turn may pollute the groundwater.

Edayattuchal and Chakkarapadam paddy fields near a dysfunctional industrial unit in Edayar industrial area that used to manufacture chemicals on a large scale was found to be contaminated with zinc and other heavy metals during the environmental audit conducted by Local Area Environment Committee during 2004-2005.<sup>7</sup> It is probable that the sludge that overflowed from these paddy fields during the flood contaminated the surface and groundwater.

Chemical contamination of groundwater and surface water caused by the floods in Kerala is yet to be seriously studied scientifically.<sup>8</sup> A systematic comparison between the pre- and post-flood pollutant levels in water and soil would bring out the environmental impact of the floods. The possibility of employing the advanced environmental forensic techniques for assessing the contamination may be explored at this point of time. In the absence of scientific evidence one can only point out the vulnerable locations and the possibility of a chemical release.

Several fungicides and weedicides are used in Kerala, in addition to the pesticides that are widely used on the food crops.<sup>9</sup> An analysis of the pesticide use pattern in agriculture and associated management system in Kerala found a declining rate in total consumption of pesticides.<sup>10</sup> However, it has been pointed out that the use of harmful chemicals is rising. The pesticides used in agriculture include chemicals which are banned and those which are suggested for restricted use. The spray fluid concentration and handling pattern are found to be unscientific. The awareness level on the safe use of pesticides is very low, which can be attributed to poor training support.

Anecdotal evidence reveals that many of the pesticide shops in the flood-affected areas of Ernakulam, Thrissur, Alappuzha and Pathanamthitta districts got inundated and quite a few containers, packets and bottles of pesticides, fungicides and weedicides got washed away. In the event of the containers and bottles getting damaged, the contents of these may have come out contaminating the floodwaters. However, a detailed assessment is required to confirm the presence of these pesticides in well water in the surrounding areas. Another area of concern is the leaching out of pesticides, fungicides, weedicides and nutrients in fertilisers from farmlands in the flood-affected areas. This also deserves serious investigation.

Many fuel stations in the flood-affected areas were submerged in water for many days. These fuel stations store petroleum products such as petrol and diesel, in underground storage tanks. However, damage to these storage tanks has not been reported. The storage tanks are designed as per international standards to provide adequate safety. It is understood that the oil companies and the Petroleum and Explosives Safety Organisation (PESO) initiated necessary steps to prevent such hazards.

In many places, the contents of the tanks could be safely transferred to mobile storage vessels. However, rupturing or leakages of tanks of submerged vehicles may have resulted in the release of petroleum products into the water. Several Liquefied Petroleum Gas (LPG) warehouses got immersed in floodwater and LPG cylinders floated in water in many places. However, most of them could be salvaged by the effective intervention of the oil companies.

## Potential Impact on Human Health

Chemicals released following a flood can cause dermal, respiratory and systemic toxic effects following direct exposure of victims and rescuers. Toxic effects and injuries may also result from environmental contamination, fires and explosions. Chemical hazards during a flood include burns from fires and exposure to corrosive chemicals, respiratory tract injury from inhalation of irritant gases, including combustion products and poisoning from exposure to spilled toxic chemicals and the consumption of contaminated food or water according to WHO.<sup>11</sup> Depending on the speed, volume and flow of floodwaters, the risk of chemical

exposure may get reduced by dilution in the water. Other potential chemical hazards during floods, according to WHO are carbon monoxide poisoning resulting from the incorrect use of fuel burning generators for electricity and injuries and poisoning in workers involved in the rescue and clean-up, including excessive exposure to pesticides used for vector and rodent control. People who were engaged in the rescue operations and the post-flood cleaning operations in Kerala may have been exposed to a range of hazards.

## Preventing Contamination

The industrial areas and places storing hazardous substances in Kerala are vulnerable to chemical releases, contaminating water, soil and crops. However, the extent of damage can be minimized by adopting response and recovery mechanisms prescribed by WHO.<sup>12</sup> Also, there is a need to establish baseline data regarding the quality of surface water, soil, groundwater and crops in the state. In the event of an emergency like a major flood, immediate steps should be taken to assess the extent of chemical contamination with respect to the baseline data.



Sajan V. Nambiar





4

# Impact on the Vulnerable Populations



# Impact on Indigenous Populations

K. Rajesh and Vidya S. Chandran

The indigenous populations, comprising the 36 tribes of Kerala, constitute nearly 1.5 per cent of the Kerala population.<sup>1</sup> Among the half a million of them, almost 90 per cent live in the rural areas, particularly the hilly regions as their lives and livelihoods are closely linked to nature. Tribal families predominantly live as clusters in settlements (*Ooru*) and there are 4,762 such tribal settlements across various districts in the state.<sup>2</sup> The majority of the tribal populations in Kerala live in Wayanad, Idukki, Palakkad and Kasaragod districts, with almost one in every three indigenous people residing in Wayanad. Scheduled Tribes constitute 18.8 per cent of the total population of Wayanad.

The Paniyan are the largest indigenous population in the state and they also are one of the most deprived tribes of Kerala.<sup>3</sup> The presence of as many as 11 tribes in the state is limited to any one of the 14 districts in Kerala. Five tribal groups, Kadar, Kattunayakan, Koraga, Kurumbar and Cholanaickan in the state belong to the list of 75 Particularly Vulnerable Tribal Groups (PVTGs) in India characterised by pre-agriculture level of technology, stagnant or declining population, extremely low literacy and subsistence level of economy. The majority of the indigenous population in Kerala depend on agriculture for a living.

The state has a Department for Scheduled Tribes Development and several focussed interventions are

being undertaken for the welfare of the indigenous population in the state through a Tribal Sub-Plan. In order to prevent atrocities against the indigenous populations, the government in 1989 enacted the Scheduled Castes and the Scheduled Tribes (Prevention of Atrocities) Act. The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 acknowledges the rights of the forest-dependent communities. A State Commission for the Scheduled Castes and Scheduled Tribes has also been set up in 2008 to ensure the welfare of the tribes in the state.

Even with Kerala's outstanding performance in the overall human development indices, the development narrative of tribes in Kerala underlines the stark deprivations of the indigenous communities in the state. They continue to be left out of the public domain as 'outliers' in the Kerala model of development.<sup>4</sup> This deprivation is well evident in most of the human development indices. At 75.8 per cent, they have the lowest literacy rate among the social groups in Kerala. While the overall literacy levels of the tribes in Kerala are relatively better compared to the all India average and that of the tribes in Tamil Nadu, Karnataka and Andhra Pradesh, it is much lower compared to the literacy levels of the tribes of Lakshadweep or north-eastern states such as Mizoram, Nagaland or Sikkim.<sup>5</sup>



## The majority of the tribes in Kerala depend on agriculture for a living

Tribes also constitute a sizeable proportion of the total BPL families in rural Kerala. The poverty ratio of tribes in the state is multiple times higher than that of the general population in Kerala whereas the pace of poverty reduction among the tribes over time is much slower contrary to the expectations.<sup>6</sup> The prevalence of physical disabilities, mental disorders and chronic diseases is also higher among the indigenous populations compared to the others in Kerala.<sup>7</sup>

From being cultivators and hunter-gatherers, there has been a steady increase in the percentage of tribes engaged as agricultural labourers with bare minimum wages in Kerala. They could not reap substantially the benefits of the social reforms that enabled Kerala to radically improve its human development indicators. The tribes also lacked the collective effort required to push for their rights. Analysis

of the socio-economic status of the tribes suggests that their hierarchy is determined by the way they appropriated land. This makes some populations the most deprived like the Paniyan and the Kattunayakan who were traditionally outside landownership which is imbibed into their lore as well.

Land alienation has been the crucial cause of tribal deprivation in Kerala. Tribes, irrespective of whether they were cultivators or hunter-gatherers, were mainly dependent on the forest land. Landownership is alien to many tribal communities as for many of them, it is inextricably linked to their cultural and social structures.<sup>8</sup> In the case of Wayanad, tribes were systematically ousted from forest rights and landownership with colonial measures of tax collection and settler invasions.<sup>9</sup> More than half of the tribal families in the state do not have proper title deeds of the land they have in possession.<sup>10</sup>

Among the Indian states, Kerala has the largest proportion dilapidated households occupied by tribes.<sup>11</sup>

The report on the socio-economic census of the tribes by the Department of Scheduled Tribes Development, Government of Kerala, in 2013 reveals the precarious scenario of the indigenous populations in the state. According to the report, the majority of the tribal children do not have access to pre-school education and nearly ten per cent of the tribal children in the age group 6 to 14 years dropped out or did not attend school.<sup>12</sup> The survey reveals unimaginably high dropout rates among tribal students in the case of higher education. More than half of the tribal families experience indebtedness and nearly one-third of them have taken loans from private institutions or money lenders. Their access to water, sanitation and healthcare continues to be poor.

The socio-economic census of the tribes also reveals that the majority of the ration cards<sup>i</sup> issued to the tribes are defective with omission of members, wrong entries and other errors. Nearly a quarter of the tribal families do not have ration cards at all. Among the tribes, 51 per cent are Below Poverty Line (BPL) families and the report underlines that this is far below the real situation. More than ten per cent of the adults do not have electoral identity cards. Only 17 per cent of the widows received widow pension and only 13 per cent of older persons received old age pensions. Nearly two per cent of tribal families were single female families. Approximately 12 per cent of the female population were women in distress<sup>ii</sup> and more than 70 per cent of

those in distress were heads of families, according to the report. Each tribe in Kerala also exhibits differential levels of deprivation and vulnerability.

### Impact on Indigenous Populations

The indigenous population in Kerala was devastated by the 2018 landslides and floods. The impact was compounded by several factors such as alienation from landownership and subsequent economic and social disadvantages. The resilience shown by the tribal population also varied considerably depending on their socio-economic bulwarks.

### Deprivation, Land Alienation and Disaster Risk

The tribes inhabit some of the most disaster-prone areas in the state. The majority of them live in the hilly regions close to the forest area of the state in the Western Ghats which makes them highly vulnerable to landslides. Nearly one-third of them live either in the reserve forests or close to it. In addition, they are also exposed to heavy flows of water from the steep hillsides. Many tribes who were traditionally hunter-gatherers live close to the floodplains of rivers which makes annual flooding a part of their lives. Ironically, some tribal settlements allotted to them are also close to floodplains which leave them with no choice.

i Food security cards

ii Widows, separated from spouse and single mothers



Tribes live close to or within the forest in the Western Ghats region, highly prone to landslides.



CMID/ Salam Atrikal

## Damage and Losses

The official estimates reveal that across 11 districts, 578 tribal settlements were directly hit and 19 settlements were completely devastated. Eight settlements were partially damaged, nearly 11,000 people were impacted and 14 people lost lives.<sup>13,14</sup> Electricity, water supply and critical infrastructure were severely damaged and the crop loss was significant. Wayanad and Idukki districts, severely affected by the landslides and floods, are also home to over 40 per cent of the tribal population in Kerala. The landslides impacted the tribes more than the floods resulting in loss of lives, severe damage to dwellings, loss of settlements and land.

The floods ravaged the tribal settlements located close to the floodplains of rivers. Tribal settlements like Parakkuni in Panamaram, Nacholi near Valliyoorkavu, and several tribal areas in Adimali and Mankulam in Idukki bore the brunt of the disasters. The tribal communities' access to water was substantially affected by the disasters.<sup>15</sup> Several

families lost their entitlement documents and other assets. Although the government provided avenues to replace them, many of the tribal families were not able to utilise such opportunities as they were either not aware about it or could not do it on time.

The impact of the disasters was felt differentially across the tribal pockets and communities. Tribal settlements in Panamaram, Kottathara and Padinjarethara panchayats of Wayanad which were severely affected belonged to the Paniyan community. The land deprivation of the Paniyan is so critical that a single home often housed up to three families. People were found living in makeshift shelters close to the collapsed homes as well. The disasters have intensified the historical deprivation of the Paniyan.

The Paniyan community from the Parakkuni settlement revealed that floods are a recurring agony every rainy season as their settlement is close to the river. It was not their choice to inhabit

these lands prone to floods. They were rather helpless victims of landlessness which is yet to be effectively addressed. The Kuruchiyan of Wayanad who are educationally forward were also affected by landslides which rendered many plots of agricultural land uncultivable. Most of their landed property is still in the joint family system which often creates an impression that they are better off in terms of landed property.

## Rescue and Relief

The indigenous people were the last to move into the camps in the absence of early warnings which in part was contributed by the remoteness of many of their settlements. At the same time there were also people who reported that the evacuation initiatives under the leadership of the panchayat saved their lives. Testimonies from the tribal areas in Wayanad, Idukki and Malappuram reveal that the process of evacuation of people from the affected areas and the management of relief camps were satisfactory to them.

Although they did not complain about the facilities provided to them, the way the camps were set up and managed demonstrated a lack of sensitivity on the part of the general population from whom the tribal people stand alienated. Several camps were organised exclusively for the indigenous populations. In many camps where the tribal communities shared the facilities with others, stigma and the resultant discrimination were fairly evident. For instance, the tribes in many camps were not involved in the preparation of the food as people were sceptical about them.

While the government announced USD 143 for households affected by the floods and landslides, USD 214 was sanctioned for the tribal families. However, a lot of tribal families did not get the support as they did not have a separate house or ration card. The indigenous populations, unlike the others, generally did not visit the government offices regularly with their grievances or followed up such grievances vociferously. Naturally, the resolution

of their issues took time or were not addressed. There were also systemic errors in distributing the compensations.

Lack of proper coordination between different departments that were expected to serve the affected population was seen in some places. It was widely noted that the involvement of the Department of Scheduled Tribes Development in disaster relief activities was relatively poor compared to the interventions of Local Self-Governments and communities. Since the tribal pockets or camps were remote, their access to external relief supplies was poor as relief supplies mostly went to urban or semi-urban areas with good road access and visibility.

### Impact on Livelihood

The floods and landslides badly affected the livelihood potentials of tribal families, particularly those depending on agriculture. This was most striking in the case of the Muthuvan in Idukki and the Kurichiyan in Wayanad. Tribes in Idukki and Wayanad were also affected by the reduced crop productivity following

**The indigenous populations, unlike the others, did not visit the government offices regularly with their grievances or followed up such grievances vociferously. Naturally, the resolution of their issues took time or were not addressed.**

the floods which could be attributed to changes in climate or the soil pattern. People cultivating pepper, coffee and cardamom were concerned about the reduced crop. This has disrupted their economic stability and opportunities for livelihood. In many tribal areas, agricultural plots were covered over by mud or the topsoil was washed off, exposing the rocks underneath.

Many in Wayanad were agricultural labourers, especially the landless tribes. They were severely hit as the paddy fields were ravaged by the floods and landslides reducing them jobless. The



CMID/ Benoy Peter



Ajith Shankaran

## Uprooted from Their Soil

It was just a few days ahead of the disasters that Preman from Nellyyaya tribal settlement in Odakkayam in Malappuram district brought his family to a shack erected near their new house which was nearing completion. Preman, from Muthuvan community, had feared that his 65-year-old father Chennan, who was paralysed after a stroke, would find it difficult to escape from the elephant menace which was increasing. Preman, a night watcher of a government office, was away at work when the rains got intense in the night of August 8, 2018. Matha, Preman's mother advised his wife, child and aunt who lived with them to get into the house under construction as the shack was not safe. However, Matha and Chennan had to stay back in the shack as it was difficult to move Chennan in the night and he needed a person by his side for his support. The landslides that occurred that night destroyed their shack and part of the house under construction. While Chennan was found alive under the debris, Matha lost her life. Preman's aunt was severely injured. It was after a lot of counselling and care that Preman's wife recovered. Preman had taken multiple loans to construct the new house. He has lost the house, and over 3.5 acres of land the family had, as the area is not inhabitable anymore. His aunt who used to work has not yet recovered completely from her injuries. Preman and family used to do farming in their land and the disaster has curtailed the income earned from that. They will not be able to continue farming which is an integral part of the lives of the Muthuvan tribe, as the family moves into the few cents of land allotted by the government. Preman and family continue to live in a temporary shelter provided by the government as he is yet to complete building a new house. While Preman can, with much difficulty, cope with the loss of land since he has a government job, several others from the Muthuvan community, whose life is intertwined with land and agriculture, will have a miserable time ahead as they have lost their farmland. A lot of them in turn are likely to become agricultural labourers eventually, unless the government does not pitch in.

stagnancy in the economy following the disasters affected other casual labourers as well. The presence of migrant workers from other states also reduced their opportunities as many employers preferred migrants compared to the natives. Those, whose lands were rendered uninhabitable by the disasters face the prospect of having to leave behind their agricultural land once they are rehabilitated. Many tribes were so financially stricken that they were forced to abandon their traditional religious festivals.

### Issues of Women and Children

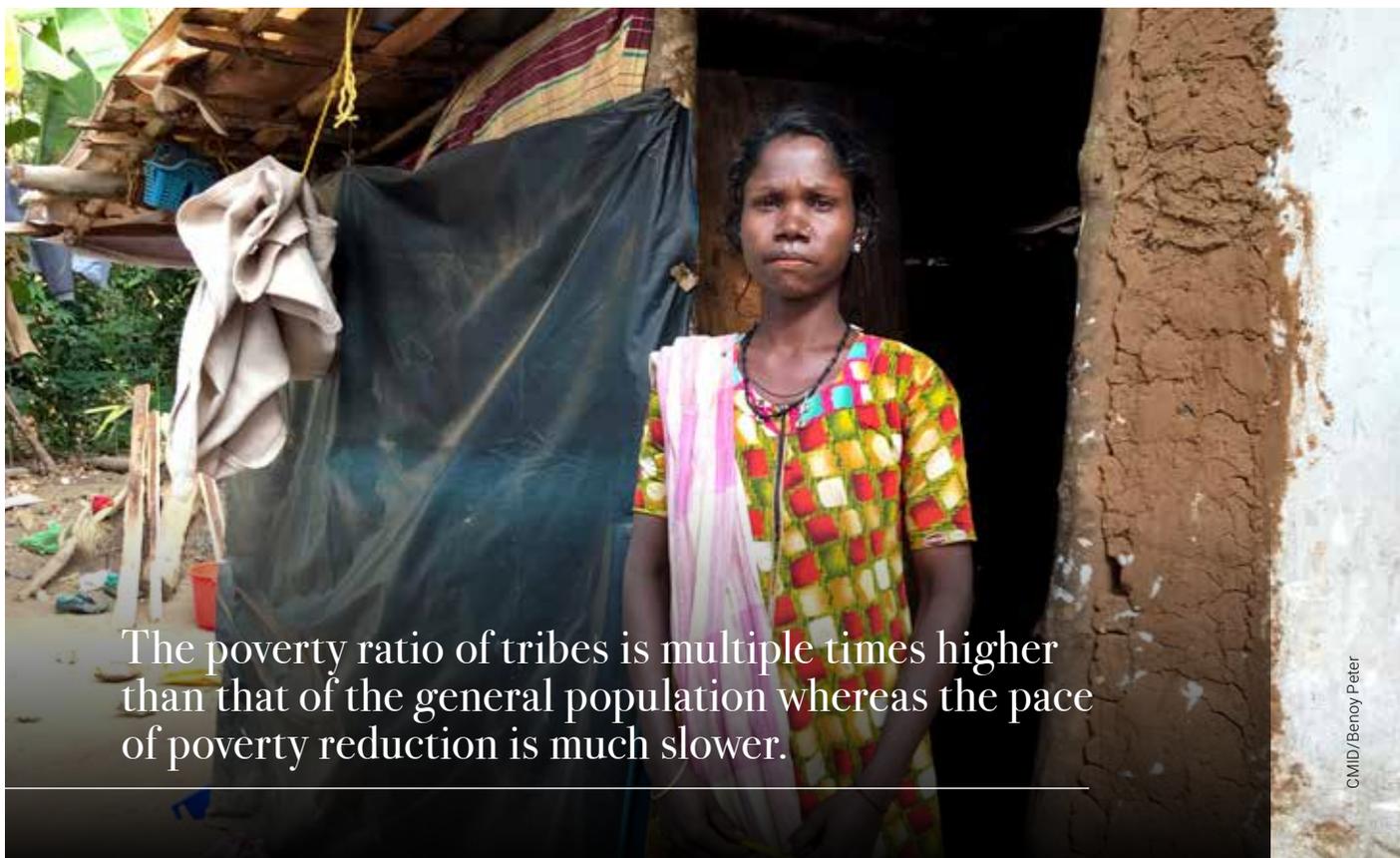
Tribal women exhibited compounded vulnerabilities which need to be addressed from a gender perspective as well. Some tribes like the Muthuvan follow menstrual taboos and many tribal women were upset about breaking them in the camps. Such gender notions are deeply rooted in such tribes which

women are unable to break free. After the disasters, many tribal women and girls had faced issues of sanitation and hygiene as toilets in their settlements were damaged and it took long to repair them. The malnutrition levels of pregnant tribal women are likely to worsen which may impact the outcomes of pregnancy.

Given the proportion of women in distress among the tribal population, it is likely that due to the additional vulnerabilities created by the disasters, their challenges may increase manifold. The children from indigenous families have become more vulnerable. It is likely that their levels of malnutrition will substantially increase compared to other affected children. The long absence from school may increase the dropout rates, as due to various reasons, generally tribal children take longer time to get back to school after a vacation. Besides, the displacement of families with children is likely to complicate their odds of educational attainment.

### External Interventions in Tribal Areas

The indigenous populations were also adversely affected by the interventions of others in the Western Ghats such as illegal quarrying, logging and unscientific constructions which the fragile ecosystem can no more cope with. Landslides that occurred in Vythiri, Chaliyar and Adimali also bore evidence to the uncontrolled interventions in the hilly areas where most of the indigenous populations live. Interestingly, some tribal populations like Kattunayakan who were living in the less exploited areas deep in the forest were not much affected by the disasters. Unscientific agricultural practices, uncontrolled quarrying and illegal constructions by those who occupy the land have intensified the possibilities for the landslides in many tribal locations.



The poverty ratio of tribes is multiple times higher than that of the general population whereas the pace of poverty reduction is much slower.

## Prolonged Displacement

Tribal woes are compounded since in many places in Wayanad, Idukki and Malappuram, their land is rendered uninhabitable given the vulnerabilities after the disasters, leaving a lot of them permanently displaced from their original habitats. However, since their identity is inextricably linked to land, many tribal communities are unwilling to relocate to places remote from their original homes.

This is especially excruciating for people engaged in agricultural practices in their limited plots of land. Many places are prone to more disasters during the monsoons and afterwards since the land was rendered fragile. For Instance, in Nellyampathy, the Kadar from a settlement are advised to relocate from their current habitat which they have been reluctant to, citing their emotional bonds with the region. This is also one of the reasons for their delay in moving to

The disasters are likely to aggravate the already high levels of poverty among the tribal families and push more of them into abject poverty. This may also result in many of them borrowing money from private money lenders adding to their indebtedness.



## Uncertain Days

Deepa, her husband Prasanth and their two children, from the Muthuvan community of Kulamankudy settlement near Adimali in Idukki district have taken refuge in a community hall. They had a narrow escape when their 'house' made out of bamboo and tarpaulin collapsed during the disasters. Deepa lost around twenty of her hens adding to the burden of their debt. They survive on Prasanth's earnings as a painter. In February 2019, Deepa staged a protest for five days in front of the office of the Department of Scheduled Tribe Development in Adimali as they did not get any aid other than the immediate assistance for the affected populations. When the team visited the settlement in February 2019, Deepa and family were under pressure from others in the colony to move out as there was no other place for the community to hold their meetings.



P. Jayesh

## Without Complaints

Nalla, a 65-year-old Paniyan tribeswoman from Kaippanchery settlement was still living in the Community Hall in Aikkuny in July 2019. Along with her husband Karuppan and children, Nalla had a narrow escape on August 9, 2018 as landslides destroyed their homes shortly after they had shifted to the relief camp. There were 12 families in the colony, mostly belonging to her own extended family out of which four still live in the Community Hall. Those who returned to the colony cook in the courtyard of their ruined homes and sleep in a house below at night. Unlike most Paniyan families, people in the Kaippanchery settlement had small plots of agricultural land though with steep slopes. Like many tribes, Nalla and her family are also emotionally attached to the plot of land they have owned and cultivated over years. Efforts to find alternative plots of land to rehabilitate the people of Kaippanchery settlement are on. Putting on her usual cheerful self, she, along with her daughter vows not to leave Periya to which they are emotionally attached as a community.

safer places. Many of the tribal families affected also have returned to their damaged homes which accentuate their vulnerabilities to further hazards.

It is unfortunate that even almost a year after the disasters, several tribal families still live in relief camps or temporary shelters across Wayanad, Malappuram

and Idukki districts. The disasters have a long-lasting impact on the tribal populations. It is likely to aggravate the already high levels of poverty among the tribal families in Kerala and push more of them into abject poverty. This may also result in many of them borrowing money from private money lenders making their indebtedness a bondage. There is also a

likelihood of their further alienation from the minimal land or property they have. A lot of them may also have to migrate to other places for livelihoods as part of their survival strategy. The impact of the disasters on the mental health of the indigenous population is not yet known.

## Recommendations

The historical vulnerabilities of the tribal population were worsened by the floods and landslides in Kerala in 2018 with a subsequent impact on their coping strategies. Long-term and short-term measures are necessary to address the vulnerability of tribal communities towards natural disasters and calamities. The following recommendations are put forth towards addressing the overall deprivations of the indigenous populations as well as mitigating the impact of the disasters:

**Take up tribal development on a mission mode to achieve the SDG targets by 2030:** The typical tribal development measures through the Department of Scheduled Tribes Development have not demonstrated a significant impact in terms of outcomes despite huge investments. Hence, the government may set up a Tribal Development Mission in line with the four missions for development<sup>iii</sup> with sufficient autonomy and flexibility to achieve the Sustainable Development Goals (SDGs) for the indigenous communities of Kerala by 2030. This shall be done by coordinating all the agencies and institutions concerned, with a focus on tribal development, without interfering in the autonomy of the LSGs.

**Track the results and outcomes of investments on tribal development projects rigorously:** In order to comprehensively address the deprivations of the indigenous populations, deprivation indices should be computed at the household, settlement and tribe level. Instead of mere investment in tribal development, the progress should be rigorously monitored based on a ten-year results framework. Informed by the deprivation indices, there has to be an action plan for achieving the results at each level.

**Address the land deprivation of the tribes:** The landlessness of tribal communities should be addressed urgently, prioritising the historically landless communities such as the

Paniyan. The government land under plantations, including those given on lease can be allotted to the landless tribes in the model of the Sugandhagiri farm in Wayanad. Instead of confining the tribal communities to colonies on a small patch of land, they should be allotted enough land to allow them to sustain themselves through cultivation.

**Understand the differential impact of the disasters on each tribal community:** Generalising the impact of the disasters on the tribal communities may not be appropriate. Initiatives are required to learn in-depth how the deprivations of the 36 indigenous populations have been differentially augmented by the 2018 and 2019 disasters.

**Prioritise the rehabilitation of tribal families still living in temporary shelters:** The Rebuild Kerala initiative should give priority to the rehabilitation of tribal families still living in temporary shelters. This has to be realised in a stipulated time of not more than six months.

**Rehabilitate the tribal families living in disaster-prone areas through a consultative process:** Tribal families living in the floodplains of rivers, on the hillsides and other areas prone to environmental disasters should be rehabilitated. A special rehabilitation plan should be developed with their active involvement, ensuring inter-departmental coordination.

**Compensate adequately for the crop losses of the indigenous populations:** Tribal families depending on agriculture require special support to overcome their loss due to decline in crop productivity after the floods and landslides. Though the government has announced compensation packages for crop loss, this is not adequate to mitigate the losses especially in the case of long-term crops.

**Support the dependents of people who lost their lives:** The families of victims from the indigenous population who lost their lives did not get the support and attention of the CSOs and the public the way mainstream communities did. Since the government aid is most likely

the only compensation available to most of the tribes, measures should be taken to ensure that it is adequate and timely. Children who lost their parents in landslides and floods require special assistance and care from the government to grow with dignity.

**Reconstruction in tribal areas should be time bound and thoroughly monitored:** The pace of reconstruction in the tribal areas could be slower given the political apathy on the issues of tribal populations. Administrative glitches in reconstruction should be addressed on an urgent basis. Since the tribes often lack the will to do the follow-up, proper monitoring of the distribution of compensation and rehabilitation packages in the tribal belt is essential. The tribes are also less informed about the compensation packages.

**Undertake a social audit of the disaster rehabilitation in tribal areas:** All data related to the compensation packages should be exhibited in the public domain to ensure transparency. The government should facilitate a social audit of the disaster rehabilitation in the tribal areas with community participation and involvement of the CSOs.

**Ban mining and quarrying in tribal areas:** A complete ban needs to be introduced on the alteration of landscape and extraction of natural resources through quarrying and mining in the Western Ghats, particularly in tribal areas. This is especially relevant in the ecologically fragile areas like Wayanad. Evidence reveals that the absence of such controls would ultimately create more adverse impact on the life of the tribes in the form of environmental disasters.

**Revive the women's collectives in the tribal belt:** Given the concentration of women in distress and single woman households among tribal communities, there is a need for focused investments in improving women's agency. Women's collectives in the tribal belt are mostly inactive which need to be revived as these are crucial from the angle of inclusion and empowerment.

iii Ardram, Haritha Keralam, Life Mission and Reviving Public Education







# Impact on Persons with Disabilities

Sabith Umer, Baishali Goswami and Akhila M.

## Context

Persons with disabilities constitute 2.3 per cent of Kerala's population with nearly 0.8 million of them enumerated in the state in 2015.<sup>1</sup> One in almost every ten households in the state has a person with disability and nearly half of them are women.<sup>2</sup> While one-third of the persons with disabilities in Kerala have a locomotor constraint, 17 per cent have multiple disabilities.<sup>3</sup> Although with a literacy rate of 71 per cent, Kerala tops among the Indian states in the literacy level of persons with disabilities, this is far lower<sup>1</sup> compared to the overall literacy level and human development of the state.<sup>4</sup>

About one-fifth of the boys and girls with disabilities in the age group 5 to 19 years in 2011 never attended a school and most of those who went to school also did not make it to higher grades.<sup>5</sup> Only 21 per cent of persons with disabilities in Kerala have education up to secondary level and a mere 11 per cent of them attained a grade of higher secondary or above.<sup>6</sup> With more boys than girls with disabilities enrolling, there is a substantial gender gap in the school

enrolment of children with disabilities in Kerala which in turn impacts the educational attainment, livelihood options and even the life course of the girls with disabilities.<sup>7</sup>

Kerala has the lowest level of workforce participation rates of persons with disabilities among the Indian states with only a quarter of them being part of the workforce.<sup>8</sup> The disability census by the Government of Kerala reveals that almost 80 per cent of the persons with disabilities in Kerala remain unemployed.<sup>9</sup> Inclusion of persons with disabilities in a rights-based framework in all aspects of development is a global agenda.<sup>10</sup> In India, the Rights of Persons with Disabilities Act, 2016 provides a legal framework to ensure their inclusion. With a vision to promote the inclusion of persons with disabilities, the Government of Kerala formulated a policy on persons with disabilities in 2015. While the state envisages to become the first barrier-free state in India, the status of persons with disabilities in Kerala is quite precarious as the evidence reveals.

## Impact on Persons with Disabilities

Despite the Kerala State Disaster Management Authority (KSDMA) being proactively engaged in disability-inclusive disaster risk reduction activities from 2015 onwards, the persons with disabilities were catastrophically affected given the nature and severity of the floods and landslides. The government statistics reveal that the number of persons with disabilities affected was around 8,600. This appears to be highly underreported given the fact that one in every six Keralites was affected by the disasters. Going by their population share, the persons with disabilities affected could be around 1,00,000. While most of the persons with disabilities affected had faced challenges, the impact varied by several factors such as gender, age, type of disability and type of disaster they were exposed to.

## The Bedridden and Persons with Locomotor Disabilities

The disasters severely impacted the bedridden and people with locomotor disabilities who constitute the majority of persons with disabilities in Kerala. Many did not receive timely alerts. Even for the families that had received alerts, shifting the bedridden to safe places was a huge challenge. Lack of vans and ambulances for safe transportation added to their woes. Besides, the landslides and floods had arrested vehicle movement. This delay and the reluctance of families to move to shelters without persons with disabilities even resulted in the death of many family members in areas hit by the landslides. The mobile intervention units of the Department of Social Justice could only operate in select accessible areas.<sup>11</sup>

On several occasions the persons with locomotor disabilities in the flood-affected areas were transported in lightweight basins without proper

care. Persons with conditions such as cerebral palsy who have to be sensitively managed, were relocated by untrained rescue volunteers. Many with locomotor disabilities had to go to their relatives' houses as camps had inadequate facilities for them. In several instances, families having people with disabilities were isolated during the time of disaster. Wheelchairs, cerebral palsy chairs and many other equipment got damaged in the floods. Many were hospitalised for several days due to various diseases as a result of the change in conditions.

For those who used equipment such as Foley catheters and colostomy bags, the disaster brought immense misery. Even their immediate family members were not in a position to help manage their situation. The rescue volunteers who did not have prior experience in managing the bedridden patients were not able to handle the situation properly. There was no provision for disinfecting colostomy bags and their safe disposal. Many had to go to hospitals and in several places even hospitals were flooded. The situation was worse for the ones who used Ryle's tubes or had undergone tracheostomy as liquid food was unavailable. Suction apparatus was unavailable even with the emergency medical aid teams. The automatic electric suction apparatus available at some locations could not be used as there was no electricity. Unavailability of toilet seats and other aids also added to the misery.

Adult diapers, an essential commodity required for the bedridden persons were not available among the relief material distributed in the camps. The attempts to manage its absence with clothes were futile. For persons with locomotor disabilities who generally have difficulties in using toilets, the camps were a real nightmare in the absence of accessible toilets. Women and girls with locomotor disabilities found it more complicated compared to men and boys.

## People with Neurological Challenges

The mentally ill, the mentally retarded, the autistic and those affected with cerebral palsy and chronic neurological disorders were another group who were excluded during the disasters. Given the stigma and discrimination around these conditions, families with such members perceive it shameful to present them in front of others. A lot of such persons in the society are invisible as they are rarely brought to the public functions, large gatherings and not even into family events. Given the deep-rooted stigma, relocating such persons during the time of floods caused them considerable distress. The unfamiliar and messed up conditions in the camps, in contrast to their regular surroundings, created severe stress to many. As it was difficult for them to co-exist with a larger crowd, a lot of them preferred to remain at the rehabilitation centres or special schools.

It was with much difficulty that their parents, teachers and volunteers shifted them to safer places. When a residential special school in Ernakulam district got flooded, the children were shifted twice to two different camps. The loss of toys and clothes agonised many. The families with such persons who were affected by the floods and landslides found it traumatic. Loss of medication and prescriptions complicated the conditions of many people. Many families were not able to move out of the camps even for cleaning their houses when the water receded as full attention was needed to take care of the family members with mental illness, mental retardation or related disorders. It was with the help of various organisations that the families managed to get back to their homes from different places.





Maithrubhumi/Leju L

## Struggling to Tide Over the Crisis

When the floodwaters entered his house on the banks of the river Varattar, in Chengannur, Shyam panicked. Suffering from muscular dystrophy, the 15-year-old boy is totally dependent on his parents. His mother carried him to a nearby house. From there they shifted him to a relief camp in an auto-rickshaw, a vehicle highly risky to transfer persons with conditions such as muscular dystrophy.

Out of fear of losing any government grant for the flood-affected people, he and his family remained in the camp although it was highly inconvenient. Shyam and his parents had a tough time spending 12 days in the crowded camp without even having a pillow to keep his head high or a bed to lie down. Shyam ended up having pneumonia. He was then admitted in a hospital for a week. Back home, the family of four members had to spend almost one month in their living room and kitchen as the rest of the house was damaged.

Shyam developed allergic reactions in the post-flood environment at home. Each time he coughed, the boy had extreme pain all over his body. Learning about the plight of Shyam's family, a non-profit helped them repair their house. As he needs attention round the clock from both parents, the mobility of Shyam's parents is restricted. Hence, his father runs a small eatery near their home and the family is struggling to make both ends meet.

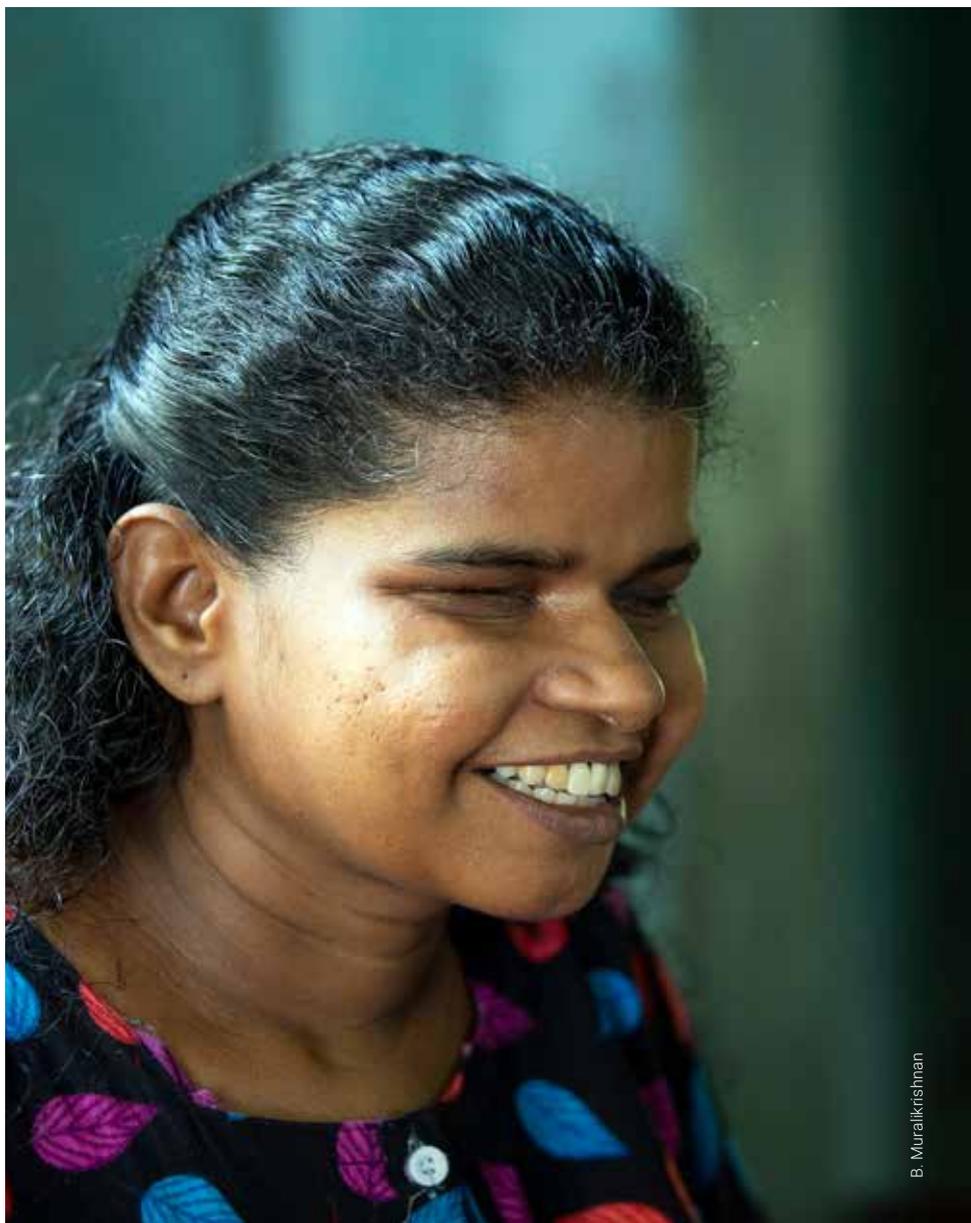
For the blind people, the camps and other places to which they were relocated, were new and different from their familiar locations necessitating help from others every time they moved. This dependency, even for fulfilling their primary needs, induced considerable stress in them.

## The Visually Impaired

Persons with visual impairment, including the blind have received a certain level of acceptance and inclusivity in Kerala. The reserved seat for the blind next to the ticket collector in Kerala State Road Transport buses proves this. But just like other persons with disabilities, the disasters proved catastrophic to the visually impaired also. For the blind people, the camps and all the places to which they were relocated, were new and different from their familiar locations necessitating help from others every time they moved. This dependency, even for fulfilling their primary needs, induced considerable stress in them. They were unaware of the events taking place around them. Floodwaters limited their mobility too as they could not use their white canes. Many lost their white canes and there was an acute shortage of white canes during the disasters. Losing their radios put many into grief. The piles of waste dumped on the pavements after the floods created impediments to the mobility of the visually impaired.

## Persons with Hearing Impairment

The hearing impaired were another group of people who got adversely affected and isolated by the disasters. They did not receive any alerts, nor could they communicate their needs during the rescue and rehabilitation phase. They were mocked in the camps, which hurt several of them. Many lost their expensive hearing aids and could not afford to replace it.



B. Muralikrishnan

## Clueless about the Disaster

Being blind, Jini was afraid to wade through the waters and so she and her father did not leave home when the floodwater entered their house in Paravur in Ernakulam district. As no one came to their rescue, she got stranded on their rooftop along with her father and a few neighbours. She stayed there hungry for two days and panicked as she was unable to make out what was going on. Meeting her primary needs in the presence of others on the rooftop was extremely difficult for her. Early warnings, mapping of persons with disabilities and disaster preparedness could have helped evacuate blind persons like Jini from disaster-prone areas.

## Overall Impact

As a lot of persons with disabilities rarely used to venture out of their homes, the entire chain of events had an adverse effect on them. The exclusion faced by persons with disabilities during and after the floods is likely to have a long-term impact on their lives. They became objects of pity in the camps. They themselves were made to feel guilty for creating troubles for others. This even affected their mental health.

Women and girls with disabilities were disproportionately affected. Several such women and girls were stranded on the rooftops and other places without safe options to meet their primary needs. Even in the relief camps, the women with disabilities had limited or no privacy. Persons with multiple disabilities, those who were bedridden, those with muscular dystrophy or autism, the blind,

older persons with disabilities, those from female-headed households and orphans and migrants with disabilities were some of the other groups who were disproportionately affected.

The government systems were not equipped and prepared to address the challenges faced by persons with disabilities on this large scale. In the relief camps, there were limited options to provide persons with disabilities the required space, attention or care according to their varying levels of disabilities. Opening camps in flood-prone areas created huge challenges for the persons with disabilities as well as the caregivers as it was a complex process to relocate them multiple times through the flood or shifting them to higher floors.

Since the camps were highly inconvenient, a lot of families having

persons with disabilities resorted to take refuge in the houses of their significant others. At the same time, many were forced to remain in the camp, fearing that they would lose the much-needed government grants, relief materials and other help if moved out. Relief materials and support did not reach many persons with disabilities who had to move out.

Many persons with disabilities did not receive the benefits provided during the rehabilitation phase as neither they nor their family members had the ability and time to pursue this, going to the offices or approaching the organizations that provided the rehabilitation support. This was evident in places that were less accessible, away from the main roads. At the same time, there were places where many organisations reached out to persons with disabilities and helped them to obtain new assistive devices or other help.





V. P. Ullas

## Living with Compounded Vulnerabilities

A fever at a very young age put 32-year-old Jolly Thomas on a wheelchair. Single, she lives with her elderly mother in the Mangottuchira colony in Alappuzha district in a small house built by a non-profit. The monthly disability pension of USD 16 for Jolly and the senior citizen's pension for her mother from the government are the major sources of income for the duo. She used to make candles for a living, but stopped as there is no one to help her market it now.

When the colony got flooded, Jolly and her mother waited for almost eight hours for a boat to rescue them. Jolly was carried in her wheelchair with great difficulty and was brought to a crowded relief camp operating in a school. Due to lack of space, they were accommodated in the computer lab along with around 20 others. In their wet clothes, they struggled in the cramped space amidst the furniture in the room. Only one of the two could sleep at a time and food was scarce. Using the toilet was a major challenge for Jolly. When the water level rose in the camp, she requested the volunteers to take her to a friend's house. They had to take her in a truck and the relocation was challenging. She later moved to a relative's place.

Back home after the floods, Jolly and her mother are having a tough time as most of their household equipment got ruined. There is acute shortage of drinking water in the area. Instead of every month, Jolly gets her disability pension as a lump sum payment once in four to six months, making life miserable. Being a woman with disability, in a female-headed household where the elderly mother is the only other member of the household, which is located in a low-lying area, Jolly has compounded vulnerabilities. She earnestly wishes to receive the pension regularly on a monthly basis. Jolly hopes that one day she will be able to set up a small shop of her own so that she can become self-sufficient.



## Recommendations

Persons with disabilities continue to be on the margins even in Kerala. They are silently excluded right from the school days. The gender differentials are also prominent. Their livelihood opportunities continue to be limited and they remain economically dependent. All these have a direct bearing on their wellbeing and quality of life. The disasters highlight the plight of persons with disabilities in the state. Although there were CSOs trained by KSDMA which were able to safely relocate scores of persons with disabilities, there is a lot more to be done to ensure that no one is left behind. Following are some of the recommendations for a better and inclusive response:

### **Empowering persons with disabilities is a long-term process and it should start with universal inclusive education:**

Providing education to persons with disabilities is of paramount importance and has a lifelong impact on their agency. The state needs to ensure that there is universal enrolment and retention of persons with disabilities in schools and colleges with the provision of inclusive education. Only with a high

level of educational attainment can persons with disabilities take up better livelihood options and achieve financial autonomy and independence.

### **Mainstream every person with disability by providing necessary assistive devices customised to their requirements:**

Providing assistive devices to persons with disabilities significantly enhances their abilities and helps them to be part of the mainstream. A lot of persons with disabilities have lost their therapy equipment and assistive devices such as white canes, hearing aids, wheelchairs, bowel and bladder control equipment, etc. in the disasters. It is important to replace them.

### **Foster economic independence of persons with disabilities:**

Immediate measures are needed to revive the livelihood of persons with disabilities who were affected by the disasters. On a long-term basis, targeted interventions are required to promote the economic independence of persons with disabilities. Measures like support for the start-ups, soft skill trainings, designing customized financial products and promotion of thrift have a direct impact on enhancing their self-esteem

and entrepreneurial skills. The meagre disability pension should be enhanced and made available on a monthly basis to benefit the people than the lump sum payment once in a while which appears convenient to the system.

### **Every new structure constructed under Nava Keralam should be barrier free, ensuring universal access:**

Merely having a ramp and rail does not make a structure barrier free. In many places, these ramps also are not scientifically done, but serve only as a compliance measure. Keeping in mind the SDG philosophy, Kerala should ensure that every new structure created in the state is barrier free for all types of persons with disabilities and not just for those with locomotor disabilities. This include government buildings, educational institutions, public transport, roads, parks and other public spaces. There must be accessible toilets, parking lots and other amenities as well. It is also important to encourage persons with disabilities to come and utilize the available facilities.

### **Mapping persons with disabilities and other vulnerable populations can ensure quick and informed action:**

It is high time the state had a live online data bank

The disasters highlight the plight of persons with disabilities who continue to be on the margins even in Kerala. They are silently excluded right from the school days. Their livelihood opportunities continue to be limited and they remain economically dependent. All these have a direct bearing on their wellbeing.

of persons with disabilities, leveraging geotagging of residences and using other advanced technology so that there is better data, understanding, protocols and preparedness to respond to the differential vulnerabilities of persons with various types of disabilities. This can help safely move the bedridden to specialized facilities or hospitals than to relief camps. Data can also inform the equipment and type of assistance/ intervention needed and reduce any delay that could be fatal.

**Set up inclusive early warning systems that reach out to persons with disabilities and caregivers:** It

is important that we create inclusive early warning systems taking into consideration various types of disabilities. Brochures and pamphlets written in Braille scripts prepared by the KSDMA after the floods and landslides are good examples. In addition to preparing such materials, measures should be taken to ensure that they are put to use and are universally available to persons with disabilities all over Kerala.

**Involve persons with disabilities in the planning and decision-making processes:** Persons with disabilities understand their requirements better than anyone else. Instead of planning and making decisions for them, it is important to actively engage them in the planning and decision-making processes. There are persons with disabilities who are in a position to contribute during the various phases of a disaster, right from planning to rescue operations, managing call centres and control rooms, preparing and disseminating alerts, etc. Identifying and leveraging their talent and expertise and putting them at the centre of action makes a lot difference.

**Build capacities of various stakeholders, including KSDMA in disability-inclusive DRR:** Persons with disabilities, their families, rescue forces, volunteers and other key stakeholders should be sensitized to and trained in disability-inclusive disaster management. Civil Society Organizations can play an important role in this. Though KSDMA is currently providing such a support, it needs to be significantly scaled up. Besides this, KSDMA also needs to enhance its capacities with the latest strategies and technologies in disability-inclusive DRR.

**Respond to the post-disaster requirements of persons with disabilities:** Persons with disabilities went through a traumatic time during the disasters. Documenting their experiences and understanding the challenges they faced can help avoid similar situations in the future. In addition to assistive devices, many, including their families, are in need of economic support, counselling and other psychosocial interventions.





V. K. Aji



# Impact on Migrant Workers in Kerala

Benoy Peter and Vishnu Narendran

## Context

With Kerala's native population on the verge of a decline given the demographic advancement of the state, nearly 3.5 million migrant workers from outside the state play an important and indispensable role in the state's economy.<sup>1</sup> Barring a few traditional sectors, the economy is highly dependent on these workers for the low-skilled, low-valued jobs. Construction, marine fishing and fish processing, mining, plantation, plywood, iron and steel, textile and apparel, hospitality, furniture, footwear and jewellery are some of the major sectors in Kerala that depend on migrant workers.

In addition to the neighbouring Tamil Nadu and Karnataka; Jharkhand, Odisha, West Bengal, Bihar, Uttar Pradesh and Assam are the states from where the majority of these workers come to Kerala. There are also workers from Nepal and Bangladesh. While a large proportion of them are young single men from poor rural agrarian families of eastern Indian states with limited education, there are also a large number of single women and girls as well as senior citizens.<sup>2</sup> There are also families with children, including nomadic communities. Nearly 8,500 children from such migrant families study in government-funded schools in Kerala.<sup>3</sup>

The majority of the migrant workers belong to socially and economically deprived communities such as Scheduled Tribes, Scheduled Castes

and minorities. They live in crowded, unhygienic conditions in single-room dwellings with limited lighting and ventilation. They work in hazardous conditions with minimal or no safety measures, without social protection, for twelve hours or more, six days a week, drawing wages lower than that of the natives for the same job.

Kerala has emerged as one of the most prominent destinations in the region as the state offers the highest wage rates in the unorganised sector in the Indian subcontinent. A footloose male migrant worker gets a daily wage of six to nine dollars in Kerala for an eight-hour job. Climate-induced disasters as well as slow onset climate changes at their native places are also some of the many reasons that bring these migrants to Kerala. The remittances from Kerala enable the families of workers from such regions to better adapt to climate changes.

The Government of Kerala has initiated a host of measures for the welfare of migrant workers. The Inter-state Migrant Workers' Welfare Scheme, 2010 offers several benefits for the workers and their families, including disability allowances, health insurance, maternity benefits and scholarships for children. The Department of Education and Samagra Shiksha Keralam have employed additional teachers in several schools with a large number of children who speak languages other than Malayalam.

## Migrant Workers do most of the 'dirty, demeaning and dangerous' work in Kerala

COVID/ Savanan R. S.



The Aawaz insurance scheme launched in 2016 provides health and accidental insurance for the enrolled workers. Similarly, a housing scheme Apna Ghar for migrant workers was launched in Palakkad district in 2019.

While Kerala has substantially benefited from the migration of its people, the way the state treats the migrant workers clearly exposes its double standards. While there is an exclusive Department of Non-resident Keralites' Affairs for the Kerala diaspora of the size of nearly three million, there is no such institutional mechanism at the state level to oversee the welfare of the more than three million workers from other states in Kerala. The state officially calls the migrant workers 'guest workers', which though well-intentioned, is an inherently exclusionary approach.

Most of the migrant workers do not benefit significantly from the welfare measures offered by the state and often get excluded given the poor demand creation, design constraints of the schemes as well as lack of migrant-sensitive interventions. Introduction of Aawaz further weakened the implementation of the Inter-state Migrant Workers' Welfare Scheme, 2010 which offers a better basket of welfare measures. Besides, the collection of the biometric data of migrants under Aawaz appears to be more a surveillance rather than a welfare measure. Schemes such as Apna Ghar in its current form help subsidize the employers' and ghettoize the migrant workers instead of promoting mainstream living where the government plays the role of a regulator. While repatriating the bodies of the deceased is a great gesture from the part of the state, what is lacking is initiatives to prevent such deaths.

### Impact of Floods and Landslides

Migrants from outside Kerala were one of the groups catastrophically impacted by the floods and landslides that occurred in the state in August 2018. Several low-cost residential pockets of migrant workers are in the low-lying areas or near the rivers, which got submerged resulting in significant loss of assets, documents of proof of identity and other resources. Workplaces were also affected resulting in loss of livelihoods for long periods, aggravating the poverty and economic crisis of the workers as well as their native households.

The official estimate reveals that 2.3 million migrant workers were displaced from employment due to the disasters in Kerala whose wage loss is computed to be around USD 29 million.<sup>4</sup> Given the fact that this estimate only takes into account of the wage loss



CMID/Benoy Peter

## Being a Woman and a Migrant

Najeeda, a Muslim widow from Murshidabad district in West Bengal, runs a small eatery in the Kandanthara Bengali market in Perumbavoor. It provides low-cost Bengali food to the workers from West Bengal who live there. Najeeda's eatery got submerged and she lost all her stock of grocery and vegetables, vessels and utensils. The refrigerator, television and fans in the shop were damaged beyond repair. She did not receive the government assistance of USD 143 although her residence also was submerged. With the help of a native woman in the locality, Najeeda pledged her gold chain to a money lender to start business anew. There are several petty migrant entrepreneurs like Najeeda who are still struggling to come out of the economic impact of the disasters.



CMID/Benoy Peter

## A Migrant's Plight

Hailing from Thenkasi in Tamil Nadu, Muthu and Selvan earn a living as rag pickers in Ernakulam district. The area they lived was not directly affected by the floods, however the adjacent areas were flooded rendering them jobless. They were left with no food during the floods. Their supplies had run out and most shops and hotels in the locality remained closed. Although they had money, they could not buy food. Even the shops that were open had no stock as people frantically bought the stuff anticipating stockouts. Since water did not enter their premises Muthu and Selvan could not even go to the relief camps where free food was being provided. As there was no transport, along with six others, the duo walked over 11 km avoiding flooded areas to reach Aluva and managed to return to Thenkasi. Now they are back as the situation has improved.

during August 16-30, 2018, it could only be treated as the immediate wage loss and the real impact could be much more catastrophic.

The alert messages in the local language Malayalam missed out the majority of the migrant workers who do not comprehend it, resulting in poor preparedness to the impending disaster. This also crippled their access to information on how and where to reach out for support for evacuation. Priority was given to the natives in access to relief camps and there were instances of

migrants being denied shelter. In some places, stigma and discrimination by the natives resulted in the setting up of exclusive camps for migrants. Most of the relief camps had no mechanism to address the requirements of the migrant labourers. They had no choice but to accept whatever was provided without any complaint.

Many relief camps for migrants were prematurely closed, forcing them to move out. A lot of such evicted workers were left without any food, money, or shelter. There were also subtle

attempts to prevent migrant workers from returning to native places in order to avert the labour shortage for post-disaster cleaning and also to avoid industrial stagnation.

While the Railways operated unreserved trains to Assam, West Bengal and Odisha, there was no official mechanism to inform those who wanted to return home about the availability of these trains. Facility to transport the migrant workers to railway stations was also unavailable. Workers who lost everything were neither able to buy tickets nor



## Tiding Over the Crisis Together

When the floodwaters entered his *papad* making unit and nearby areas, Anil Kumar from Ambalappuzha approached six to seven relief camps in the district requesting to accommodate his workers. However, all of them turned him down. Most camps were full and some were reluctant to accommodate migrant workers citing that the camp was meant for families. Anil's enterprise had nearly 100 migrant workers and most of them belonged to tribal pockets of Odisha state. Unlike many other entrepreneurs, Anil did not off load his workers near a relief camp and flee the scene although he had incurred huge loss. Along with his family, he brought the workers to his brother's house in Alappuzha. Converting the house into a camp and registering it with the authorities, Anil provided food and water to the workers for about ten days, collecting the relief materials. He sets an example of a responsible employer during the time of calamity by protecting his workers.



## A Helping Hand for Kerala

Seeing the plight of the victims in relief camps, Vishnu Kachhawa, a migrant blanket vendor from Neemuch district of Madhya Pradesh donated over 500 blankets in Kannur district of Kerala. For the past 12 years, Vishnu has been visiting Kerala during the monsoons to sell blankets going door to door. "One cannot afford to remain a silent spectator when the people who have helped me earn a decent living are in trouble", he says.

could they show proof of identity and many were made to descend from the trains en route. Those who travelled starved without money for buying food and water.

A lot of migrant workers lost their weekly/monthly wage dues as the employers were either unable to settle it or were reluctant to pay. This forced

many workers to stay back although they wanted to go home. Very few migrant workers whose residences were inundated received the immediate relief assistance of USD 143 provided by the state. Lack of information about such a scheme, inability to furnish the application, lack of residential proof, absence of bank accounts, visits to native place, absence during the

inspection visits by the authorities<sup>i</sup>, lack of social support to follow up the application, etc. were some of the reasons for not getting the financial aid.

There was limited or no timely support provided to migrants in cleaning their dwellings, disinfecting their water sources or restoring electricity. The migrant workers who were hired by the

<sup>i</sup> inspections took place during the day when migrants go to work



PTV / A. S. Satheesh

natives for the post-disaster cleaning worked without preventive gears such as boots, gloves or facial masks and were exposed to risks of snakebites and hazardous waste. Migrants were by and large also left out of the prophylactic treatment against leptospirosis. While there was a universal shortage of food and clean drinking water in the disaster-hit areas, this was severe in the residential areas of migrant workers as these areas were not prioritised by the relief volunteers.

Although there were exceptions, local politicians were more worried about the natives than the migrant workers who are not part of the electoral roll. Except the Government of Odisha, no other source state took significant initiative to provide relief to the affected workers from their state in Kerala. Footloose workers who are not attached to any employer, recently arrived migrants with limited familiarity with the locality, women and girls, families, particularly

those with children, migrants from tribal communities, migrants with disabilities, migrants in remote areas or areas which got isolated due to the disasters, and migrant entrepreneurs were some of the severely impacted subgroups within the migrant population.

### Recommendations for a Better and Inclusive Response

Malayalis prefer migrant workers for doing all sorts of hard labour, including the construction of huge buildings, malls, metros and roads. But once the work is done, they do not prefer them to be in their visible spaces. This underlying element of feudal culture and disrespect for the migrant labourers has been there in the Kerala society. This was evident during the time of the disasters as well, when the native population insensitively refused to share their space in the relief camps operations, putting them into deeper trouble and unveiling the

discrimination faced by them.

Kerala has been one of the pioneers among the Indian states in recognising the contributions of the diaspora, by setting up a Department of Non-Resident Keralites' Affairs (NORKA) and constituting *Loka Kerala Sabha*, a platform that provides the diaspora an opportunity to contribute to policy formulation of the state. With the remittances from the diaspora amounting to nearly 36 per cent of the State Domestic Product (SDP), Kerala understands well how migration sustains its economy. The migrants who come to Kerala for work should also be treated with the same dignity and sentiments that the state has for the Malayali diaspora. The following are some of the recommendations towards a better and inclusive response, keeping in mind the inherent vulnerabilities of migrants in the state:

**Kerala requires the migrants more than they require the state. Creating this awareness among the key stakeholders is fundamental to developing inclusive policies:** Migrants fill an important vacuum and play an indispensable role in Kerala's labour market. In fact, when migrants have the choice of other destinations in the country, the state's economy is dependent on the migrant workforce given the demographic scenario. Creation of this awareness among key stakeholders is fundamental to stimulating a vigorous response towards mainstreaming the migrant workers. The industry and private sector also need to be sensitised to complement the efforts of the government and the civil society.

**Programmes should be migrant-sensitive and inclusive:** It is important to recognise migrant workers as a vulnerable group in disaster preparedness given their socio-economic and political exclusion and inherent marginalisation. Keeping this in mind,

the challenges of this vulnerable group are to be sensitively considered and efficiently addressed, right from planning disaster preparedness programmes to rehabilitation and recovery. The requirements of the migrants should also be understood through research.

**Instead of ad hoc welfare measures, set up institutional mechanisms for social protection of migrant workers and their families:** While there is an exclusive government department to take care of the affairs of the Kerala diaspora, currently there is no institutional mechanism with adequate human resources to ensure the social protection of the migrant workers in the state. This needs to be immediately addressed and universal access to available measures of social protection should be provided to migrant workers and their dependents in Kerala. Migrant-sensitive redressal systems should be set up to understand and address the grievances of migrants who were affected by disasters.

**Leverage the potential of Civil Society Organisations in reaching out to migrants:** Given the profile of migrants and their barriers to access government systems, the Civil Society Organisations have a pivotal role in complementing the state in fostering migrant inclusion. Instead of migrant workers reaching out to the Government systems, the systems should have provisions to reach out to them through CSOs, recognising migrants' constraints in accessing them. Migrants should be reached out at a time and location convenient to them by those who can communicate with them.

**Evolve migrant-sensitive communication strategies:** Migrant workers from Assam, West Bengal, Odisha, Tami Nadu and Karnataka work predominantly in Kerala in addition to the Hindi speaking workers. In order to overcome the language barrier and limited literacy levels of the migrants, migrant-sensitive communication strategies should be evolved.



T. K. Pradeep Kumar

Migrant workers engaged in the post-disaster cleaning received limited preventive gears





# Impact on Older Persons

Celine Sunny and Benoy Peter

## Ageing in Kerala

With 12.6 per cent of the state's total population above 60 years in 2011, Kerala not only tops among the Indian states, but also has surpassed Sri Lanka which has the largest proportion of older persons among the countries in the South Asia region.<sup>1,2,3</sup> Fastest among the Indian states in the ageing process, Kerala has the highest old age dependency ratio in the country.<sup>4</sup> The 4.2 million older persons in Kerala face several challenges. Loss of livelihood, income and property, lack of engagement, limited mobility, separation from significant others, death of their spouses, lack of recognition, loneliness, dependence on others, disabilities and morbidities are some of them.

While the majority of the older persons in Kerala live with their significant others, the demographic transition, the spread of nuclear families and the migration of their children have given rise to a situation wherein several households are left with only older persons. Nearly three to five per cent of the older persons in Kerala live alone and about 20 per cent of them are from the lowest wealth quintile.<sup>5,6</sup> The old age homes are increasingly becoming visible in Kerala and the culture of sending older persons to such institutions is gaining popularity in the state which already has the largest number of such homes in the country.<sup>7,8</sup>

The feminisation of ageing in Kerala is very evident. Women outnumber men among the older persons in the state. The life expectancy at birth for women in Kerala is 77.8 years, whereas for men

it is 72 years.<sup>9</sup> The custom of women marrying older men and longer life expectancy of women are the two key reasons for this. While women constitute 55 per cent of the persons aged 60 years and above, they form 62 per cent of the persons above 80 years. Among the women above 60 years, 57 per cent are widows whereas only nine per cent of men in the same age group are widowers.<sup>10</sup> The long period of widowhood is often traumatic, given the overall low workforce participation of women, resulting in their dependence on the family during the older ages. The majority of the older persons who live alone in Kerala are also women.

The official retirement age from government jobs in Kerala is 56 years and given the life expectancy of 74.9 years, a person in Kerala has to move out of the formal labour force during the peak of his/her experience with nearly 20 life years ahead. At the same time, many older persons who work in the informal sector, who do not have dependents or any regular means of income, are unable to move out of the labour force even if they wish to do so. The workforce participation rates of older persons are higher in the case of the poor, the less educated as well as those belonging to the Scheduled Caste or Scheduled Tribe communities. Nearly eight per cent of the elderly men and about three per cent of the elderly women continue to work even at the age of 80 years.<sup>11</sup> Nine in every ten older persons in Kerala in the lowest wealth quintile work out of economic compulsions.<sup>12</sup>


 An elderly man with grey hair, shirtless, is cooking in a traditional kitchen. He is leaning over a large, dark, earthenware pot on a brick stove. The kitchen has a rustic, aged appearance with a window in the background showing a wooden lattice. The lighting is warm and natural, coming from the window.
 

## Kerala surpasses Sri Lanka, the country with the largest proportion of older persons in South Asia

Kerala has been one of the most proactive states in the country that has initiated a host of measures for the welfare of older persons. The state formulated a policy on older persons in 2006 which was further refined in 2013. The Kerala Maintenance and Welfare Citizens Act, 2007 provides protection to those who are unable to maintain themselves. Complementing the welfare programmes implemented by the Department of Social Justice and the State Social Security Mission, various departments such as Health, Labour and Skills, Local Self-Government, etc., have their own programmes for the welfare of older persons. In addition to the old age homes and day care centres run by the Civil Society Organisations, there are also government institutions. The old age homes run by the government are overcrowded given the insufficient capacity.<sup>13</sup> While the awareness of the social security measures is relatively good in the state, the coverage and utilisation are still suboptimal.<sup>14</sup>

The accessibility of government buildings and public places continues to be poor, creating barriers for the older persons. The government provides an old age pension of USD 16 to eligible senior citizens and this is delivered at their doorsteps. The National Rural Livelihood Guarantee Programme has been a critical support to several older persons who are less likely to get other jobs and are desperate for income through work.

### Impact of Floods and Landslides

The digital divide and limited exposure to media kept the older persons clueless about the developments and the alerts. In the panic situation, trying to salvage the assets and lives, not many cared to brief the older persons on the developments. Many older persons refused to relocate to safer places as they had hardly understood the gravity of the situation. Several of them were overconfident and discouraged the

rescuers, rationalising that they had seen enough life and nothing grave would happen. At the same time, there were also others who panicked given the terrifying narratives of the 1924 flood they had heard from their elders. Some of the older persons, particularly those who lived alone as their spouses had passed away, were reluctant to leave the premises bearing the memories of their dear ones. Elderly couples whose children had migrated had limited support to move out. The class and caste barriers also were deterrents for many to shift to a relief camp.

Given their poor health and agility, it was difficult to swiftly move older persons to the relief camps or to safer locations. This was more complicated in the hilly areas where the landslides occurred. The delay of families in moving out from such vulnerable areas due to the presence of very old persons, the bedridden or older persons with disabilities, resulted in increased casualties. Moving bedridden

persons, persons with urine bags and persons with disabilities was challenging. In many flood-affected areas, basins were used for transporting older persons which was highly inconvenient for them. Rare cases of family members leaving behind the older persons at home when moving to safer places were also observed in the flood-affected areas.

There were several older persons who could not be moved to safer locations. Those who did not realise the gravity of the situation and were reluctant to move to relief camps later got stranded without sufficient food and drinking water for several days. In the case of multi-storey buildings in the flooded areas, moving the bedridden and the very old to the upper levels was difficult without sufficient external support as the lifts were dysfunctional due to the disruption in power supply. The older persons who lived alone and households where elderly couples were the sole residents had difficulty in ensuring supplies when they were stranded as they could not fetch the provisions and were dependent on the relief supplies by the volunteers.

The older persons who got stranded on the terrace of the houses had a tough time. There was a shortage of clothes, blankets and other supplies and the exposure to rain, wind and the cold weather complicated the morbid conditions for many. Lack of sufficient supply of food and drinking water and loss of medicines further aggravated it. Bedridden persons who were stranded on rooftops were severely affected. In the absence of facilities to meet their primary needs, many stranded in the houses or on the rooftops remained soiled in urine and excreta for multiple days. Neighbours were of great help to many older persons who did not have immediate relatives within easy reach. Deaths of older persons too were reported from the flood-affected areas due to lack of timely access to emergency care.

In the crowded conditions of the relief camps, those who were very old, the bedridden, the sick, and those who used bed pan, urine bags or followed a special diet had a tough time. In several cases, the change of caregivers who

attended to their primary needs made them feel stressed. Initial shortage of medicines affected the older persons who were under medication. The sudden changes from their habitual environment made several of them distressed. Many found their sickness aggravated as a result of the life in the camps. Deaths of older persons were also reported from the camps.

Lying on the floor and getting up was difficult for the older persons as cots were not available in most of the relief camps. Besides, the majority of the buildings that were used as camps were not accessible to the older persons. The toilets were also not elderly friendly. The relief materials, particularly the clothes provided did not suffice their requirement. Older persons who wear traditional attires found it hard to find a compatible one among the clothes distributed in the camps. Such inhibitions made many to stick to their shabby clothes. Besides, many older persons had the responsibility of looking after the grandchildren which aggravated their struggles in the crowded camps.





## Three Days on a Tabletop

Age has drawn wrinkles over the body of Damodara Pillai and Vasu Pillai, both brothers and over 75 years old. Since his son works in the Middle East, Damodara Pillai, a widower, lives with his daughter-in-law and grandchildren in Pandanad. Pandanad, which lies in the Pamba basin in Alappuzha district was severely affected and got isolated in the deluge. Unmarried, Vasu Pillai also lives with his brother and his family. Both brothers have difficulty in walking, being so old. In addition, Vasu Pillai has hearing impairment too. Since the elderly brothers were unable to climb the steps to take refuge on the rooftop, they were shifted to a nearby house as the flood hit Pandanad. Everyone thought water will not enter that house. It was with much difficulty that the Pillai brothers walked up to that house, all the way through the water. Assuming this place to be safe for the elderly who cannot climb steps, the daughter-in-law moved to the terrace of another house with children.

Unfortunately, the place where Pillai brothers took refuge also got flooded. While Vasu Pillai managed to climb onto the dining table, Damodara Pillai was too frail to make it. There was no one else in the house to help him and the water rose up to his chin level. A neighbour who was engaged in rescue operations found Damodara Pillai sinking. He lifted up Damodara Pillai, who was numb and speechless with cold and the shock, and made him lie on the dining table. Any delay in finding him would have resulted in the death of the old man. For three days, the elderly brothers lived on the tabletop eating the porridge the neighbour brought from time to time wading from the rooftop where they cooked. The experience of the Pillai brothers underlines the need for DRR sensitive to the differential vulnerabilities of the older persons.



## Starting Life from Scratch

With his 23-year-old daughter suffering from cerebral palsy, John and his wife are displaced and live in a rented house in Mananthavady town in Wayanad district, paying USD 43 per month. Their house in Boys' Town in Thavinjal panchayat got damaged in the landslips and the place is not liveable anymore. John, who is 63 years old, has been sentimentally attached to the house where he had lived with his parents, his children grew up and their marriages took place. Investing a significant amount from his hard-earned savings, John had even constructed a ramp from the road to his house so that an auto-rickshaw can come down till the front door of his house to take his daughter with disability to hospital as and when required. A farmer, John lost most of his crop this year in the landslips. As the place is not liveable anymore John had no option than take up the small piece of land provided by a non-profit which is far away from his original place and the agricultural land. Once the construction of the house is complete, he will have to commute more than 20 km every day to come to his farmland for work. John is not ready to give up and he does not have a choice too. He is building back his life brick by brick. There are several older persons like John who are the sole breadwinners of the households with multiple vulnerabilities.



B. Muralikrishnan

## Wading through the Tides Alone

Mary, a 65-year-old widow lives alone in her house on the banks of the river Periyar in Gothuruth in Ernakulam district. Her only source of income is the pension of USD 16 provided by the government, as her daughter who got married lives elsewhere and is unable to support her financially. Mary's house was damaged in the fury of the floods; the kitchen area was completely destroyed. She does not have a title deed for the land on which the house is built. Though the government has announced rehabilitation packages for such people also, she does not know whom to approach. Along with the loneliness and ailments of age, the flood has put her into deeper waters.



P. P. Binoy

## Own Their Own through Thick and Thin

Ammini and Velappan are the sole residents of their house on a hillslope in the Vellathooval panchayat in Idukki district, which was badly hit by the landslides. Their children got married and live elsewhere. The house was severely damaged in the debris flow through both sides. The floor and walls developed cracks and the steps were partially destroyed, making it difficult for the elderly couple to climb and alight. Since there is no other place to go, they continue to live in the damaged house. Velappan who is 65 years old has heart problems and 62-year-old Ammini suffers from chronic backache. For subsistence, the couple bank on the meagre old age pension provided by the government. Getting to the road negotiating the slope is a real struggle for both of them. And each time they have to fetch something they must get down. When it rains, they take refuge in their neighbourhood. When there is a shortage of piped water, this is all the more difficult. Since they are weak, they can bring water only in small quantities at a time and this warrants several trips up and down. Initially the government had sanctioned money to build a house, but not to buy land, even though their land was declared uninhabitable. After a year-long struggle and negotiations with the authorities, they were able to buy a house with the support of government, in August 2019. Their struggle is just a mirror held against the lives of scores of older persons made more vulnerable by the disasters



Madhurai

Witnessing the damage and loss was traumatic for the older persons as they returned home from the camps.

Older persons have been the sole breadwinners in many households in Kerala. A large number of them depend on agriculture, animal husbandry or poultry for their livelihoods. Such households were disproportionately impacted. Many lost their houses, agricultural land and other means of income. Permanent displacement from their usual residence has been a big blow to several older persons. This is severe in the case of the older persons from tribal communities, many of who still remain displaced in Wayanad, Idukki and Malappuram.

Witnessing the damage and loss was traumatic for the older persons as they returned home from the relief camps. Weak and depressed, they found it difficult to cope with the situation. The floods and landslides damaged and displaced their documents,

including the medical records, pension books, bank passbooks, identification documents and even land title deeds. Many older persons had lost their assistive devices also. In the immediate post-disaster scenario, the requirements of the older persons were not a priority to the other family members.

Although all over Kerala, the LSGs and volunteers extended their support in the cleaning of houses, wells and clearing the waste, further efforts required to bring life back to normal were tough for the older couples and older persons who lived alone. Following up on the government funds, pursuing insurance claims, obtaining duplicates of the documents lost, finding alternative land for the construction of a house, etc. have also been hard for the older persons without support.

The psychological impact of the disasters on the older persons has been significant and would need long-term interventions for recovery. A lot of them felt hopeless, helpless and worthless. The displacement, though temporary, had a toll on the emotional wellbeing of the older persons. Psychosocial interventions among the older persons were also limited. They often lack someone to vent their feelings, adding to the misery. Several older persons also experience financial difficulties. Many have lost their houses, household property, lifetime assets and significant others. This has resulted in depression, discontinuation of medication and withdrawal.

## Recommendations

With significant advancement in ageing, which is ahead of most of the countries in South Asia, Kerala faces unique challenges in addressing the needs of the older persons. The disasters have exacerbated their vulnerabilities. Elderly couples who were the only residents of the households, older persons who lived alone, those who were over 70 years, older persons with disabilities, those who lost family members in the landslides, the bedridden, those who were left behind by other family members during the disasters, older persons from poorer families, those who remain displaced, those whose livelihoods are affected, older persons who are the breadwinners of the family and older women, particularly the widows, were some of the subgroups disproportionately affected. The following are some of the recommendations to respond to the needs of the older persons in the context of the disasters:

**Understand in depth how the older persons were negatively impacted by the disasters to rule out such situations in the future:** It is important to study in detail, the impact of the disasters on the older persons. Understanding who among the older persons have heightened vulnerabilities and documenting their experience during the rescue, relief and rehabilitation phases will offer valuable insights for a better and efficient disaster response in the future.

**Mitigate the impact of the disasters on older persons on a war footing:** The floods and landslides have impacted the older persons severely. Many of them continue to be displaced even now. There are various subpopulations who have been impacted disproportionately and possess compounded vulnerabilities. Immediate and time-bound efforts are needed to address their displacement, financial constraints due to disasters,

continuity of their medication, access to nutritious food and their mental health issues. Households with older persons should be given priority in housing and other recovery measures.

**Strengthen the local capacities in inclusive disaster risk reduction:** The LSGs and CSOs can play a pivotal role in DRR and optimising the local level response to natural hazards. Based on the lessons learned from the floods and landslides, the KSDMA may develop a detailed module to train the LSGs and CSOs in identifying the highly vulnerable among the older persons, reducing their risk and responding to their unique

needs. Such a module could be of benefit to other Indian states also.

**Ensure universal, barrier-free access for older persons in the existing and the newly proposed structures:** Most of the government buildings and public spaces such as the bus stop shelters do not take into consideration the requirements of the older persons. While it is important to ensure that the new constructions including the houses, are designed in a manner that is accessible to older persons, it is essential that all existing government buildings and public places are made barrier free.



**Foster the financial independence of older persons:** A large number of the older persons from the disaster-affected areas depend solely on the monthly old age pension which is meagre and irregular. Generally, bulk payments are made once in a few months instead of monthly payments. It is important to enhance the pension significantly so that the older persons are able to meet their expenditure. While it is a great help that the pension is delivered at their doorsteps, it should be disbursed every month so that the older persons are not at the mercy of others.

**Address the mental health issues of older persons:** The older persons underwent significant trauma during the disasters. However, not much focussed attention has been provided to respond to the psychosocial needs of the older persons affected by the disasters. This may be taken up as a priority as this group is less likely to reach out for professional assistance.

**Enhance the formal retirement age to 65 years; but provide options for early retirement for those who wish:** Given the significant increase in life expectancy, the current retirement age of 56 years is too unrealistic, and a person's vast experience and expertise are discarded or underutilised. Enhancing the age of retirement will keep the person optimally engaged and keeps him/her healthier. At the same time, there should be also options for early retirement for those who wish to retire early. The government should also ensure that no senior citizen is desperate for work out of financial constraints.

**Old age homes in Kerala should be liveable and cater to the demand:** Although staying with their families is ideal for older persons, there are also people who have no one to take care of, the majority being women. Since the facilities currently accessible to the poor and the vulnerable are overcrowded, measures should be taken to ensure

that the old age homes in the state are liveable and effectively cater to the increasing demand. The day care centres for the older persons may be attached to primary schools which would make the environment lively and provide an opportunity for communication between children and older persons.

**Older men and women living alone need more attention and care:** Older persons living alone are highly vulnerable to deprivations and exploitations. The feminisation of ageing has resulted in a lot of older women living alone. Many are unable to take up the daily household chores such as cooking which can even reduce their consumption. Keeping this in mind, mechanisms should be devised to provide proper hand-holding and care for such persons.







T. K. Pradeep Kumar



# Impact on Women

Vidya S. Chandran and Baishali Goswami

## Context

Women and girls outnumber men and boys in Kerala, with over 17 million of them constituting 52 per cent of the state's population in 2011.<sup>1</sup> The state has made significant strides in women empowerment and tops among the Indian states in its progress towards achieving the Sustainable Development Goals on gender equality and empowerment of women and girls.<sup>2</sup> The advancement in human development in the state has resulted in women achieving high levels of education and longevity of life compared to their counterparts in most of the other Indian states. This has been a combined outcome of the social reforms in the state, investments in education and healthcare, geographic advantages related to access, proactive government policies and a host of other factors. There is not much gender differential in the overall levels of literacy, school enrolment and retention rates in the state.

Women in Kerala enjoy a better health status as reflected by the lowest maternal mortality ratio in the country and better longevity. The state has a sex ratio at birth favourable to girls. Kerala has also undergone a demographic transition to reach the replacement level of fertility through its family planning initiatives and safe delivery practices and the state owes it to the better social status of women.<sup>3,4</sup> Kudumbashree, the state's programme for poverty reduction and women empowerment is globally renowned. The state has mandated 50 per cent reservation for

women in the representation in Local Self-Governments in Kerala, including the key positions. Kerala also has a Gender Equality and Women's Empowerment Policy that came into effect in 2015.

Despite the impressive gains in the conventional indicators and transformative investments, women in Kerala continue to be a vulnerable segment of the population. They do not necessarily enjoy the kind of freedom expected in a state like Kerala with high levels of human and gender development.<sup>5</sup> Only about 12 per cent women in the age group 15 to 49 years have the freedom to go alone to market, health facility and places outside the village.<sup>6</sup> Although the state boasts about its history of matrilineality, men have the control over the assets and wield the decision-making powers in most households. While Kerala is much ahead of other Indian states in its progress towards gender equality and empowerment, it lags considerably behind in the SDG index score for Goal 5 with a score of 50 out of 100 and is neither an 'achiever' nor a 'front runner' according to the NITI Aayog.<sup>7</sup>

The lower visibility of Keralite women in the public sphere has sparked debates. Their presence in the Kerala Legislative Assembly and representation from Kerala in the Indian Parliament are abysmally low even in 2019. The weak political representation of women at the state level significantly limits women's voices from being heard and effectively addressed. The major political parties



in Kerala continue to field mostly male candidates for the state and parliamentary elections. Only 5.7 per cent of the current state legislative assembly seats are represented by women and there is only one woman among the 20 parliament representatives elected from Kerala in 2019. The political participation of the women in LSGs has improved only after the introduction of fifty per cent reservation.<sup>8</sup>

The state has one of the lowest female workforce participation rates and it has been steadily declining. The Fifth Annual Employment and Unemployment Survey 2015-16 reveals that the labour force participation rate among women in Kerala aged 15 years and above is only 31.4 per cent and the unemployment rate is 24.5 per cent. The corresponding figures for men are 71.7 per cent and 3.7 per cent respectively.<sup>9</sup> Moreover, women are often found to be stuck at the lower end in terms of both pay scale and authority.<sup>10</sup> Despite the state's Gender Equality and Women's Empowerment (GEWE) Policy expressing its concern, the representation of women among

the members of the state's Planning Board has come down from one woman among nine members in 2013 to one among twelve members in 2019.<sup>11</sup>

Women get lower wages compared to men for the same job in many sectors even now. Their control over assets is also limited. A clear trend of limiting the property rights of women by payment of dowry at the time of marriage and thereby cementing their dependent status has become prominent in the Kerala society in the last quarter of the twentieth century.<sup>12</sup> Only about 40 per cent of women in the age group 15-49 years in Kerala have money that they can decide how to use.<sup>13</sup> The majority of the women aged 60 years and above in the state are widows and depend on their families. Nearly 30 per cent of women in the age group 15-49 years owned a house whereas one in every two men in the same age group owned a house.<sup>14</sup> Women's ownership of land also is minimal in Kerala. Women also constitute the majority of the older persons living alone in the state.<sup>15</sup>

While the state has a Department for Women and Child Development and GEWE policy, Kerala continues to have several state-funded schools which are exclusively for boys or girls, reinforcing the gender stereotypes from younger ages. Although there is no gender differential in the overall enrolment and retention of children in schools, there continues to be a gap in the enrolment of girls with disabilities.<sup>16</sup> The state has a 'Pink' Police Patrol designated for the safety of women, demonstrating the mismatch between the policy and the practice of stereotyping. The prevalence of domestic violence and crimes against women also continue to be high in the state.

Even the impressive achievements in the demographic front of modernization of childbirth and birth control are accomplished using female bodies as the instrument in the name of sterilization, caesarean section delivery etc. without considering women's control over their sexuality.<sup>17</sup> The 'gender parity' Kerala achieved in select conventional indicators is by merely fulfilling the

practical needs of women without attempting a gender transformation or questioning the conventional gender roles.<sup>18</sup> The newly acquired potentials of better education and health have been used effectively to propagate an “enlightened domesticity”, internalizing the message of male superiority instead of questioning it.<sup>19,20</sup> The case of women in Kerala clearly demonstrates that better education or better health, though necessary, are not sufficient to perform the transformative role towards empowering the individual.

### Impact on Women

Women bear the brunt of disasters disproportionately due to the gendered construction of identities which idealizes their vulnerability and weakness. The

2018 floods and landslides showcased both the resilience of the society and the fissures immanent in the disaster preparedness. The impact of the disasters on women varied by the nature of their differential vulnerabilities, complicated by a host of factors such as age, ethnicity, income, marital status, occupation, ability and autonomy. Pregnant women, women with infants and toddlers, single women, women with disabilities, older women, women with the aged/chronically ill/bedridden/ persons with disability in the household, widows, single parents, women who were heads of the households, self-employed women, migrant women, women from tribal populations and adolescent girls were some of the subgroups who were impacted severely.

**Women bear the brunt of disasters disproportionately due to the gendered construction of identities which idealizes their vulnerability and weakness. The impact of the disasters on women varied by the nature of their differential vulnerabilities, complicated by a host of factors such as age, ethnicity, income, marital status, occupation, ability and autonomy.**

A key aspect of disaster management is disaster preparedness itself which includes inculcating the crucial skills for disaster preparedness and survival among its population. The prevalent gender norms that reduce women to domesticity and prescribe notions



Many mothers were traumatised as their children got separated during the rescue process

Reuters /Sivaram V.

of femininity that constrain, mould and objectify them had the effect of straightjacketing during the floods and landslides. On the one hand, this created hurdles in the rescue. On the other, this resulted in a systematic exclusion of women by and large from the rescue activities and negated their roles of being potential rescuers.

In many cases, women were the victims of male decisions. Even during such a dire situation, the decisions were left to the male members of the family which often compromised the wellbeing of women. There were instances when the rescue teams found it hard to shift women from the affected households to safer places as they waited to obtain permission from their husbands, or other male members of the family. Several girls stranded in hostels also refused to move out without the consent of their families. Sometimes the men decided

to stay on the rooftops and wait for the waters to recede even as the rescue teams pleaded with them to move to the camps. Such decisions compromised the health of women in the family as they had no access to clean water or toilets.

While not a single incident was reported, a lot of women were worried about potential sexual abuse during the rescue process which made them reluctant to move out. Women also had difficulty in moving out as they were the primary caregivers of the children, the aged and the infirm in the family given the gender roles. This additional responsibility, which ideally should have been shared, added to their plight and delayed their evacuation. Many mothers were traumatised as their children got separated during the rescue process or went missing for short periods. Besides, being the gendered 'custodian' of the domestic affairs, women were engaged

**Being the gendered 'custodian' of the domestic affairs, women were engaged in salvaging the animals, poultry and other resources which also hindered their evacuation. Such delays even cost the lives of women in the areas where landslides had occurred.**

in salvaging the animals, poultry and other resources which also hindered their evacuation. Such delays even cost the lives of women in the areas where landslides had occurred.

Rescue and evacuation of women were slowed down by a host of other factors too which include their sartorial choices and lack of agility, both linked to the gendered construction of identities.

V. S. Shime



Boarding the rescue vehicles was challenging for many women

## Even though they themselves were unwell, looking after the children was a woman's job in the camps



Those who were in saree, mundu, nightie and other traditional attire had difficulty in wading to safety given the water levels. The prevailing gender norms which shun agility and athleticism in women also denied them the crucial skills of survival during disasters like these. Women had found boarding the heavy trucks and other rescue vehicles difficult, always requiring the help of others. For pregnant women, women with infants and toddlers, older women and women with disabilities, this was even more difficult.

The disasters increased the vulnerability of women with disabilities as a lot of them had to depend heavily on strangers. Many relief camps were not barrier free and the women with disabilities had a harrowing time using the bare minimum facilities available which in most cases

included only a ramp. Limited privacy was another issue. In addition, the needs of women with disabilities are unique which need to be specifically addressed.

Most women were clueless about the exacerbated displacement and had thought they can return to their houses quickly. Besides, a lot of them were panic-stricken and were little prepared for the evacuation. So not many women had stocked extra clothes including undergarments when they moved to the relief camps. Many of them had to use the same undergarments for several days. In Wayanad, where the spree of landslides and floods had started much earlier than in other parts of Kerala, there was a shortage of dry cloths in the initial phase. The cold and humid climate made drying them a difficult task. Many had to wear the same cloths

or partially dried clothes for days until the relief material poured in. The women and girls who were menstruating during the rescue phase suffered significantly given the secrecy and stigma associated with menstruation even in a society like Kerala. Initially there was a shortage of sanitary napkins. Damp environment and lack of facility to wash clothes added to the misery. However, provisions were quickly made to ensure the availability of sanitary napkins in most of the camps.

Tribal women had compounded vulnerabilities given their ethnic and gender identities. Among tribes like the Muthuvan of Idukki, the practice of menstruating women living in separate quarters still prevail. Many Muthuvan women had to live in the allocated quarters during their periods in places where the Anganwadis or community



B. Muralkrishnan

## The Complex Fabric of Life

Rathi, hailing from Ernakulam district and in her late forties, lost her husband during the floods. Her husband, who was schizophrenic, was accommodated in the first rescue boat that reached them whereas Rathi and her young son had to wait for the next boat. Rathi's husband was missing from then onwards. All efforts to trace him turned futile and his dead body was found later. Her sense of guilt in letting him go alone was compounded by her family members who blamed her for his death. Rathi had to undergo psychiatric treatment following this traumatic episode. Though the floodwaters have receded, life has come to a standstill for her. The death compensation of nearly USD 6,000 from the government is deposited in the bank which she can avail only when her son turns 18 years and the interest is taken away by the bank since their house is on mortgage. Rathi has now a stitching machine donated by a local leader; but it is the complex fabric of life that bewilders her.

The prevailing gender notions render women the primary caretakers. Despite the intense psychological stress, women were forced to extend the same responsibility in the relief camps too, prioritizing the other family members' needs, even though they themselves were unwell.

halls which were converted into relief camps were within the premises of the colonies. Such notions of impurity associated with menstruation which denigrate the status of women are so deeply rooted that women subscribe to them willingly. For instance, in Wayanad, many tribal women were upset about breaking the age-old menstrual taboo in the camps. The existing social hierarchy that reduces the tribal population to

the fringes also added another layer of segregation and exclusion against tribal women. Though food was prepared by women in many relief camps, tribal women were not involved in the job as others were sceptical. Instances like this demonstrate the pitfalls of generalising the experiences of women without considering the complexities of the gender spectrum.



CMID/ Binu P. K.

## Ordeals of a Pregnant Woman

When her natal home at Edathua got flooded Shyjimol, in her thirties, was in her second month of pregnancy after a long wait of four years. They first shifted to her husband's house and from there to a relief camp in a boat. Inadequate facilities forced them to shift to Cherthala in a huge truck. All these while she had to wear the same wet clothes and was extremely panicked. Since she felt sick with acute back pain, the family took her to hospital and then shifted her again to the safety of her sister's house in Kollam, in a truck. Shyjimol was later diagnosed with several infections which persisted all through her pregnancy. Engrossed in taking care of her little one, Shyjimol prefers to forget those days as a bad dream.

Women had to cope with both physical and psychological issues following the disasters. In Kerala, as in many patriarchal societies, prevailing gender notions render women the primary caretakers. Despite the intense psychological stress and physical illnesses, they were forced to extend the same responsibility in the relief camps too, caring for their husbands, children

and older persons in the household and prioritizing the family members' needs, even though they themselves were unwell.

Access to clean and hygienic public toilet facilities got aggravated during the disasters, affecting even the relief camps. This was severe in waterlogged areas. To avoid using toilets with poor

hygiene they ate less and drank little water which affected their health. This included breastfeeding mothers. Also, there were no separate toilets for men and women in several camps, which made many women reluctant to use them. Those women who were stranded in the buildings and terraces for three to five days had to struggle in terms of access to toilets and availability of

B. Muralikrishnan



## When Life Has to Be Rewritten

Being a wheelchair-bound woman, Mini from Aluva, in Ernakulam district, had a tough time during the disasters, the major issue being inaccessibility to toilets in the camp. Either the wheelchair would not enter the small toilets, or there was no ramp to access them. Privacy was another issue to access toilets in the crowded camp. While everyone moved upstairs when the relief camp also got flooded, she had no other choice than leaving the camp and moving to a relative's house. It was with much difficulty that Mini moved to that house, wading through the water. As she did not stay in camp, most of the relief materials did not reach her. She makes paper pens and other handicrafts for a living and the meagre disability pension is her only other source of income. Both her parents are unemployed and her brother too does not have any stable income. She lost her stock of pens as well as the materials for making pens and other crafts, incurring a loss of around USD 715, which is a huge amount for her. Though there are not many orders after the floods, Mini has started making pens again to make a living.



sanitary napkins. They had to carry out their primary needs before daybreak and once the sun set. In the absence of food or drinking water many had to quench their thirst by collecting rainwater. At places where they did not have any option to collect it in a bottle or utensil, they wet towels and wrung them to drink the water.

The suffering of the elderly women was compounded by their physical weakness and subsequent feeling of anxiety and insecurity. Many of them had the additional burden of looking after their grandchildren. In the case of women with advanced age, there were issues of mobility too as it took considerable effort to shift them to safety. There were many elderly women surviving solely on family pensions. The disasters were a blow to these people who had no other means to sustain themselves.

The disasters severely affected the livelihoods of many women. A large proportion of women had been engaged in low-productive and labour-intensive jobs in the traditional sectors such as handloom, Khadi and coir which were severely hit by the floods. The impact was substantial in the case of women whose petty businesses were affected by the floods and landslides. Those who ran petty shops or grocery stores had little business immediately after the disaster as free supplies were pouring in. This also include migrant women with limited education, from states such as West Bengal, who ran eateries and other small businesses in Kerala which were shattered by the disasters. In addition, many women were engaged in backyard farming. A lot of them were widows or heads of households. There were women who made a living with a few cattle or poultry which are neglected in

**A large proportion of women had been engaged in low-productive and labour-intensive jobs in the traditional sectors such as handloom, Khadi and coir which were severely hit by the disasters.**

records but assume significance against their struggles. In the larger process of rehabilitation and recovery many women were unable to revive these avenues of income as the stress and burden of rehabilitation fell on their shoulders.

A lot of the tribal women were engaged in agricultural labour. After the disasters,

## Migrant women who ran small eateries in Perumbavoor were severely impacted





## Restoring the home after the floods was mostly a woman's burden

Sajan V. Nambiar

many of them lost their livelihoods as labour was hard to come by. The meagre patches of agricultural land several of them owned were lost in the landslides or rendered uncultivable by the disasters, adding to the misery. There were also women's collectives engaged in small-scale enterprises which were severely affected. In some places the agricultural land which the women's collectives had taken on lease for farming was entirely covered over by the debris from the landslides rendering the land uncultivable. In addition to the loss, they were also severely burdened with the task of repaying the loans. Many of these women who constitute the lowest rung of the society stand outside the ambit of credit or insurance.

The post-disaster scenario also has been stressful for a lot of affected women. While the first level of cleaning of the houses was done with the support of volunteers, in most cases, it was women who were burdened with the task of restoring the houses after the floods. The women who lived alone, particularly older women found it extremely difficult. Such women also were clueless about where to go and how to avail the compensations. The information regarding the aid and assistance in terms of rebuilding their damaged houses, matters related to the compensation of crops, poultry, cattle and others were not properly transferred to a lot of them.

The loss of utensils and other household items has complicated the struggles of women. The government has provided the option to offer loans to the female heads of the households through Kudumbashree for buying household items damaged/lost or as livelihood support, with a guarantee that the government will pay to banks the interest. A moratorium on repayment for six months was also mandated. However, in several places, women were pressurised to initiate repayment immediately. Interest is also being collected by the banks from women in several places with an assurance that it will be later recouped. These loans stand a chance of becoming a burden on the women in the household.



Practices such as immediate repayment put tremendous pressure on them, particularly those who are displaced and live on rent as they struggle to cope with the economic crisis.

The female-headed households were catastrophically affected. A lot of such women are struggling to cope with the losses and start life anew. Women with daughters in the marriageable age who lost most of their assets in the floods and landslides are clueless about the future as marriages are expensive affairs in the Kerala context. There are also many women who lost their spouses, children or other family members. In several such cases the person who died had been the breadwinner of the family. Making both ends meet in the absence of the breadwinner has put

tremendous pressure on such women. Given the gender roles, the reduction in household consumption as a result of the disasters is likely to have a severe impact on women and girls of the affected households, which may affect their nutritional status. While there have been several interventions to address the psychological trauma of women during the rescue and relief phase, much needed interventions and follow-up were conspicuous by their absence in the rehabilitation phase.

### **Demonstrating Resilience**

During the floods and landslides of 2018, the Kerala society paid particular attention to the needs of women and girls compared to any other disaster in the past. The prime reason for this is

the presence of women representatives of LSGs who took a pivotal role in organising the relief camps throughout the state. It had its obvious impact and their involvement has been a major contributing factor in resolving the challenges of women and girls in the camps quickly such as the shortage of sanitary pads and undergarments. Their presence also gave assurance to women in the relief camps and significantly improved the camp atmosphere and facilities in terms of gender sensitivity. There were also women in key decision-making positions in some of the districts who effectively headed the entire rescue and relief operations. Women in various uniformed services and health services also played a key role in the rescue and relief.

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A large number of young women coordinated rescue missions through the social media. This was an instance where technology conferred visibility to women, obliterating gender barriers. It was remarkable how the women's collectives which were initiated as part of the women empowerment programmes of the state of Kerala functioned during the disasters. The women in Kudumbashree units were also badly affected during the disasters.

Despite suffering huge losses, they were in the forefront of relief work in the camps. Similarly, Anganwadi workers and Accredited Social Health Activists (ASHAs) in many areas also demonstrated considerable resilience, substantiating that the state's investment in women empowerment measures has not gone futile.



P. Jayesh

## Ensuring Gender Sensitivity

Women representatives of LSGs played a key role in alleviating the miseries of women during the disasters. Shabitha K., chairperson, Welfare Standing Committee, Thavinjal gram panchayat, Wayanad has been one of them who were on their heels during the disasters. There were 25 camps in Thavinjal panchayat during the 2018 disasters. Shabitha was given direct charge of four such camps. The camps in her charge had pregnant women, mothers with new-borns, the chronically ill and people with mental health issues. There was also a woman in advanced stage of pregnancy who had to be taken to hospital for delivery. Shabitha played a key role in ensuring that issues of women are sensitively addressed. Having a woman in charge significantly helped de-stress the women in the camp.

## Recommendations

The disasters brought out both the vulnerabilities and strengths of the system. The resilience shown by the population informs that Kerala's long-term investment in its people has helped. On the other hand, it also exposed the disproportionate nature of that investment which made some sections more vulnerable and less resilient. From a gender perspective, it reminds us of the need to address the gaps in our women empowerment measures which have not broken free of gender stereotyping. The disasters exposed the compounded vulnerabilities of women and girls which need specific attention in disaster management and recovery. The following are some of the recommendations for a better and more inclusive response, not just in the wake of the disasters but for improving the overall status of women:

### **Disaster preparedness needs to be more gender sensitive and inclusive:**

During the rescue operations, women were often seen waiting for the directions from the male members of their family. This kind of indecisiveness, though common during a crisis, has its roots in the age-old conditioning of women in a patriarchal society. However, disaster preparedness needs to be gender neutral. Women need to overcome their sense of vulnerability and their potential should be used to the extent possible in disaster mitigation.

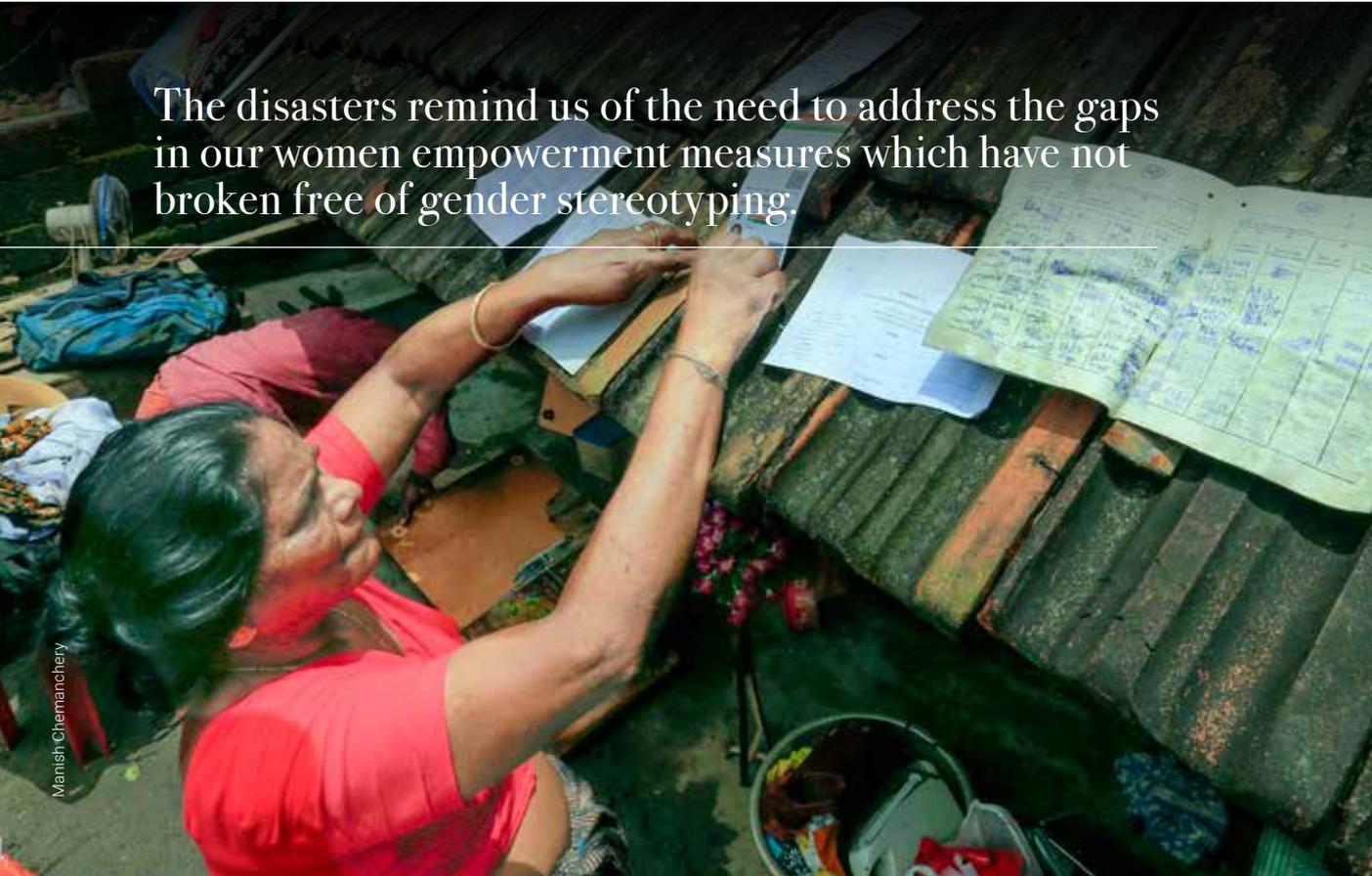
### **Women's representation in planning and governance needs to be strengthened at all levels:**

Kerala's response to the 2018 disasters reveals the significance of the involvement of women LSG representatives in alleviating the miseries of the affected women and girls. This was made possible through the 50 per cent reservation for women in the LSGs and not due to the gender sensitivity of the political parties. While in a state

like Kerala, equal opportunities should have happened without mandatory reservation, the key positions continue to be male dominated. The state and other key stakeholders should earmark 50 per cent of the key positions for women, including the legislative assembly seats, representation in the parliament and membership in the State Planning Board so that the nuances about gender empowerment spelt out in the policies exist not just on paper, but are practiced.

### **Undertake a gender audit of the disaster response and also document the impact of the disasters on women and girls:**

There is only limited evidence on how the women and girls were impacted by the disasters in the various phases. Lessons learnt from in-depth studies can help shape a better and inclusive response. A gender audit of the disaster response can help realise how women have compounded vulnerabilities and were differentially impacted.

A photograph showing a woman in a red shirt sitting at a desk, looking at a laptop. There are several papers and documents on the desk. The background is slightly blurred, showing what appears to be an office or workspace. The text is overlaid on the image.

The disasters remind us of the need to address the gaps in our women empowerment measures which have not broken free of gender stereotyping.



**Improve the economic participation of women substantially which has an impact on the quality of life of the whole family:** Lack of financial security denies women the decision-making roles and render them helpless to contribute to the post-disaster rebuilding process. Though women in Kerala are far ahead of their counterparts in other states in terms of education and health, they lag behind in economic participation. In the post-disaster period, it is necessary to take initiatives for ensuring gainful employment, especially for women in the rural areas. More women need to be brought under the ambit of women's collectives with some plans for economic avenues. This will change a woman's position in the family from a passive receiver to an active earning member, which has a positive impact on the quality of life of the whole family. This will not only catalyse the rebuilding process, but also improve their sense of self-worth and mental health significantly.

**Acknowledge the differential experiences of women and address their unique needs, including long-term needs of the most vulnerable:** Disaster management practices tend to homogenize women without considering their disproportionate and differential experiences as in the case of tribal women, migrant women, women with disabilities, the elderly and women who are heads of households. Many of them have compounded vulnerabilities and need long-term support as they may not be able to tide over the crisis through a one-time compensation package. The issues of these women should be analysed not just from the perspective of disaster management but also from the perspective of equity.

**Prioritize women entrepreneurs in rehabilitation:** Women engaged in small-scale enterprises should be given some priority in the rehabilitation process. The loss of livelihoods of women entrepreneurs becomes grave

as they are likely to be the major earning members as well as the caregivers of the family and they may not have much expertise in any other work except what they have been practicing. Also, most of them have limited capacity to absorb the losses incurred. In such cases, the rehabilitation support is critical for the families to survive.

**Make women's collectives more inclusive and decentralised:** Kerala's experience of collectivising women is now being leveraged by several Indian states. While the state has moved ahead in this, it appears that instead of liberating them, it is getting more and more centralised. Besides, the women's collectives need to be more inclusive as many sections like the tribal women, migrant women and women with disabilities have lower representation. In addition, there is also a need to revive women's collectives in the tribal belt which are more or less inactive.



# Impact on Boys and Girls

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Sandhya J. and Akhila M.

## Context

Boys and girls under 18 years constitute 9.4 million, over a quarter of Kerala's population.<sup>1</sup> The state has made significant strides in child survival, child development, child protection and child participation. Kerala ranks first among the Indian states in the Child Rights Index.<sup>2</sup> A child born in the state is likely to live eleven more years compared to a child born in Uttar Pradesh.<sup>3</sup> Kerala has the lowest neonatal as well as under-five mortality rates among the Indian states.<sup>4</sup> The immunisation coverage and institutional deliveries are near universal.<sup>5</sup> The access to education is one of the best in the country with overall negligible dropout rate. A forerunner in local governance, the state has made efforts to promote Child-Friendly Local Governance (CFLG) since 2016, and the capacities of a fair number of LSGs in the state are built in this direction. Although set up in 2017, the state has an exclusive Department for Women and Child Development.

While the general scenario of both boys and girls is good, there are many subpopulations where both boys and girls still lag behind. Children with disabilities, children of migrant workers and children from indigenous communities, to name a few. The decline in the child sex ratio has been a cause of concern. Crimes against children are on an upward trend recently.<sup>6</sup> One in every three children under five years is anaemic.<sup>7</sup> The mental health issues of children are noticeably significant. Among the students in state-funded schools in Kerala, 11.4 per cent is

estimated to have emotional problems.<sup>8</sup> Rare though, cases of child marriage as well as female genital mutilation have been reported in the state in the recent past.<sup>9,10</sup>

## Impact of Disasters

The ferocity of the floods and landslides did not spare the boys and girls of the state. It impacted the lives of a substantial number of children from 1,259 disaster-affected villages spread across 14 districts. The worst hit were children from Alappuzha, Ernakulam, Idukki, Kottayam, Pathanamthitta, Thrissur, and Wayanad districts. According to the official estimates nearly 70 children died during the disasters.

## A Traumatic Experience

The emotional wellbeing of children often depends on the emotional health of adults surrounding them. In the affected areas, generally people were emotionally disturbed by the unprecedented floods and landslides. The first time in their lives, a lot of children witnessed their parents crying. The grief experienced by adults permeates the children's world quickly. A majority of the severely affected children were from the regions hit by landslides, when compared to the floods.

Several children lost their parents, siblings, grandparents or other family members in the landslides. Some of them even witnessed such deaths or had to recover bodies from the debris. These experiences have been traumatic to

## A child born in Kerala is likely to live a decade more compared to a child born in Uttar Pradesh



V. S. Shine

such children. There were also children who got separated from their family during the rescue operations. This also panicked them significantly. There were also instances where some members of the family, including children, were stuck for several days, away from the other family members without contact. There were also children including new-borns, infants and toddlers, among those who were stranded on rooftops with limited access to food and water.

### Life in the Relief Camps

A substantial number of children had to live in relief camps along with their families for many days and weeks. During the first few hours and days in the camps, children experienced acute stress. Terrified young children clinging to their mothers was a common sight in the camps. It took some time for the kids to get to understand the reality which they had never witnessed or had only seen in movies. Anxieties about sexual exploitations prevented parents from letting them play around as the camps were crowded and there were too many visitors. Hence, a lot of children were made to quietly sit at a place and it was boring for them.

There was no conducive learning environment for children belonging to families who lived in relief camps for a month or more. The freedom of girl children was curtailed more in the camp compared to boys. There were only a few toilets in the camps and children had difficulty and discomfort in using them given the lack of privacy. Accessing the toilets in the camps was a challenge for the children with disabilities.

The youngsters had to stay in the camps in the dress that they wore for a few days together as initially there were not enough supply of clothes including undergarments. During this period the girls found it difficult to meet their menstrual hygiene needs in the camps. Adolescent girls, particularly those who were in their menstrual periods had difficulties in obtaining sanitary napkins as well as undergarments. While this

Several parents with children with disabilities did not come to the camps given the constraints in access. Parents with mentally retarded children tried to stay away from the camps as they did not want their children to be objects of attention, fun or humiliation.

was resolved immediately, changing the napkins was challenging given the limited privacy in the camps as well as the lack of means for the disposal of used sanitary napkins. Children of migrant workers who were in the camps exclusively for migrant workers did not get much attention and care.

Several parents with children with disabilities did not come to the camps given the constraints in access. Parents

with mentally retarded children tried to stay away from the camps as they did not want their children to be objects of attention, fun or humiliation. Many parents of adolescent girls also did not come to the camps due to the concern over the safety of young girls. In many such cases, the women went to a relative's place which was 'safe' while the men went to the camp. However, cases of sexual harassments or exploitations were not reported during the disasters.

### Post-Disaster Period

Coming back home after the disasters also has been traumatic for the children. Many had developed an intense fear of rains. A sound, clouded sky or rain put them into panic during the days immediately after the disasters. This was particularly seen among the younger kids. Children had trouble sleeping as many were haunted by the recurring images of the disasters. Children were also upset that they lost their toys and pets.

Children also lost their textbooks, class notes, other utilities and equipment, uniform and other clothes, cycles and other assets. It is estimated that 71,927 school students lost their uniforms and 86,634 students lost their textbooks, notebooks, schoolbags, noon-meal plates and tumblers.<sup>11</sup> This was painful to a lot of them. Those who were preparing for the matriculation as well as higher secondary examinations were more worried as these examinations are considered as important milestones deciding the chance of entry into subsequent streams and the examinations were nearing.

After the disasters, the entire texture of the soil in the flood-affected regions changed due to the deposits of silt. Children who played in the open places and soil had skin infections in places like Pandanad and Chalakudy. This resulted in restrictions in play and children found it difficult to cope with.

To the children's relief,  
the government replaced the lost  
textbooks and study materials



B. Muralikrishnan



P. Jayesh

## A Void Forever in Their Lives

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The landslides in Wayanad district took away the lives of both the parents of these young boys. They also lost their house and live with their aunt in a rented house. The fathomless void has a permanent impact on the lives of these children.

## Impact on Education

Schools play a pivotal role in the life of a child. Schooling was severely disrupted during the disasters as the relief camps were by and large organised in the schools. Such disruption of classes went even up to three weeks or more in some cases, particularly in districts such as Alappuzha. Besides, there has been significant damage to school infrastructure. Anganwadis and school buildings were damaged, including classrooms, kitchens, toilets, urinals, playgrounds and other infrastructure, resulting in delay in reopening schools which diminished the opportunity for the children to meet and play with peers. Such delays in resuming schools resulted in the exacerbation of the traumatic situation of the children.

The educational institutions also lost teaching/learning materials, toys and other equipment, crippling the academic exercise. Institutions also lost records, including growth-monitoring data of children. Schools being used as camps also resulted in damage and losses. Disruption of function of anganwadis and schools also affected the nutritional intake of children as supplementary feeding and noon-meals were missed.

Children also had difficulty in getting back to schools even though the schools reopened. A lot of them from the areas where landslides had occurred had to abandon their damaged houses forever and move to distant places. This disrupted their schooling. Children from many tribal families took longer periods to be back in school. Several children

in the affected areas also had not recovered from the trauma to get back to school. Although the academic loss of children due to the long absence from school cannot be quantified, the adverse impact of such absence on their overall academic performance can increase the risk of dropping out.

Children who got back to school also had several hurdles. Several of them were impacted by the death of their classmates. The loss/damage of clothes made several children to use the same clothes for many days. This affected the self-esteem of many older boys and girls, particularly those in colleges and other institutions where uniforms are not mandated. The lost uniforms of schoolchildren were later replaced by the government.



## Long-Term Effects

Disasters create newer vulnerabilities, in addition to augmenting existing vulnerabilities. The livelihoods of marginalised populations and vulnerable families in the society such as tribal communities are severely affected by the disasters, adding to the plight of the children belonging to these sections. These groups, who are already left behind, suffering from challenges such as poverty, malnutrition, etc., have been pushed further towards the fringes following the disasters.

The older children from the disaster-affected vulnerable families and communities are in a dilemma to choose between higher studies and jobs as many of them do not have any other means to move forward. Death of parents/breadwinners has resulted in increased responsibilities for many

such children. In addition to the trauma of death, survival also becomes a challenge for such children. This is more evident in the areas where landslides have occurred, where families are also displaced for longer periods, many of whom dependent on agriculture for livelihood. This is likely to force such children, particularly boys, to compromise their studies and take up odd jobs for a living.

There is also a possibility of children being forced to live in childcare institutions in order to continue their education. The loss of livelihoods of the families has impacted the consumption and can aggravate the malnutrition of children in the affected households. Children who are still displaced are vulnerable to exploitations. The impact on the mental health of the adults will have repercussions on the children. The deterioration of mental health of children

could lead to poor school performance, absenteeism, dropping out of school, depression and other psychological challenges which could persist for many years and even carry forward into their adult life.

Girls and boys with disabilities, children from migrant communities, children from tribal communities, those who were bedridden, those who were separated from siblings or parent/s, children whose one or both parents died during the disasters, children from women-headed families, children from families whose houses were completely destroyed, children from landless and poor families, children from families which are even now displaced, children from landslide-affected areas, adolescent girls and boys from vulnerable families, etc. were some of the subgroups differentially impacted by the disasters.



The livelihoods of marginalised populations and vulnerable families in the society are severely affected by the disasters, adding to the plight of the children belonging to these sections.



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## Confronting the Harsh Realities

The landslides not only damaged Binu's house in Cheruthoni in Idukki district and displaced him for ever, but also shattered his dreams. Hailing from a female-headed family, Binu lives with his mother who is a diabetic patient. She also suffers from epilepsy. He was preparing to go for his higher studies after completing the twelfth grade with good scores, when the landslides devastated their house and rendered their land uninhabitable. His mother got terribly ill following the chaos and was hospitalised for 15 days. It was with the help of many of his friends who were equally disadvantaged due to the disasters that he managed to pay the hospital bills. He missed the college admission in 2018 due to all the turmoil and financial crisis. But he had hoped to join a vocational training course that would help him quickly fetch a good job as he had to look after his mother also.

From August 2018 onwards, he has been doing several odd jobs, including manual labour wherever in the state such opportunities take him. Recently he lost his job as a waiter in a local hotel as its business got dull when Idukki dam was closed for visitors. His mother gets work through National Rural Employment Guarantee programme. The income from it is meagre and irregular. Binu earnestly hopes to enrol for a vocational course (industrial training) this year doing some part time job that can help him pay the fees and also sustain their lives. He currently stays with his mother in the KSEB colony in Cheruthoni where several other displaced families have taken refuge temporarily.

## Recommendations

The disasters have adversely affected the life of millions of people in Kerala. Outwardly, the children in Kerala portray a higher scale of recovery compared to adults. But the nuances of the disaster suffered by each child are not identified in depth. Given the kind of struggles the adults impacted are going through, it is likely that the issues of children will get only less visibility and attention. The lessons learned reveal how unprepared Kerala is, to quickly respond to disasters of this scale, and keeping in mind the high vulnerability of the state to various disasters, how the state needs to weave risk reduction and resilience into its vision in a comprehensive manner. The disasters also provide us an opportunity to reimagine the future of children in Kerala and it is hoped the following recommendations foster a more inclusive and child-sensitive disaster preparedness as well as response:

**Understand in depth how children were impacted by the disasters:** While there have been studies to explore in depth how certain subpopulations were impacted by the disasters, not much attention has been given to the impact of the disasters on children. There is a need to comprehensively understand the impact of a disaster of this scale on the children.

**Map the vulnerable children and prepare comprehensive individual level plans for their long-term rehabilitation:** There are hundreds of children who have become vulnerable or whose vulnerabilities have been compounded by the disasters. The Department of Women and Child Development and UNICEF may take lead roles in mapping the vulnerable children and preparing a long-term rehabilitation plan for each of such children as the vulnerabilities could be unique.

**Ensure that children have not dropped out of school or stopped pursuing higher education:** In all likelihood, several

children may not have resumed studies in the academic year 2019-20. Also, many who have passed matriculation or higher secondary examinations may have stopped pursuing higher education. The government as well as CSOs should investigate this on a priority basis and ensure that the education of children is not affected due to the disasters.

**Rule out the possibility of children being moved to institutional care from the affected families:** Efforts should be made to rule out the possibility of affected families being forced to put their children in institutions such as orphanages out of constraints and desperation. Children should not be devoid of the love and care from families which can have serious implications on their future life course. Efforts should be made to extend assistance to such families to rule out such options.

**Schools should be the last resort as relief camps:** The LSGs and the government should make sure that there is enough infrastructure other than schools to cater to the relief operations. This not only prevents disruption of the classes, but also substantially accelerates the recovery of the affected children as they resume the schooling.

**Strengthen the systems and foster convergence for effective child rights governance:** Strengthen coordination and inter-department convergence amongst various institutional structures at the district and state levels to promote effective child rights governance in disaster situations.

**All new constructions should be accessible and child-friendly:** School buildings should be constructed or refurbished keeping in mind the notion of green and safe schools, initiating comprehensive school safety planning. Such buildings should also be made universally accessible.

**Consult children before designing interventions for them:** Children should also be given due importance as key stakeholders in disaster preparedness and other interventions. Instead of teachers and experts preparing curricula or plans for children, consultations should be taken up with the Balasabhas of the affected LSGs and such efforts should also be undertaken in schools before finalising the plans/strategies/curricula.

**Weave climate resilience and larger issues into the curriculum beyond mere disaster preparedness:** Instead of preparing a curriculum on disaster preparation based on just the floods and landslides, the school curricula should take into account of the larger issues such as climate change, sustainable development and inclusive development so that the young generation is well conscious of the need for preventive behaviour and averting disasters that occur mostly due to human interventions.

**Ensure continuous psychosocial support through schools and other educational institutions:** Early diagnosis and interventions have a lifelong impact on improving the mental health and quality of life of children. There is a need for continuous psychosocial counselling and treatment for children who are traumatised in the wake of the disaster. Systems should be established to provide psychosocial support as part of regular schooling.

**Child-friendly governance should be made mandatory in the state:** Instead of celebrating Kerala's advancement in child development in comparison with other Indian states, measures should be taken to ensure that children in Kerala are on a par with children from advanced economies. Leveraging the expertise and experience of Kerala Institute of Local Administration (KILA), all LSGs in the state should be trained and monitored in Child-Friendly Local Governance.







5

Response





# Response to the 2018 Disasters

Akhila M. and Vishnu Narendran

Unlike the Indian states such as Odisha or Assam which experience large-scale disasters almost every year, the people and Government of Kerala had not experienced such a massive disaster since the formation of the state in 1956. The entire state panicked as thousands of landslides occurred and overflowing rivers flooded almost three-fourths of the villages in the state, the worst disaster the state has confronted in the past nine decades. However, even amidst the chaos, the unprecedented disasters also witnessed an unprecedented response.

Despite the poor preparedness and lack of experience in managing a disaster of such a large scale, braving the initial shock, the government and the people of Kerala came together and responded to the disasters with commendable resilience. At the state level, the Disaster Management Authority headed by the chief minister, and at the grassroots level, under the leadership of the Local Self-Governments, various government departments, Civil Society Organisations, the fisherfolk, the youth and millions of volunteers worked day and night during the rescue and relief phase. Government of India supported with additional funds and deployment of the armed forces, in addition to the National Disaster Response Force (NDRF).

With the network of roads damaged, power supply interrupted and failure of telecommunication in several places,

rescuing hundreds of thousands of people, including evacuating hospitals and moving older persons, persons with disabilities, the wounded and those who needed immediate medical assistance was a herculean task. Together, the rescue teams and volunteers brought over a million people to safety. Across the districts, over ten thousand relief camps were set up and above 1.5 million people were accommodated in the camps. Immediately after the disasters, there was a seamless flow of relief material to the camps, easing the pressure on the state government.

The disasters brought out the unflinching resilience of the people of Kerala, providing a silver lining to an otherwise bleak scenario. The entire government machinery and the public worked day and night single-mindedly in the rescue and relief efforts. People of Kerala contributed selflessly towards bringing back the state to normalcy. Support poured in from all over the world. Cases of theft or sexual exploitations that generally occur during a disaster situation were not reported from any part of the state. Quick measures were taken for cleaning the tens of thousands of households affected, preventing diseases, bringing back electricity, resuming drinking water supply, rebuilding the roads and clearing the debris. This article briefly describes how Kerala responded during the rescue, relief and rehabilitation periods.





T. K. Pradeep Kumar

## The State

While the Government of Kerala was somewhat prepared for the monsoon beyond its routine levels, it did not expect a disaster of such intensity and scale. However, the state rose to the occasion and faced the disasters boldly. The chief minister, who heads the State Disaster Management Authority, reviewed the situation frequently in special meetings convened by the SDMA. The SDMA, the department of Disaster Management under the Department of Revenue, and the State Emergency Operations Centre coordinated the operations. Alerts were issued through social media as well as mass media. All the ministers and other elected representatives continuously engaged people to assure the best support of the government. Emergency control rooms were set up in the districts where the district administration provided leadership in the operations. Government officials, armed forces and the volunteers worked 24 hours managing rescue and relief operations in the state.

Almost all the departments worked hard despite a lot of the offices and equipment getting damaged and families of the officials also being hit by the disasters. The Department of Revenue played the pivotal role given their mandate in disaster management. From the secretary at the state level to district collectors, revenue divisional officers, tahsildars, village officers and staff under each of these officers worked day and night for several days. While the Fire and Rescue and Police were engaged in the rescue operations with the volunteers and the armed forces, the Revenue officials and the officials of LSGD were engaged in managing relief operations. The Department of Health and Family Welfare took lead in the healthcare delivery and preventive services and the Civil Supplies managed the supply of provisions to relief camps. The Motor Vehicles Department managed the logistics. The staff of Electricity Board worked round the clock, forming a task force, Mission Reconnect, to bring back power supply to normal on a war footing. The Department of

Public Works and the Department of Water Resources strived to restore road connectivity and drinking water supply.

For the rescue operations, the state secured support from the Government of India, leveraging the air, water and road rescue teams under the various armed forces. On a risk-priority basis, with the help of thousands of volunteers and the officials, the control rooms and the rescue teams tracked people stranded on rooftops of buildings in the flooded areas as well as areas cut off by the landslides. Food and water also was supplied to stranded people through all possible means. The government also mobilised and deployed the traditional marine fishers of Kerala and their boats to rescue people stranded in areas which were flooded.

Despite being badly hit by the disasters, Kudumbashree, the Government of Kerala's initiative for poverty reduction and women empowerment, rose up to the disaster situation and contributed an amount of USD one million to

the CMDRF. Besides, over 3,00,000 women under Kudumbashree actively participated in the post-disaster cleaning and sanitation drive. They were also engaged in providing counselling to the disaster-affected and also played a key role in relief distribution.

Take-home kits with essential supplies were provided to families in most places as they returned home from the camps. Immediately after the disasters, the government led a mass drive to clear and process the debris and clean the water sources. Hundreds of thousands of volunteers were mobilised for this from within and beyond the state. An immediate relief assistance of USD 143 was provided to the affected families. Measures were taken to prevent the spread of communicable diseases and address mental health issues. Camps were held to reissue the certificates, title deeds and other entitlement documents lost during the disasters. The government replaced the textbooks and notebooks of all children who lost them during the disasters. Several rehabilitation packages were designed and implemented to alleviate the crisis of the affected population.

The government also reached out to development partners, including the United Nations, World Bank and other agencies within and beyond India to provide technical support on managing the challenges related to the disasters.



## The unprecedented disasters also witnessed an unprecedented response

Consultations were organized and assessment of the damage, losses as well as the post-disaster needs were commissioned jointly with the development partners and government departments. Crowdsourcing efforts to mobilise funds were undertaken. Mass campaigns to mobilise donations to the Chief Minister's Disaster Relief Fund (CMDRF) were undertaken. The diaspora was urged to contribute. Although it was scaled down, ambitious plans were made to mobilise resources from all over the world with the representatives of the government visiting important countries with a large diaspora.

The attempt of the government seeking contributions from the salaries of the government officials, popularly known as 'Salary Challenge', invited heavy criticism even from the apex court of the state for its coercive nature. It had sought from all the government employees a contribution equivalent to one month's salary of the individual over a period of ten months. The directive made it mandatory for government employees who were unwilling to contribute to submit a declaration in writing.



## Local Self-Governments

The people's representatives at the LSGs are the first contact at the grassroots for the resolution of most of the crises of the local community. Being the face of democracy at the grassroots, the LSGs played a pivotal role in disaster management. The response from the part of the Local Self-Government institutions endorses the strategic importance of decentralisation and the successful way it functions in Kerala. From the alerts to rescue, from managing relief camps to attending critical issues related to the people of the locality, from disseminating the availability of relief packages to facilitating access, elected representatives, from the municipal chairperson or panchayat president to ward representatives of the Local Self-Government institution, irrespective

of the ruling front or opposition front, played a key role in the affected urban local body or panchayat in most of the places.

Being from the locality, they knew their area and people, which helped them intervene effectively. Despite their families also being impacted, the people's representatives worked round the clock in rescue and relief. Their presence was visible in the camps, making sure that the people in the camps have adequate amenities, reassuring support and providing a patient ear to the grievances of thousands of people. It was the presence of the women representatives of the LSGs which by and large ensured gender sensitivity in the relief camps. In addition to the elected representatives, in most affected places, the whole staff at LSGs

**The response of the Local Self-Government institutions endorses the strategic importance of decentralisation and the successful way it functions in Kerala. It was the presence of the women representatives of the LSGs which by and large ensured gender sensitivity in the relief camps.**

from the secretary to the driver were on their toes during the rescue and relief phases. Even during the post-disaster period, it is they who disseminate the recovery needs and facilitate government aid to the affected people.



**Benny Antony, LSG representative of Thavinjal panchayat, Wayanad, convinced the people of Kaippanchery settlement to move to the relief camp which saved their lives**

## The prime minister of India visited the state and reviewed the situation



PTI/A. Sathesh

### Government of India

Government of India (GOI) supported the state by providing the resources as well as ensuring the deployment of the central forces. The India Meteorological Department (IMD) provided the state with alerts and weather forecast. In July 2018, two of the central government ministers visited the state and reviewed the situation. Soon after the visit, the National Disaster Response Force and the Navy were deployed for rescue and relief. On August 9, 2018, the disaster was declared as a Level III emergency, a disaster beyond the capacity of the state to handle on its own. More teams of NDRF, armed forces, paramilitary forces and other technical teams were deployed for rescue and relief. The minister for Home Affairs, Government of India visited the state during the second week of August to review the situation on behalf of the Government of India. When the situation turned grim, the prime minister of India personally visited the state, conducted an aerial survey and reviewed the situation with the state government. The prime minister announced USD 87 million as initial financial assistance to the state.

The Kochi Naval airport was thrown open for civilian traffic as the Cochin International Airport had to be closed due to the damage from the disasters. The Indian Railways deployed several special trains from the state to various destinations in Assam, West Bengal and Odisha for the distressed migrant workers to return home. Several expert teams from the Government of India also visited the state as part of reviewing the situation and providing strategic support. The Ministry of Rural Development announced a support of about USD 257 million to generate 55 million person days of employment under Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGA).<sup>1</sup> The National Highway Authority took repairing of the roads damaged on a priority basis. Several institutions and centres of excellence actively participated in the efforts to understand and address the impact of the disasters. These institutions included the National Institute of Mental Health and Neurosciences (NIMHANS) and the Central Water Commission.



T. K. Pradeep Kumar



## The Community

The local community was the first responders in the disasters in almost all the places as it took time for the official rescue teams to arrive. People swung into action without any command or instruction when a landslide occurred, or water started seeping in. While all the officials and the forces deployed by the government were instrumental in saving lives, it was the millions of selfless volunteers from the community who were the backbone of the rescue and relief operations. They spread the warnings and helped the affected people save their lives as well as property. The intervention of the local community was vital as they had a clear idea about the people and places, and in many cases, it was difficult for external intervention as the places got cut off by the disasters.

Volunteers put their lives at risk to save the stranded people. Many of them worked round the clock soaked in the

rains and dirt. They were also able to guide the armed forces and other rescue teams in efficiently pursuing their work. A lot of them were in the forefront of the rescue and relief operations despite their houses and family being affected by the disasters. Some rescue workers and volunteers shared the irony of being turned the victims all on a sudden, as the floods and landslides claimed their assets while they were engrossed in the rescue and relief elsewhere, leaving them no opportunity to salvage them. Several of them met with accidents too, even resulting in permanent disability, with a long-lasting impact on their lives and livelihoods. Deaths of volunteers were also reported after the disasters, due to leptospirosis.

As hundreds of thousands of people got displaced, others opened their hearts and homes to even strangers. A lot of temporarily displaced families stayed in the warmth of homes they hardly knew

before. Also, people cooked food for others, and delivered it on the roads, at the camps, railway stations, affected areas and other places where hungry people without money to buy food immensely benefited. Even families who got displaced and were staying in other places cooked and delivered food at the relief camps. In most of the places, it was the volunteers who literally ran the relief camps while the government provided all possible support. Hundreds of people offered their vehicles, boats and other equipment for free for rescue and relief work. Those who were not able to actively engage in rescue and relief contributed liberally to reliable persons and organisations that were engaged in such work. From grocery to undergarments, the camps received almost every required item from the community. The community also played a key role in the sanitation work and restoration of the affected premises, after the disasters.

## Traditional Fishers

With 222 marine fishing villages along the coast, Kerala is home to over 2,30,000 active fishers. As the floods ravaged the state and the canopy of trees and the truss on the rooftops prevented air lifting of people stranded in the floods, the Government of Kerala reached out to the traditional marine fishers to save thousands of people marooned. Although the NDRF and the armed forces had deployed 435 boats and dinghies, given the scale of the disaster, these were far from the requirement. Besides, given the shape and the high currents, it was difficult to operate many of the dinghies. From coastal areas of several districts, 4,357 marine fishers rushed to the flooded regions, including many of the cities, with their 669 boats. A lot of the boats had to be transported scores of kilometres in trucks from the coastal areas.

Putting their lives at risk, even without life jackets, a lot of the fishers who had no formal training in rescue operations worked day and night continuously for several days saving thousands of people who would have died if the fishers had not reached in time. The fishers rescued a minimum of 65,000 people marooned in the floods, demonstrating an example of pragmatic rescue operation leveraging local expertise. For many fishers, the current was much severe than they had experienced at the sea. It was with much difficulty that they negotiated the boats through the floodwaters as there were compound walls, gates and vehicles underneath, in addition to the floating debris.

While the Department of Fisheries provided all facilities including diesel for the boats, a few of the fishers went all by themselves. Many boats were damaged after the rescue operations, which were

Putting their lives at risk, even without life jackets, the fishers, who had no formal training in rescue operations worked day and night continuously for several days, saving thousands of people marooned in the floods, demonstrating an example of pragmatic rescue operation leveraging local expertise.

later repaired by the government. Citing that they did not need money for saving the lives of their brothers and sisters, the fishers gently declined the monetary reward offered by the government for their critical services.



The fishers rescued a minimum of 65,000 people



## The Youth

The youth of Kerala voluntarily came forward and actively participated in the rescue and relief operations during the disasters. Neither responding to a call to action nor organized under any banner or brand, thousands of young women and men joined hands with the government and CSOs engaged in the disaster response. Their presence was evident in almost all the operations such as rescuing stranded people, answering the calls on the helplines,

locating marooned people and flagging the location coordinates to the rescue teams, volunteering in relief camps and working at the relief material collection and distribution centres, day and night. The youth were able to effectively leverage their edge in using the internet, technology, social media and other network services for disaster response. Students from Mumbai, Delhi, Kolkata and various other places also through online platforms, joined the Kerala youth in the disaster response. The tons of relief materials flowing from all over the

world were sorted, packed and sent to distribution channels by the government with the support of the youth. They enthusiastically participated even in the loading and unloading of relief materials. The youth resolved a huge human resource crisis of the government without which relief supply would have been a daunting task. The youth were actively involved in the post-disaster mass cleaning drive, assessments of damage and campaigns to support the affected population.



## The Truckers

When the roads of Kerala were flooded almost one metre or above, the rescue operations could not be undertaken using regular vehicles due to the low ground clearance. There was a lack of or shortage of boats. Also, the carrying capacity of a boat was limited. On their own, and at the request of the government of Kerala, the owners of hundreds of heavy trucks in the state deployed their vehicles for rescue and relief operations. The high ground clearance of the trucks made it possible to drive them through the flooded roads, and the truckers took the risk of navigating such roads although it was difficult to distinguish the road and the drains. Their timely intervention helped thousands to move safely through the floodwaters when no other means of transport was available. The truckers also played a crucial role in transporting the rescue boats to the disaster-affected areas. Along with strenuous navigation, they also helped the people board and

alight from the vehicle which was a tough task given its height. The truckers also played a key role in transporting the relief materials to all the affected places.

## Kerala Diaspora

Popular as a money order economy, Kerala has a diaspora of the size of three million spread all over the world. As ambassadors of the state, at the time of crisis, the diaspora mobilized resources for the state, predominantly through the Malayali associations. While a lot of them directly or through associations, contributed to the Chief Minister's Disaster Relief Fund, many also sent essentials and equipment to Kerala. The ports, railway stations and the cargo terminals were flooded with relief materials sent by the NRKs and others. Several of them travelled to the state to be part of the relief operations and several others contributed to CSOs which have been actively engaged in the relief operations. The diaspora also responded by offering their technical expertise,

experience and leveraging their networks for rebuilding Kerala.

Away from their native place, a lot of them also had panicked as their family members were affected by the disasters. Many could not contact the relatives back in Kerala. But it was their timely intervention in providing details about the marooned family members that helped the rescue teams in locating them in many cases. As communication channels were fully destroyed in the affected areas, each call from a distant land saved the lives of many. Data being the necessity of the time, they formulated task groups to coordinate rescue efforts online through social media and other platforms. They even provided alerts to their family members in Kerala through telephone as most other networks were disrupted during the time of the disasters and a several of their family members at the native place did not have enough digital literacy or resources to gather vital information on rescue and relief.



Hundreds of heavy trucks played a crucial role in rescue and relief

AFP

## The Forces

The Fire and Rescue and the Police of the state managed the initial rescue and relief operations with the support of the various government departments, CSOs and volunteers. Over 4,000 personnel from the Department of Fire and Rescue and the entire equipment of the department were put to use. From the Police force, over 40,000 personnel was deployed and all of them worked under harsh conditions during day and night under tremendous pressure as the demand was huge. They provided alerts, helped people to relocate to safer places, shifted the ones who got stranded in the disasters and provided reassurance. The roadblocks were cleared and supplies were provided to stranded people. Throughout the state, the Police opened control rooms and through their various channels, including the social media, they dealt with 1.2 million requests for assistance and together with other agencies rescued about one million people in distress.<sup>2</sup> The Fire and Rescue teams saved over 40,000 lives and

moved 80,000 people to safety. Both the forces were engaged in the post-disaster cleaning operations also.<sup>3</sup>

As the situation turned grim, the national forces had to be deployed to support the state government forces and volunteers. A total of about 7,500 uniformed personnel, including the National Disaster Response Force, the Army, the Navy and the Air Force of India along with the Border Security Force and the Central Reserve Police Force joined hands with the response teams from Kerala in the mission. Operation *Sahyog*, Operation *Karuna*, Operation *Madad*, and Operation *Rahat*, the missions carried out by the Indian Army, the Air Force, the Navy and the Coastguard substantially improved the efficiency of the response to the disasters and reduced the casualties. A total of 435 boats, 40 helicopters, 20 aircrafts and two ships took part in these operations. They also provided food and water to the stranded people, constructed temporary bridges and roads, and touched the lives of millions.<sup>4</sup>

## The Civil Society Organisations

The CSOs played a pivotal role in the rescue, relief and rehabilitation initiatives. With their expertise in various sectors, they were able to provide crucial support to the vulnerable populations. A group of women from the Kerala Chapter of All Ladies League, an international collective, helped the district administration of Alappuzha to install nearly 70 bio-toilets in Kuttanad as well as different locations of Alappuzha, severely affected by the floods. Trained in Disability-Inclusive Risk Reduction by the State Disaster Management Authority, Thanal Palliative and Paraplegic Society, a CSO based in Ernakulam was able to quickly move over 100 persons with disabilities to safer places during the rescue operations. The Centre for Migration and Inclusive Development worked with Disaster Management Authority of Assam, Department of Labour, Government of Odisha, Government of West Bengal and also with CSOs in other parts of the country, in the rescue, relief and



Reuters/ V. Sivaram



rehabilitation of inter-state migrant workers affected by the disasters. Similarly, hundreds of CSOs from India and abroad contributed to the disaster response. A lot of Faith Based Organisations (FBOs) were engaged in providing food and other relief supplies at the railway stations, on the road, at the relief camps as well as reaching out to households.

During the initial days when the government was struggling to mobilise resources and procurement process was taking time, the CSOs played a vital role in providing resources to

clean the houses by supplying tons of bleaching powder, hand gloves, boots, facial masks and other supplies to the affected LSGs which were desperately looking for external aid. Several CSOs joined hands with the government in offering counselling as well as other mental health services to the affected populations. CSOs, working with the government, continue to play a key role after the disasters, repairing and reconstructing the houses, restoring livelihoods, promoting resilience and better preparing the community for DRR. The disasters have also resulted in the evolution of newer CSOs such

as Resilient Chendamangalam, a collective of the weaving units of Chendamangalam in Ernakulam district, which were badly affected by the floods.

## Media

Rescue and relief efforts in the Kerala disasters were exceptional with the well-coordinated interventions of the different media platforms. This was aided by Kerala's unique achievements in literacy, mobile phone and the internet penetration, and higher media consumption. The responsible and sensible coverage of news became one of the models in the communication during disasters. All the major media houses set up helpdesks to coordinate the rescue efforts. Many pulled out advertisements sensing the gravity of the situation. The reporters strived hard to make sure that nothing went unheard. In the process, lives were also lost in accidents. Several media houses collected and distributed relief materials in large scale. The digital and social media spaces of the newsrooms facilitated the rescue and relief measures. The media also refrained from sensationalism and successfully curtailed the spread of fake news. The social media platforms played a significant role during the time of the disasters in disseminating information and coordinating the rescue and relief efforts. They served as control rooms in many cases.





Sajan V. Nambiar



6

Recovery and  
Reconstruction





# Revitalising Kerala

Benoy Peter and Vishnu Narendran

## Introduction

While the floods and landslides of 2018 and 2019 have become history, the impact of the disasters has thrown millions into misery from which they will take years to recover. Besides, the hazards continue to be a reality that Kerala has to live with forever, given its vulnerabilities. The continuous disasters have been a wake-up call for the state to realise and respond to the ecological sensitivity with immediate priority. The state also has a challenging task of bringing the lives of the people of Kerala back to normal. This calls for significant and multifaceted investments in the four priority areas of action identified under the Sendai Framework.<sup>1</sup> Rebuilding the infrastructure, revitalising the economy, restoring livelihoods, addressing the post-disaster trauma and creating a road map towards a more inclusive and resilient Kerala are some other tasks. This article briefly discusses the progress made by the state in this direction.

## Assessing the Impact

The Government of Kerala joined hands with development partners as well as CSOs to assess the impact of the 2018 disasters on the state and its people. The Joint Rapid Damage and Needs Assessment Report (JRDNA)

with the World Bank Group and Asian Development Bank, and the Post Disaster Needs Assessment (PDNA) with the United Nations were two such key assessments made. In addition to this, various government departments and institutions also conducted studies on the impact of the disasters on select thematic areas such as the study on the impact on biodiversity by the Kerala State Biodiversity Board.

There have been a host of other assessments too by organisations and expert groups. The Special Centre for Disaster Management Research at the Jawaharlal Nehru University (JNU) examined the governance and compliance by the state in the context of the disasters and heavily criticised the government for its poor preparedness and laxity with which it responded to calls to action such as the recommendations of the Western Ghats Ecology Expert Panel.<sup>2</sup> The Central Water Commission in its assessment found that the dams in Kerala neither reinforced the floods nor helped prevent the disaster.<sup>3</sup> There have also been initiatives of gathering and analysing data on the causes, impact and implications of the disasters by the activist groups as well as the think tanks.

The Government of Kerala rolled out a host of measures for the rehabilitation of the people impacted by the disasters. The measures included a one-year moratorium on loans by the farmers; loans to support Kudumbashree and the small-scale traders impacted; and financial assistance to families with persons who are bedridden.

## Rebuild Kerala Initiative

Taking cognizance of the need for a comprehensive and long-term effort to revive the state given the massive damage and losses during the 2018 disasters, the state has established Rebuild Kerala Initiative (RKI), a five-year Special Purpose Vehicle to lead the recovery and reconstruction initiatives. The RKI is governed by the Council of Ministers of the Government of Kerala and an advisory council has also been constituted to provide strategic directions to the initiative. A high-level empowered committee has also been constituted to support the government on the RKI. In consultation with the development partners, CSOs and other key stakeholders, a Rebuild Kerala Development Programme (RKDP) has

also been developed to create the road map to a new resilient Kerala.<sup>4</sup> The RKI will lead the implementation of the RKDP.

The Government has also made efforts to understand promising practices from all over the world that can help catalyse its efforts to evolve a more resilient Kerala. Under the leadership of the chief minister, a team visited the Netherlands to learn how the country has evolved a nature-based plan like Room for the River. With the technical and financial support of the United Nations and the World Bank, the state has already geared up its efforts under the RKDP. The lessons learned by the state from the disasters and its response were presented at the World Reconstruction Conference held in Geneva during May 13-14, 2019. The chief minister of the

While the disasters have become history,  
the hazards continue to be realities





The chief minister shared the experience of Kerala at the World Reconstruction Conference

CMID/Muralee Thummarukudy

state was invited to speak at the plenary, on the experience of the state and its recovery plans. Besides, a satellite session on the Kerala disasters was also organised at the conference.

### Recovery and Rehabilitation

The Government of Kerala rolled out a host of measures for the rehabilitation of the people impacted by the 2018 disasters. The measures included a one-year moratorium on dairy, animal husbandry, agriculture, education and all other loans by the farmers in all the districts of Kerala to ease their burden of repayment during difficult times; loan schemes to support Kudumbashree and the small-scale traders impacted; and financial assistance to families with persons who are bedridden.

The government, from its funds or through other agencies, provided financial assistance to those whose houses were partially or fully damaged.

In order to raise additional funds, the government of Kerala has introduced a disaster cess in the state with effect from August 1, 2019. The efforts to repair and rebuild the infrastructure damaged are in progress. In partnership with the private sector, CSOs and other stakeholders, the process of identifying land for resettling the displaced families and constructing new houses is at an advanced stage.

Several consultations have also been undertaken by the government to formulate strategies to refine current policies and programmes to be more inclusive as well as resilient. The CSOs also have been organising deliberations on various issues related to the disasters. Campaigns such as Chekutty and Compassionate Keralam have evolved to support the individuals, families and institutions impacted by the disasters so that they can quickly tide over the crisis.



V. S. Shine



Madhurai

## Compassionate Keralam

Compassionate Keralam is an online platform that leverages technology to connect compassionate individuals with people in dire need of support. Conceptualised after the 2018 disasters, Compassionate Keralam was born out of the realisation that there are thousands of people affected by the disasters who are in desperate need of support, and that there is also another group of people who are genuinely interested in helping others without publicity.

The platform does not have staff, bank account or office bearers like a traditional CSO. Nor does it accept money directly. The entire operations are managed by hundreds of volunteers. Genuine requests seeking help can be posted on the Compassionate Keralam website which are then verified by the volunteers. Any compassionate individual can browse through the validated requests and based on his/her ability, directly support an individual or family affected by the disasters.

With a philosophy 'respond sensibly and help responsibly', the platform provides various opportunities to support others. The scholarship programme of Compassionate Keralam aims to address the needs of 25,000 students in Kerala who were affected by the disasters. The amount provided as scholarship is not fixed as it varies by the needs of each student and the impact of the disasters. The amount requested, which normally ranges between USD 30 to USD 300, is facilitated by the platform after the verification process. Within a month of the launch of the scheme, the platform could support 3,000 students by distributing a sum of about USD 1,40,000.

The 'Extended Family' scheme of Compassionate Keralam provides opportunity for those who are willing to extend one's family by becoming a relative of a family affected by the disasters. This helps the person to understand the requirements of the family and support it on a long-term basis, depending on the ability to support. Compassionate Keralam does not publish the list of people who supported others, nor do they click or disseminate pictures of providing or receiving support. Between August 2018 and July 2019, the initiative supported about 5,600 families through mobilisation of over USD 2,25,000.



## Chekutty

Chekutty dolls made out of the handloom cloth spoiled by the 2018 floods have become the mascot of the resilience of Kerala. Chendamangalam, the handloom village of Kerala on the banks of the river Periyar in Paravur, Ernakulam district, is known for its delicately woven handloom clothes. Hoping for a good sale during the forthcoming Onam seasons, the weavers in the village had stocked their products when the floods ravaged the village. The entire stock was inundated for several days and the handloom workers, mostly women, were thrown into misery. Most of them also had their houses inundated and property damaged.

In Karimpadam Weavers' Society of Chendamangalam alone, handloom clothes worth over USD 30,000 got damaged and the looms were destroyed. Even after a wash, the stained clothes, mostly sarees, were unusable. The poor women had the choice of burning or burying them. Social entrepreneurs Gopinath Parayil and Lakshmi Menon pitched in to help the weavers in distress. The Chekutty dolls which evolved out of their brainstorming, saved the weavers from incurring huge losses. Chekutty, meaning 'the kid of Chendamangalam' in Malayalam, made out of the washed and sterilised clothes damaged in the floods, bears the scars of the disasters.

Each saree is sold at an average rate of USD 18.5 and when converted into dolls, they could make around 360 dolls with a price of less than half a dollar per piece. Thus, out of a single damaged saree the dolls brought a total revenue of nearly USD 130. Though weavers were encouraged to make the dolls, they were unable to do so given their state of devastation. Hence volunteer groups from within and outside the state strived to make the dolls, which were then packed and distributed from a single point. Through this endeavour they were able to mobilise over USD 45,000 by February 2019.

Chekutty made its appearance in global events with its story of resilience. If not for Chekutty, many women would have left the traditional handloom industry forever after the 2018 floods. Chekutty has now evolved as a garment brand under the Resilient Chendamangalam initiative, a collective of the weaving units in Chendamangalam.



## Road Map to a New Kerala

The missions of the government to promote a Green Kerala or to ensure housing for all have become more relevant after the disasters. However, care should be taken to ensure that the missions strengthen the existing systems rather than weakening them. The disasters in August 2019 have complicated the situation. The government has the daunting task of convincing thousands of families to relocate from ecologically sensitive zones to safer places. The state should also ensure that development in disaster-prone zones is strictly regulated, there is better and integrated management of water resources, the wetlands are

safeguarded and that the flourishing tourism and mining industries do not harm the ecology. The Disaster Management Authority needs to give more emphasis on DRR than responding to the emergencies. The state also needs to reconsider the recommendations of the Western Ghats Ecology Expert Panel.

Keeping in mind the Sendai Framework, focussed efforts are required towards engaging the whole society in disaster risk reduction. This involves sensitising and bringing consensus among the political parties, the elected representatives at all levels, the government officials, the CSOs, the industries and the people of

Kerala since each one, through his/her action or inaction, is responsible for the circumstances that culminated into the disasters. While the lessons from developed countries such as the Netherlands are important, the state could also leverage the vast DRR experience of the resource-constrained Indian state of Odisha and the strides it made in reducing the casualties during the recent cyclone Fani. Given the demanding task at hand, with a part time CEO, the emphasis on 'rebuilding' and an institutional set up which is more centralised than decentralising and empowering the communities, the path to resilient Kerala appears to be long and winding.







# Reimagining the Role of Local Self-Governments in Kerala in Disaster Management

K. Rajesh and Benoy Peter

Kerala has shown an exemplary performance in managing rescue and relief operations with mass participation during the 2018 floods and landslides. Nearly 1.5 million people were evacuated from the affected areas and more than 10,000 relief camps were organised across the districts. The state was able to satisfactorily manage the disaster operations only because of the active leadership provided by the Local Self-Governments in the rescue and relief operations. Hundreds of panchayats, municipalities, and corporations in the affected areas acted as governments of the locality while the state government provided the leadership. Elected representatives and officials of the LSGs took a lead role in all initiatives, working day and night, that too when even their lives, assets and offices were also hit by the disasters.

While the Government of Kerala recognises that the role of the Local Self-Government is paramount in achieving its vision of *Nava Keralam*, a road map towards empowering the LSGs is not very evident in the Rebuild Kerala Development Programme (RKDP), set up to ensure a resilient recovery and development pathway towards it.<sup>1,2</sup> The floods and landslides that devastated the state again in 2019 highlight how Kerala's vulnerability is augmented by a changing climate, and call for a stronger, and a more grounded and participatory response.

In this context, this article, by providing an overview of the current disaster management systems and the strategic potential of the LSGs, illustrates how in the Kerala context, disaster management can be transformed at the local level in a sustainable manner by transferring powers to Local Self-Governments rather than following the conventional approach of relying on the limited potential of the Department of Revenue.

## Present System of Disaster Management in Kerala

In Kerala, the disaster management, at present, is piggybacked to the Department of Revenue as a sub-department, although not mandated under the National Disaster Management Act 2005. From the state through village levels, the functionaries of the Department of Revenue are assigned pivotal administrative roles in disaster management. At the state level, the chief minister is the ex-officio chairperson of the seven-member Kerala State Disaster Management Authority (KSDMA), with the minister for Revenue, minister for Agriculture, chief secretary of the state, additional chief secretary, Revenue and Disaster Management, additional chief secretary, Department of Home Affairs, and head of the State Emergency Operations Centre as ex-officio members.<sup>3</sup>



C. Sunil Kumar

The chief secretary is the chief executive officer and the additional chief secretary, Revenue and Disaster Management is the convener of the authority. The State Executive Committee is chaired by the chief Secretary of the state. The additional chief secretary, Revenue and Disaster Management is the convener. The additional chief secretaries of the Departments of Home and Vigilance, Health and Finance are the other three members.<sup>4</sup>

At the district level, a seven-member District Disaster Management Authority is constituted with the district collector as the chairperson and the district panchayat president is the ex-officio co-chairperson. The members include the additional district magistrate (ADM), ex-officio representatives from the Police, Health, Fire and Rescue and another official from a relevant department which varies from district to district. The State as well as District Emergency Operations Centres function under the Department of Revenue. The KSDMA serves as a state level coordination system, whereas the district collector, tahsildar,

and village officials coordinate such activities at lower levels. The minister for Local Self-Governments, Kerala, does not figure among the KSDMA members. The additional chief secretary, Department of Local Self-Government (LSGD), is not part of the State Executive Committee. Except the position of co-chairperson in the District Disaster Management Authority assigned to the president, district panchayat, which is a default design under the Disaster Management Act 2005, no other LSG representative is given a key position in the existing system.

It is pertinent to note that the role of Local Self-Governments is only subsidiary in disaster management initiatives despite having a gender-balanced representation, a close interaction with the community and more access to community level institutions such as residents' associations, Kudumbashree and committees at ward level. The LSGs in Kerala are not empowered with legal powers and financial resources to involve in disaster management.

Presently the role of LSGs is undermined as a supplementing agency providing support to the Department of Revenue which does not have sufficient human resources to undertake this task at the grassroots level. Village offices in Kerala have only three to four staff to undertake all their mandatory tasks. Besides, below the district level, the Department of Revenue does not have any technically competent staff to undertake the disaster management initiatives.

### Why Local Self-Governments Should Be in the Forefront?

With its participatory governance in a much advanced state compared to the rest of India, Kerala has 1,200 fully functional LSGs including 941 gram panchayats, 152 block panchayats, 14 district panchayats, 87 municipalities and six municipal corporations equipped with the human resources as well as financial resources to efficiently undertake disaster management at the LSG level. However, akin to the Indian states where local governance is weak and often dysfunctional, LSGs

in Kerala are devoid of the powers in disaster management which have been assigned to the district collectors and the subordinate staff. A glance at the capacities of LSGs in Kerala reveal how the LSGs in Kerala have an edge over the Department of Revenue in disaster management.

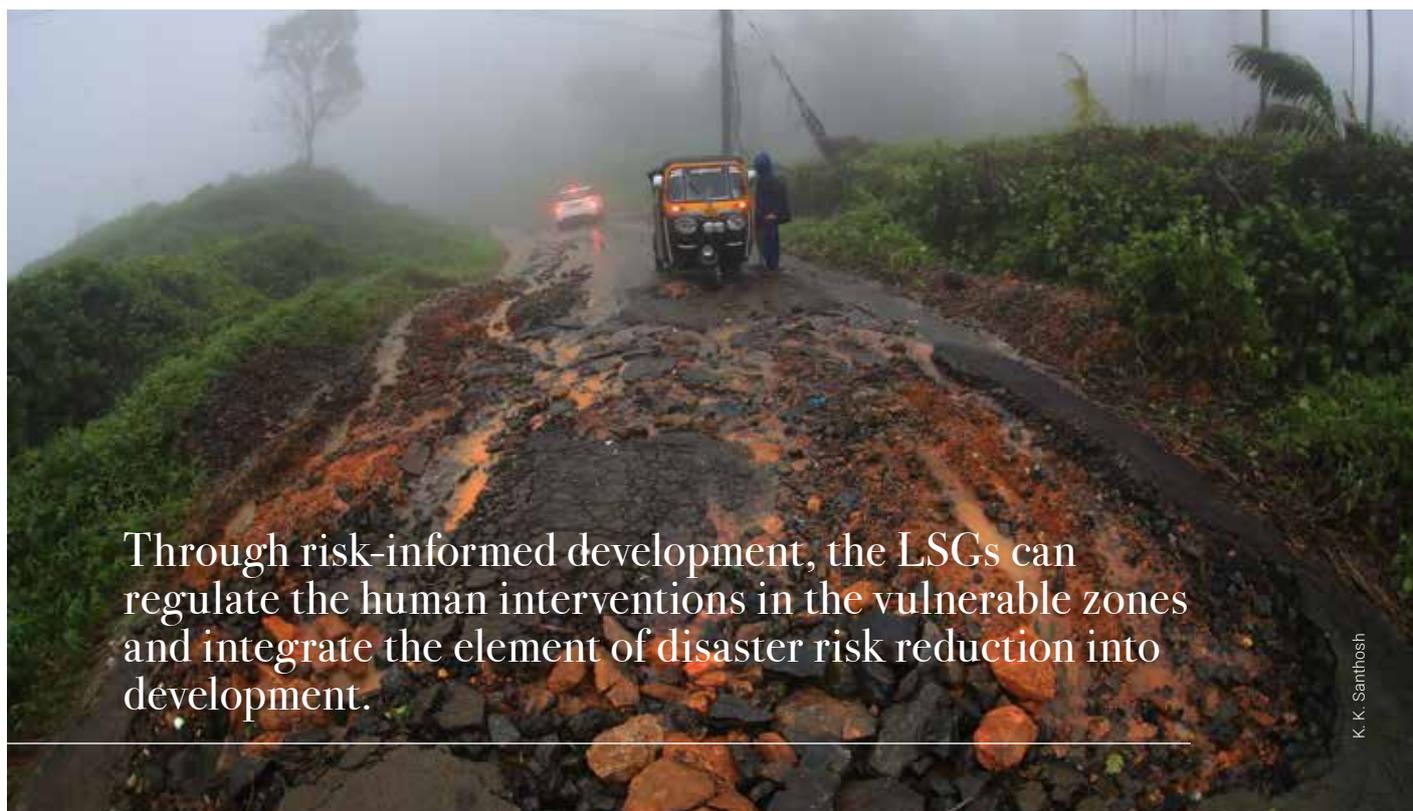
**Availability of competent technical experts:** Every Local Self-Government in the state has technical experts, including engineering staff and there is a Local Self-Government engineering wing under the Department of LSG. Along with this, another engineering expert is available in all the rural local bodies in the state as the part of MNREGS. The various departments transferred to Local Self-Governments have specialists in public health, agriculture, veterinary science, child development and many more. The availability of such experts enables the department to undertake tasks that require technical competency. This also enhances their strength in coordinating disaster management and rebuilding activities beyond supervising infrastructure development and housing.

**Control over local institutional network:** Local bodies in Kerala have several institutions and hundreds of staff transferred to them. Gram panchayats have control over Primary Health Centre, primary schools, agriculture office, veterinary sub-centre, Integrated Child Development Scheme, and anganwadis and village extension offices. Hence, LSGs can easily coordinate all the relevant government institutions at the grassroots level. This enables the Local Self-Governments to mobilize both the infrastructure as well as human resources for developing LSG based Hazard Management Plans, coordinating rescue, relief and rehabilitation and also for fostering resilience.

**Control over infrastructure development:** All development activities under its area of jurisdiction are approved by the LSGs. Through risk-informed development, the LSGs can regulate the human interventions in the vulnerable zones and integrate disaster risk reduction element into development.

**Higher potential for resource mobilisation:** The Local Self-Governments also have the potential for resource mobilisation which RKDP also recognises. They can mobilise financial resources from the community by leveraging the provision of local relief fund. Once this is strengthened, community mobilisation to address the disaster management can be made possible to a certain extent. The interventions of the Thiruvananthapuram municipal corporation in August 2019 to mobilise relief materials for the hill districts devastated by the landslides, is a good example

**Mechanisms for transparency and accountability in place:** Disaster management initiatives under the Local Self-Governments can improve the transparency and accountability of such initiatives. People's forums like the panchayat committee and gramasabha ensure this and facilitate the social audit. This will help the state to improve the efficacy and inclusivity of rescue, relief, rehabilitation, and rebuilding initiatives followed by disasters.



Through risk-informed development, the LSGs can regulate the human interventions in the vulnerable zones and integrate the element of disaster risk reduction into development.



### Community disaster warning

**mechanism:** Various community-level disaster warning and information dissemination mechanisms can be developed and managed as part of local disaster management plans. Information technology and practices such as community radio can be leveraged for this.

### Formation and capacity building of local rescue and relief volunteer groups

**groups:** Local volunteer groups with expertise and interest in leading various disaster management initiatives can be formed and trained in all the Local Self-Governments as part of the local disaster management plans.

### Identifying and mapping areas vulnerable to various disasters and regulating human interventions

**The Local Self-Governments with inputs from technical experts, can identify and map areas within their jurisdiction that are prone to various disasters, update the biodiversity registers and improve watershed management. With appropriate revisions in the regulations as well as devolution of powers, LSGs should be in a position to ban/restrict human interventions in disaster-sensitive zones.**

### Fostering community resilience through training and capacity building

Local communities can be trained through the community institutions such as residential associations and Kudumbashree in climate and nature-sensitive resilient practices as well as inclusive disaster risk reduction.

### Include disaster risk reduction measures under the rural employment guarantee programme

**Currently the potential of work under the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) is not optimally leveraged by the Local Self-Governments. Initiatives for disaster risk reduction, such as mangrove afforestation and enhancing room for the river can be taken up under MGNREGA.**

### Huge potential to organise local corps:

The LSGs are best placed to establish an effective community warning system to prevent hazards becoming disasters and alleviate the gravity of disasters. A trained voluntary force and rapid rescue and relief response mechanism can be effectively organised under the leadership of Local Self-Governments.

## Evolving a Local Disaster Management Plan and Intervention Strategy

While there have been efforts to develop disaster management plans for select urban local bodies as well as for a few panchayats, given the vulnerability of the state to various natural as well as unnatural disasters, it is imperative to have disaster management plans for each LSG. Since the LSGs in Kerala are empowered with significant power and resources, they have a higher potential to lead the process of evolving local climate

resilience and disaster management plans. The following could be some of the components of the local disaster management plan:

**Empowering the people's representatives and officials and strengthening the systems:** Leveraging the availability of institutions such as Kerala Institute of Local Administration (KILA) the capacities of the people's representatives and officials can be enhanced. Besides, the existing systems can be strengthened appropriately to prevent, manage and mitigate disasters.

**Local weather prediction system:** One of the major challenges during the 2018 disasters was that the number of rain gauges in the state was only one-fourth of the minimum requirement. An efficient and economic weather prediction system can be established and managed by each of the local bodies.

**Evolving Systems for rehabilitation and recovery:** Locally relevant temporary and permanent rehabilitation packages to cushion the effect of disasters can be developed as part of local disaster management plans through consultative processes.

**Identifying and developing potential locations for relief camps:** Potential locations which would be safe in the time of different disasters can be identified and necessary infrastructure can be developed in such locations with community involvement.

## Conclusion

The Local Self-Governments in Kerala are institutions with public participation that are capable enough to effectively address the local level development challenges. The Sendai Framework underlines the importance of empowering the local authorities and local communities in disaster risk reduction through resources, incentives and decision-making responsibilities while the state plays an enabling, guiding and coordinating role.<sup>5</sup>

Despite the outstanding performance in the rescue and relief during the 2018 disasters, active involvement in the recovery and rebuilding process and the huge potential in disaster risk reduction and management, the LSGs in Kerala lack legal powers in disaster management. The report on the Governance and Legal Compliance during Kerala Floods 2018, prepared by the Special Centre for Disaster Management Research at the Jawaharlal Nehru University highlights how the state government as well as the KSDMA ignored the most vibrant grassroots layer of governance in the state.<sup>6</sup>

Given the context of the second phase of the decentralised planning in the state, informed by the lessons learned from the 2018 and the 2019 disasters and the significant vulnerabilities of almost all the regions in the entire state, it is imperative that the disaster management plans and strategies are in place at local level, under the leadership of LSGs. Local coordination of the disaster management activities requires to be shifted from the Department of Revenue

to the Local Self-Governments for the efficient planning and implementation of disaster management mechanism. Hence, the Local Self-Governments in the state should be equipped with more powers and resources in disaster management with appropriate amendments in the State Disaster Management Rules 2007. Further investments are also needed to address the inherent weaknesses of the system.

While the Rebuild Kerala Initiative is only a special purpose vehicle to implement the RKDP in a time-bound manner, the 1,200 LSGs in the state with their own human resources including technical specialists, the hundreds of transferred staff from various departments, gender-balanced team of people's representatives and transparent systems for accountability, are strategically poised to offer participatory, inclusive, gender-sensitive and sustainable solutions towards achieving the vision of a resilient *Nava Keralam*.

The Sendai Framework underlines the importance of empowering the local authorities and communities in DRR through resources, incentives and decision-making responsibilities.







7

Exploring the  
Root Causes





# Kerala Floods of 2018: Causes, Management and Mitigation

Eldho T.I. and Sreedevi S.

## Introduction

Being in the southern margins of the Western Ghats, Kerala has been surprised by multiple hazards (hydrological and geological) over a decade starting from the tsunami of 2004, the series of severe cyclones (Ockhi 2017, Gajja 2018) and droughts (2004, 2009, 2013, 2016, 2017) to the devastating floods of 2018 and 2019. Besides, there have been significant changes in the land and waterscapes of Kerala due to direct human interventions. The changes to the landscape in terms of forest conversion/extraction have a long history and have adversely affected not only these diverse ecosystems but also the water resources of the region.

There has been an alarming reduction of forest cover (83 per cent) in the Western Ghats over the last century. There is a significant reduction in the paddy/wetlands (77 per cent) which were mainly converted to homesteads/perennial tree plantations of coconut and rubber. The total paddy land of Kerala has decreased from 9,000 square kilometres in the 1970s to just 1,890 square kilometres in 2016.<sup>1</sup> The modification of wetlands has high impact on the floodwater retention and post-monsoon water availability in the state. The repercussions of such widespread modification of the landscape should be taken into account while assessing the impact of climate change on the water resources in the region.

Most of the river basins in the state are highly controlled and modified by dams and diversions for catering to multiple needs. The natural flow has been highly hampered in most of the basins, especially during post-monsoon months. At present, there are about 60 large dams in the west-flowing rivers (Kerala and Tamil Nadu) concentrated mainly in the four basins of Periyar, Bharathapuzha, Chalakudy and Pamba. Moreover, the numerous weirs, lift irrigation and drinking water projects that operate in these river basins draw significant amount of water during post-monsoon months.

Lowering of riverbeds and water levels due to acute sand mining has resulted in increased saline ingress and water scarcity in the downstream mid and lowland riparian stretches across the state. Interestingly, these are the very basins which faced most severe devastation during the Kerala floods 2018. Hence, the floods in Kerala during 2018 have to be examined in this larger context of changing climate along with extensive changes in the physical landscape of Kerala. In this paper, an analysis of the causes and effects of the floods, possible mitigation measures, and challenges in flood management are briefly discussed.

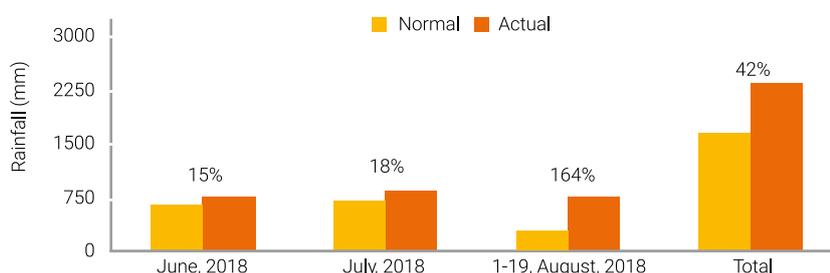
## An Analysis of the Kerala Floods 2018

Kerala receives an average annual rainfall of around 3,000 mm with 90 per cent of rainfall due to the south-west and north-east monsoons. From June 01, 2018 to August 19, 2018, Kerala received an abnormally high rainfall (42 per cent above the normal) according to the India Meteorological Department (IMD) data (Figure. 1). This led to severe flooding in 13 out of 14 districts in Kerala. Idukki had the highest departure in rainfall from normal (around 92 per cent) followed by Palakkad (around 73 per cent).

The analysis of IMD rainfall data from 67 rain gauge stations within Kerala found the cumulative rainfall amounts during August 15-17, 2018 to be quite significant.<sup>2</sup> Peermade, a place between the Periyar and Pamba sub-basins received more than 800 mm rainfall and Idukki received more than 700 mm rainfall during August 15-17, 2018.

From June 01, 2018 to August 19, 2018, Kerala received 42 per cent above normal rainfall which led to severe flooding in 13 out of 14 districts in the state. Idukki had the highest departure in rainfall from normal followed by Palakkad.

Figure 1: Comparison of normal and actual rainfall (June to August 2018) in Kerala. The percentage departure of actual rainfall from normal is shown in brackets



Source: The India Meteorological Department, 2018



As per the analysis of Central Water Commission (CWC), Government of India, the rainfall of August 15-17, 2018 (with centre of storm near Peermade) was almost comparable to the rainfall of Devikulam, Kerala during July 16-18, 1924 which had led to severe flooding. The rainfall depth during August 15-17, 2018 was 414 mm, while it was 443 mm during July 16-18, 1924 in Kerala.

The runoff volume generated in the rainfall event of August 15-17, 2018 in the sub-basins where severe flooding occurred (Periyar, Pamba, Chalakudy river, Bharathapuzha and Kabini) was estimated by CWC. The maximum discharge at CWC gauging stations on severely affected rivers are provided in Table.1. The analysis of release and inflow data as given in Table. 2 shows that the releases from these dams were controlled releases, as the discharging capacities of these dams are 5,013 cumecs (Idukki) and 3,012 cumecs (Idamalayar) respectively. Most of the dams were already at Full Reservoir Level (FRL) or very close to FRL on August 14, 2018, due to more than normal rainfall in the months of June to July 2018 and hence, the dams in Kerala did not add much to the flood nor helped in the reduction of the flood.<sup>3</sup>

The huge runoff of 12 Billion Cubic Metre (BCM) generated within three days (August 15-17, 2018) in entire Kerala was beyond the carrying capacity of the rivers in the state, resulting overbank flows from most of the rivers. The total live storage of Kerala is about 5.8 BCM (Figure. 2). The worst-affected districts were Wayanad, Idukki, Ernakulam, Alappuzha and Pathanamthitta.

**Table.1: Maximum discharge of rivers with severe flooding at CWC stations**

River and CWC gauge station	Maximum discharge (cumecs)
Periyar (Neeleshwaram)	8800 (on August 16, 2018)
Pamba (Malakkara)	2900 (on August 16, 2018)
Manimala (Kallooppara)	1250 (on August 16, 2018)
Chalakudy (Arangaly)	2900(on August 16, 2018 at 8:00 hours)
Bharathapuzha (Kumbidi)	6400(on August 17, 2018at 8:00 hours)
Kabini (Muthankara)	2235(on August 10, 2018 at 12:0 hours)

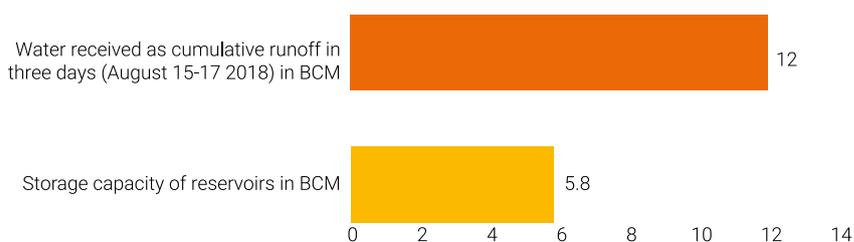
Source: Central Water Commission, 2018

**Table. 2: Details of inflow and release at reservoirs in the Periyar and Pamba during August 15-17, 2018**

River	Date	Dam	Release (cumecs)	Inflow (cumecs)
Periyar	August 15, 2018	Idukki	1100	1640
	August 16, 2018		1400	2000
	August 17, 2018		1460	1440
	August 17, 2018	Idamalayar	1272	1007
Pamba	August 15-16, 2018	Kakki	938	835

Source: Central Water Commission, 2018

**Figure. 2: A comparison of storage in reservoir and water received as runoff, Kerala, August 2018**



Source: Central Water Commission, 2018

## Evaluation of the Floods: Causes and Effects

An initial assessment of the extreme rainfall and the role of major reservoirs was carried out in a study by Mishra and others.<sup>4</sup> The study highlights that the Kerala floods were caused by multi-day extreme rainfall and partly due to high reservoir storage. The state-averaged two, and three-day extreme rainfall had return periods of more than 200 and 100 years, respectively. However, attributing the Kerala flood events to climate change is questionable, although it is known that there is an increase in extreme precipitation under the warming climate. All the major reservoirs were more than 90 per cent full before the heavy rain (August 14-17, 2018) which had a larger return period than what the state had witnessed.

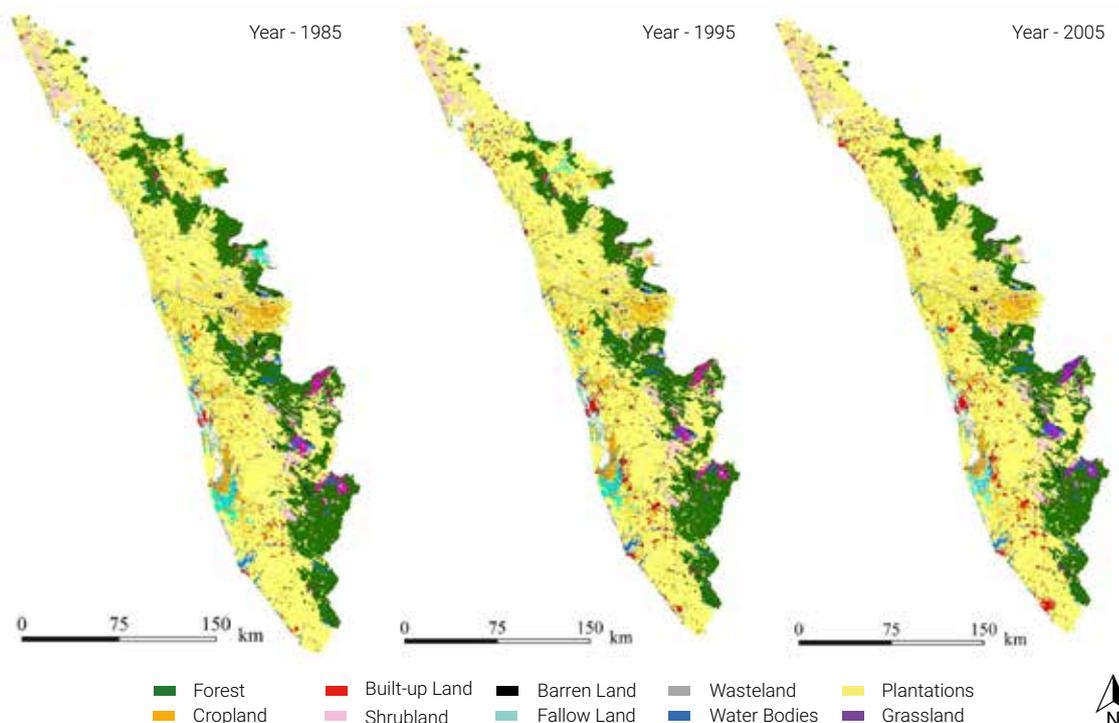
## Floods: Human Made or Natural?

A myriad number of factors determine the frequency, duration and magnitude of floods. The three important causes of floods are meteorological causes (high rainfall magnitude), geomorphic causes which include channel migration, meandering growth, avulsion and natural changes in the elevation of channel bed and anthropogenic causes (construction of dams, barrages, embankments and other engineering works causing alteration to land use pattern).<sup>5</sup> Prediction of flood events is possible only when there is a complete understanding of the causes of the flood-preceding events in a basin.

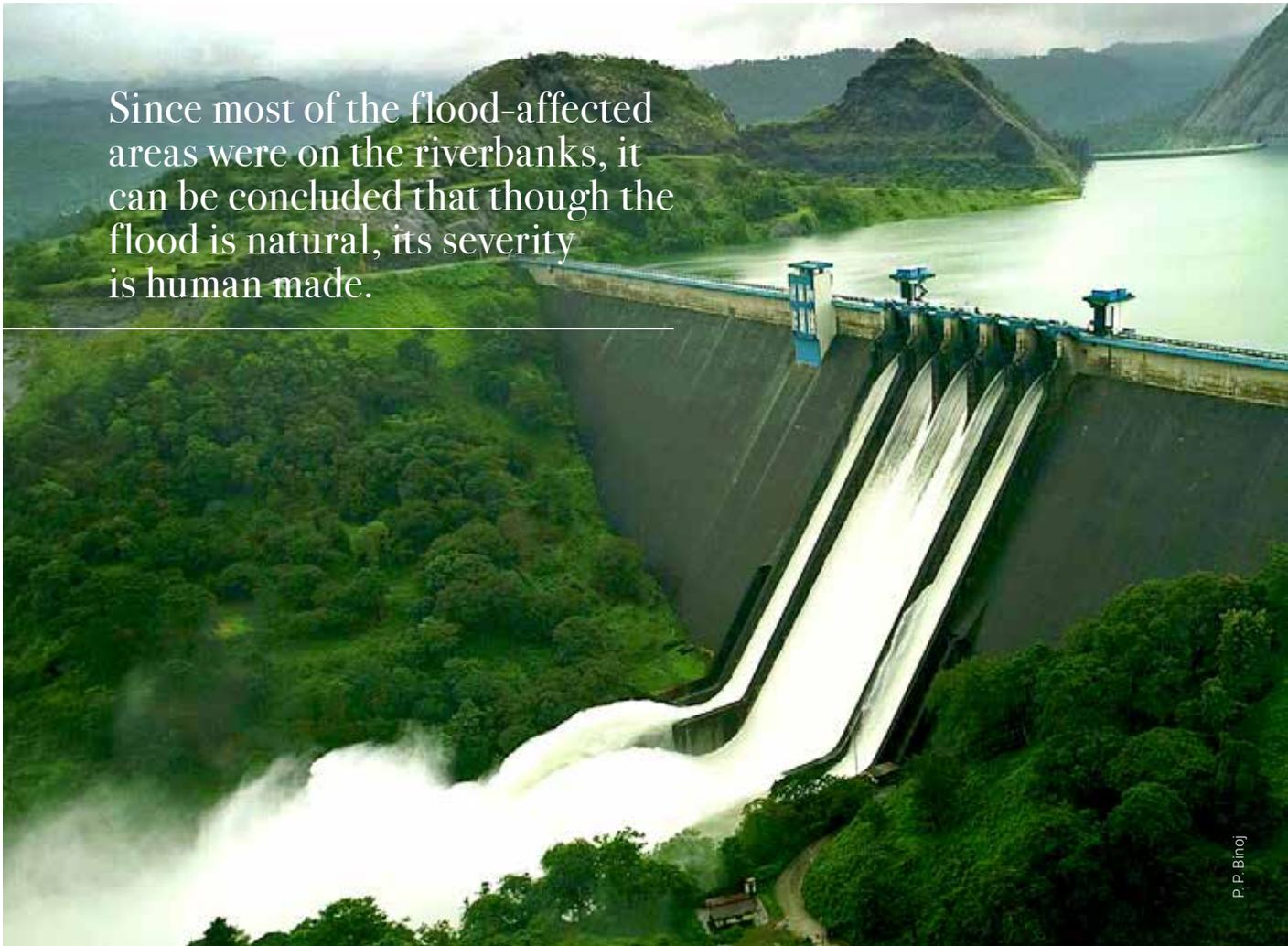
A numerical simulation of floods under different reservoir storage scenarios was attempted in a study by Sudheer

and others using Hydrologic Modelling System of Hydrologic Engineering Centre (HEC-HMS), US Army Corps of Engineers.<sup>6</sup> The role of dams and reservoir operations in causing flood in the Periyar river basin was investigated in this study. The study suggested that the reservoir operations during the flooding could not have helped much in avoiding the flood situation as only 16-21 per cent peak attenuation was possible by emptying the reservoir in advance, as the bulk of the runoff to the flooding was also contributed by the intermediate catchments without any reservoirs to control. A revision of reservoir rule curves was suggested, by considering the dams as multi-purpose and multi-reservoir water resources systems and developing integrated reservoir operation policies so as to maintain the balance between flood control and other system objectives. However, using a 1D type model such

Figure. 3: Land Use/Land Cover types in Kerala for the years 1985,1995 and 2005



Source: Roy et al., 2015, Data: <https://doi.org/10.3334/ORNDAAC/1336>



Since most of the flood-affected areas were on the riverbanks, it can be concluded that though the flood is natural, its severity is human made.

as HEC-HMS-RAS may not give much insight into this type of flooding event.

The role of Land Use/ Land Cover (LULC) changes in the Kerala floods needs to be examined in detail. Figure. 3 provides the land use maps of the years 1985, 1995 and 2005. The major LULC in Kerala are plantations (58 per cent of the total area), evergreen broadleaf forest (15.6 per cent of the total area) and cropland, shrubland and grassland together constituting 11.3 per cent according to the 2005 land use map by National Remote Sensing Centre, India.<sup>7</sup> Around 10 classes of land use types could be identified.

The notable changes in land use type from 1985 to 2005 were the 79 per cent increase in built-up land, 7.65 per cent reduction in forests (which

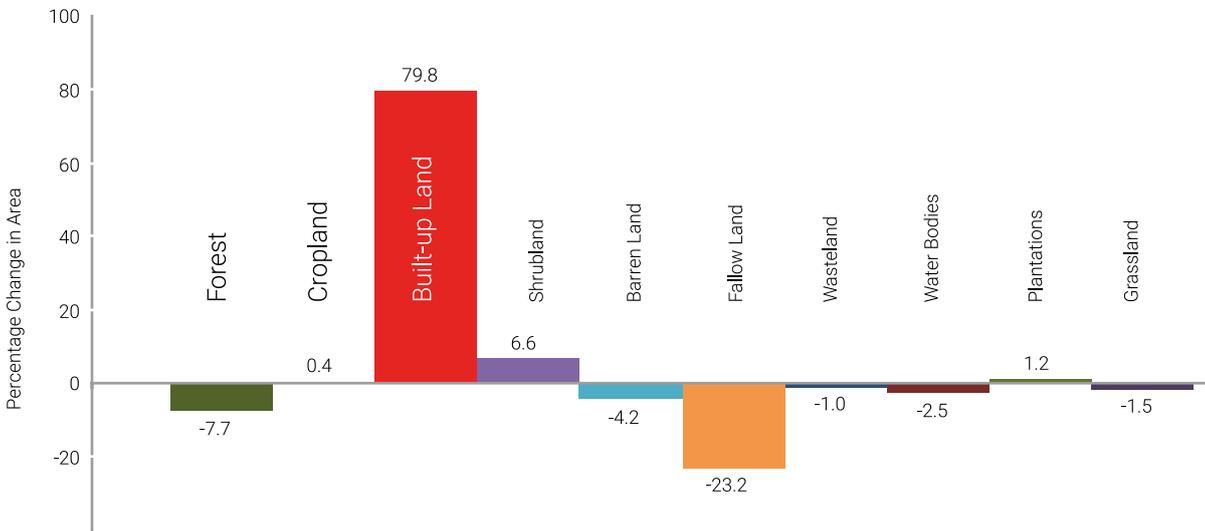
includes deciduous, evergreen, mixed and mangrove forests) and 23 per cent reduction in fallow land respectively (Figure. 4). As can be seen, due to large-scale urbanisation in the past three decades and reduction in forest/ fallow/ grassland, there is a huge impact on the hydrological process with less infiltration and high runoff. Further, it can be seen that most of the urbanisation/development took place on the riverbanks or floodplains leading to catastrophic effects during the heavy flooding.

However, it should be noted that a detailed study to assess the effect of land use change on runoff using hydrologic models needs to be performed at a watershed scale to have a better understanding of the impacts of

the LULC changes. Satellite images can be effectively employed to assess the land use changes and its impact on flood hydrograph, determined using hydrologic models in various studies.<sup>8,9</sup>

Further, it is observed that in most of the areas affected by the floods, large-scale construction took place in the floodplains of the rivers. It seems that there is no policy/ restriction on the developments on the floodplains of most of the rivers. Since most of the affected areas are on the riverbanks, it can be concluded that though the flood is natural, its severity is human made. However, further detailed studies in all the river basins are required to understand the development pattern and future course of actions.

Figure. 4: Percentage change in land use area, Kerala, 1985:2005



Source: Roy et al., 2015

Identification of areas vulnerable to floods can help provide early warning, facilitate rescue operations effectively and reduce the impact of flood events. An integration of satellite imageries in Geographic Information System together with field surveys can aid in assessing the damage caused by floods.

## Effects of Flood

The Kerala floods and landslides caused the death of nearly 500 people and damage and losses worth USD 3.8 billion.<sup>10</sup> The operation of Cochin International Airport was suspended for over one week. Due to floods, infrastructure facilities like many buildings, highways and bridges were washed away and there was a tremendous loss of agricultural land. The worst-affected districts were Wayanad (the Kabini sub-basin), Idukki (the Periyar sub-basin), Ernakulam (the Periyar and Chalakudy sub-basins), Alappuzha and Pathanamthitta (both in the Pamba sub-basin) according to CWC.

Moreover, nearly 1.5 million people were displaced from their homes for several days and had to take shelter in relief camps. This has caused huge stress on the economy, infrastructure and on the disaster management system of Kerala State. The state government was forced to take help from the defence forces for the rescue operations.

## Living with the Floods? Flood Management

Flood management is possible by developing flood hazard maps, based on the return period or historical data at watershed scale. River flood inundation can be predicted using hydraulic models such as MIKE-11, MIKE-Urban, HEC-HMS-RAS, Telemac and FLO-2D. Considerable amount of data and parameters like topographic data, the surface roughness parameters and flow boundary conditions are required for hydraulic modelling.

Identification of areas vulnerable to floods can help provide early warning, facilitate rescue operations effectively and reduce the impacts of flood events. An integration of satellite imageries in Geographic Information System together with field surveys can aid in assessing damage caused by floods.

Using land use, land cover pattern, digital elevation model, soil data and climate data, hydrologic/ flood models for various river basins can be developed. Using the available rainfall pattern, for example, of minimum past 30 years, intensity duration frequency (IDF) curves and future return period rainfalls can also be developed. By running the hydrologic / flood models, the possible flooding patterns for various return periods such as, of 10 years, 25 years, 50 years and 100 years can be obtained. Using these data, the corresponding flood maps/ hazard maps, vulnerability and risk maps can be prepared.

Further, it is possible to prepare return period-based flood hazard plans (based on intensity-duration- frequency curve and return periods) for 10 years, 50 years and 100 years return periods for each river basin and identify the flood zones. The flood zones can be classified into zones where only restricted development is allowed and zones, where absolutely no development is allowed. These can be used for future development plans, flood vulnerability and risk assessment and preparation of disaster management plans.

## Rebuilding Kerala: Hydrological Perspectives

The devastating floods in Kerala in August 2018 resulted in significant losses in terms of human lives, economic crisis, damage to infrastructure and displacement of people. Hence, while planning for rebuilding Kerala for the future, various hydrological perspectives are to be considered. Some of the important aspects to be considered include:

- **Develop hazard, vulnerability and risk assessment maps for all river basins:** Develop flood hazard, flood vulnerability and flood risk assessment maps for all river basins based on past data and return periods of 25 years, 50 years and 100 years.
- **Regulate development on the floodplains with strict enforcement and stringent actions:** Restrict any future development on the floodplains of the river basins. Develop future plans for all river basins based on detailed study and past experiences. Avoid any kind of development in highly flood-prone zones and ensure minimal development in less flood-prone zones. Strictly remove encroachments in these zones, if any.
- **Determine safe discharge rates for dams:** While operating the reservoirs, there should be long-term plans by considering the flooding scenarios. The safety of the dam as well as the safety of the people downstream should be taken into account. This can be achieved by considering a safe discharge rate based on the downstream water level, which can be fixed based on many criteria such as a safe flood line in all respects or a flood line with an acceptable level of damage. The factors determining the release time would be the inflow rate to the dam, projected rainfall and safe discharge rate.
- **Better and integrated management of reservoirs:** The existing reservoirs should be managed in an integrated way by considering the flooding scenarios. For severe flood-prone zones, possibility of new reservoirs for flood management can be investigated.
- **Develop real-time Flood Forecasting and Management Information System:** Development of a real-time Flood Forecasting and Management Information System for the most vulnerable river basins should be taken up on an urgent basis.





## Centre for Disaster Management and Hydrological Studies

In the context of the recent floods, it is essential to set up a highly skilled flood management/ disaster mitigation centre in Kerala, and integrate all hydrological aspect studies including floods and droughts. A group of dedicated scientists and engineers must be trained for this centre. This can be co-ordinated in association with organisations such as Centre for Water Resources Development and Management (CWRDM Kozhikode), Indian Institutes of Technology (IITs) and National Institute of Hydrology (NIH Roorkee). A core group of permanent scientists/ engineers should be available with the centre. The centre should have various core groups of experts in areas such as hydrology, hydraulic modelling, remote sensing and GIS, drought management, disaster management and vulnerability and risk management. These core groups should be able to provide further training to various engineers from the Department of Irrigation, Kerala Water Authority, and Kerala State Electricity Board (KSEB).

The main activities of the centre shall be the following:

- Development of a real-time system for flood warning/water management for all the river basins in Kerala
- Development of flood hazard, vulnerability and risk assessment for all the river basins
- Development of an Integrated Reservoir Operation Management System for the Kerala reservoirs
- Development of flood zonation maps for all the Kerala rivers based on IDF curves and return period analysis
- Drought assessments and preparation of management plans
- Development of disaster management plans
- Land Use and Land Cover pattern studies
- Climate change impact assessment studies
- Regular training for engineers from various government departments
- Environmental impact assessments
- Preparation of future development plans, assessment of the plans and revisions





Mathrubhumi Archives

## Concluding Remarks

In this paper, an analysis of the causes of the Kerala floods 2018, mitigation and management of floods and future challenges within the context of hydrology and water management are discussed. The Kerala Floods 2018 were caused by factors such as above normal seasonal rainfall, state-wide extreme rain, high reservoir storage during the season, drastic changes in the LULC in the last three decades and large-scale urbanisation on the river fronts by reducing the natural drainage. The severe flooding can be attributed to the heavy rainfall received within three days, amounting to around 414 mm during August 15-17, 2018 which forced the concerned authorities to open 35 reservoirs. An effective disaster management plan has to be developed to deal with such floods in future. An integrated reservoir operation policy needs to be framed to balance flood control and other utilities such as hydropower or irrigation. Further, an integrated flood mitigation and management system is to be developed, including real-time flood forecasting for the vulnerable basins.

## Recommendations

Following are the major recommendations from the hydrological and water management perspectives:

### **Publish daily data on dam storage and release, establishing an online portal:**

Develop a web portal to publish online, daily data on dam storage and release levels of all the dams in Kerala. Presently, only a few dams operated by KSEB publish data online.

### **Evolve a robust system to forecast, monitor and manage floods in Kerala:**

Evolve a transparent, accountable, technical and integrated mechanism to monitor, forecast and manage floods in the future.

**Develop hydrological models for flood forecasting and monitoring:** Develop hydrological models for flood forecasting and real-time flood monitoring and integrate them with early and real-time warning systems.

**Prepare dam operation guidelines and rule curves at river basin level:** Prepare dam operation guidelines and rule curves at river basin level, for multiple extreme rainfall scenarios including hypothetical extremes.

**Integrate reservoir operations:** It is important to integrate reservoir operations and prepare a schedule required for flood management.

**Prepare flood and drought maps at river basin levels for multiple extreme climate scenarios:** Prepare flood and drought maps at river basin levels for

multiple extreme climate scenarios such as extreme rainfall, temperature, cyclonic conditions and heat waves.

**Communicate flood warnings effectively to people:** Translate flood related/ other warnings into easily understandable common parlance from a practical point of view.

### **Develop disaster preparedness master plan at Local Self-Government (LSG) levels and update them regularly:**

Develop disaster preparedness master plan for each district, at the level of Local Self-Governments (LSG) and make it available in the public domain. Such master plans are to be updated once in every two years.

**Undertake risk/vulnerability assessments:** Assess the vulnerabilities and risks associated with various possible extreme events in Kerala.

**Set up a Centre for Disaster Management and Hydrological Studies in Kerala:** Set up a centre of excellence in flood management/ disaster mitigation and integrate all hydrological aspect studies including floods and droughts under this institution. Experts in hydrology, hydraulic modelling, remote sensing and GIS, drought management, disaster management and vulnerability and risk management should be appointed exclusively for this.





# Landslides of 2018 in Kerala: Causes and Mitigation Strategies

S. Sreekumar

Heavy rainfall battered thirteen out of Kerala's fourteen districts with the onset of monsoon in June 2018, and developed ferocity after July, triggering catastrophic floods and a series of landslides. Vast stretches of the Ghat roads, dwellings, hotels, bridges and other construction on the hillslopes slipped downward along with water-soaked boulders, decayed tree roots and mud. Wayanad, Kannur, Kozhikode, Malappuram, Idukki and Pathanamthitta were the most affected districts.

According to India Meteorological Department, from June 1 to August 22, 2018, the state received 2,394.1 mm rain, compared to the normal rainfall of 1,701.4 mm. Kerala is not new to floods and landslides but this was a disaster that devastated the high ranges and the low-lying areas of the state alike. Kerala's worst flood since 1924 reinforces how unscientific land use practices and lack of disaster preparedness can make extreme weather events deadly.

A comparative study of the 2018 deluge and the flood in 1924 demonstrates the contribution of the humankind in aggravating the disaster and the

reluctance of Keralites in general to learn lessons from the past experiences. The state had received far more rainfall in 1924. Places affected in the 1924 floods were hit in the 2018 floods as well and the same rivers had brought havoc both in 1924 and 2018. Munnar, located 1,500m above the Mean Sea Level (MSL), Kuttanad, which is below MSL, Peerumedu, Paravur, Perumbavoor, Kothamangalam, North Pandanad, Mannar, Pandalam, Ranni, Konni, Aranmula, Omalloor and Thiruvalla were all locations affected in both the floods.

Reports on the 1924 floods in Kerala mention the surging waters destroying the buildings and submerging vast areas of plantations. In the high ranges, landslips had occurred in all the hills from Peerumedu to Vandiperiyar. Forty people had died as a hill crashed on a building and the Kottayam -Kumaly road was destroyed by huge landslides. Mountain Karinthiri was completely swept away in the landslides, devastating the then Munnar-Kochi road. The first monorail of India, in Kundala Valley, connecting top station and Munnar town was also totally destroyed.

## Landslide Hazard Profile of Kerala

The Western Ghats on the Kerala side are frequently ravaged by the disastrous consequences of several types of slope failures. Among these, the most common are the debris flows. It is the swift and sudden downslope movement of highly water-saturated overburden containing a varied assemblage of debris material ranging in size from soil particles to boulders, destroying and carrying with it everything that is lying on its path. The west-facing Western Ghats scarps that run the entire extent of the mountain system is the most landslide-prone physiographic unit in Kerala. These scarp faces are characterized by soil cover (regolith) modified by anthropogenic activities. The majority of the mass movements have occurred on hillslopes greater than 20 degrees along the Western Ghats scarps.

Wayanad and Kozhikode districts are prone to deep-seated landslides while Idukki and Kottayam districts are prone to shallow landslides. Except Alappuzha, all other districts of Kerala are prone to landslides. It is worth mentioning here that more than 40 per cent of the land area of Kerala falls within the highland region and the slopes in this region are normally steep. Studies reveal that 14.4 per cent of the state's total area is susceptible to failures (Figure.1). Highly hazardous zones in different districts are presented in Table. 1 and Figure.1.

### Types of Landslides

The movement of earth materials downwards due to gravitational force is referred to as mass wasting. Several types of mass movements have been reported from Kerala. These include rockfalls, rockslides, debris flows, toppling, slump and subsidence. Blocks of rock may abruptly fall, slide or topple down from the hillslope and often initiate a debris flow. A peculiar failure noticed in hill ranges during the south-west monsoon was the slab slide, where the land slides in a step like manner. This is considered as an aborted or incomplete debris flow. It would have escalated into

a major disaster if the factors were more favourable. This type of slide produces a terraced ground surface with longitudinal and horizontal cracks. Percolation of excess water through the cracks in the ground can lead to a disastrous debris flow. A slump is another kind of failure where relatively fine homogeneous regolith moves downwards along a concave surface. Slumps of smaller and larger dimensions were reported from different parts of the state. Land subsidence due to soil piping and tunnel erosion had also been recorded earlier in Kannur, Kozhikode and Idukki districts.

### Increased Incidence of Soil Piping

Soil piping or tunnel erosion leads to the formation of subsurface tunnels which may lie very close to the ground surface or extend several metres below the ground. Once initiated, they grow over time, expand due to subsurface erosion, leading to roof collapse and ground subsidence. During the last decade several piping incidences were reported from different parts of Kerala.

In 2000, National Centre for Earth Science Studies (NCESS) investigated land subsidence in the Chattivayal locality of Thirumeni village of Kannur district. This was the first major incident reported by NCESS on soil piping. At that time, it was thought to be an isolated incidence. But during the 2018 monsoon, widespread incidents were reported from Thrissur, Wayanad, Kozhikode and Idukki districts.

### Causative Factors

Slope failures are either due to natural or anthropogenic factors or both. Natural factors include rainfall, seismicity, hill slope, rock type, altitude and dip of joints in the rock, overburden thickness and engineering properties of the soil. Anthropogenic factors include deforestation, quarrying and blasting, impoundment of water on the slopes, diversion or blockage of the natural drainage and toe cutting.

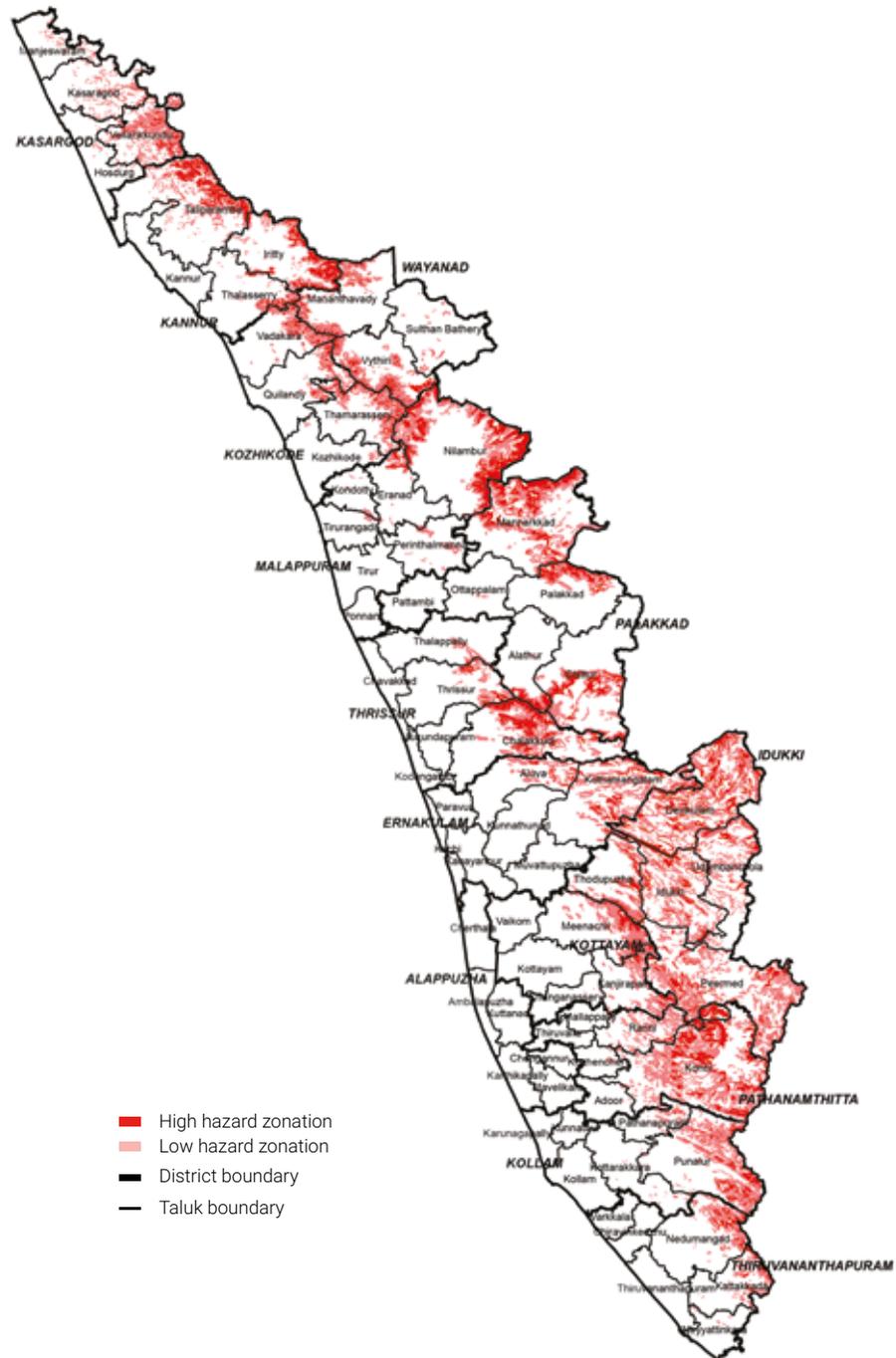
Based on causative factors, NCESS has generated and published Landslide Hazard Zonation Maps of all the districts

Table. 1: Highly hazardous landslide zones in different districts

No	Districts	Area (Sq. Km)
1	Pathanamthitta	170.3
2	Idukki	388.3
3	Palakkad	324.6
4	Malappuram	198.6
5	Kannur	168.7
6	Wayanad	102.6
7	Kasaragod	33.2
8	Kozhikode	109
9	Thrissur	108.1
10	Ernakulam	61.4
11	Kottayam	61.8
12	Kollam	75.6
13	Thiruvananthapuram	45.6
14	Alappuzha	-

Source: Kerala State Disaster Management Authority, 2010

Figure.1: Landslide susceptibility map of Kerala



Map not to scale

Source: Kerala State Disaster Management Authority, courtesy NCESS



The Western Ghats Ecology Expert Panel constituted by the Indian Ministry of Environment and Forests, had stated that human interventions in the ecologically sensitive areas without considering the geo-environmental aspects can escalate the scale of damage due to natural disasters. This came true in 2018. Many failures have happened in the fragile zones demarcated by the Expert Panel.

in Kerala. Highly hazardous, moderate hazardous, less hazardous and stable zones are demarcated in these maps. This will help the administrators and the public to select areas for construction or other development activities. Though this map is available on the website of the Kerala State Disaster Management Authority (KSDMA), the Local Self-Governments (LSGs) in Kerala have not been able to utilise it fully owing to lack of expertise.

## Landslides in 2018

In 2011, Madhav Gadgil, Chairperson of the Western Ghats Ecology Expert Panel constituted by the Indian Ministry of Environment and Forests, had stated that human interventions in the ecologically sensitive areas without considering the geo-environmental aspects can escalate the scale of damage due to natural disasters. This came true in 2018. Many failures have happened in the fragile zones demarcated by the Expert Panel.

The post-disaster landslide assessment carried out by the Geological Survey of India revealed that a total of 650 landslide events were recorded in Kerala during this period.<sup>1,2</sup> Preliminary geological studies carried out after the disasters reveal that unscientific land use practices were the major contributing factors in the catastrophic events in 2018 apart from heavy and prolonged rainfall.<sup>3,4</sup> The locations, types of failure and causative factors are presented in Table 2.



Slab slide at Vattapara, Thrissur



Tunnel erosion due to soil piping at Maripuzha, Kozhikode



Slump in Idukki

## Rainfall

Rainfall was the triggering factor for the landslides and debris flows during the 2018 monsoon period. Studies reveal that the threshold value for initiating landslides on the Kerala side of the Western Ghats is 120-150 mm rainfall for two or three consecutive days. During the south-west monsoon in 2018, the rainfall over Kerala was extremely heavy, beyond expectations and was continuous for a number of days.

There were clearly four distinct peaks of rainfall in Kerala. Two such peaks were in June, around June 14 and 20, one in July, around July 20, and the final and the most devastating one during August 8-16. The dates of occurrence of major landslide events coincide with these distinct peaks. A comparison of the amount of rainfall obtained in each district and normal rainfall is shown in the Table. 3.

## Degraded Forest Areas

The wild trees have deep roots capable of bolting the loose and fragile regolith to the underlying rocks. However, in a degraded forest area, this bolting mechanism is very weak. When it rains continuously for two or three days, the water completely soaks the overlying porous earth material. Further downward movement of water is prevented by hard rock and consequently pressure develops at the interface of the hard rock and the upper layer, leading to a debris flow. Illegal tree felling and forest fires result in such degraded forest patches.

The crowns of many debris flows in 2018 were situated in degraded forest areas. The crown of the disastrous Kuranchery slump in Thrissur district which took the lives of 18 people initially started from a forest area which was blazed under fire a few years back and is presently transformed into a monoculture plantation. A pond in the crown region would have acted as a hydraulic head for this event. Similarly, the origin of the debris flow in Echippara was from a forest area devastated by fires three years ago.

**Table. 2: Location, type and causative factors of selected slope failures**

Location	District	Type of failure	Causes
Kochi-Dhanushkodi National Highway (NH 49)	Idukki	Debris flow	Adverse cultivation pattern and defective maintenance of drainage systems
Second Mile bus stop road, Anachal, (NH 49)	Idukki	Debris slide	Construction of building on loose overburden material without proper strengthening of foundation-blocking drainage
Kallarkutty 1	Idukki	Debris slide	Unplanned construction, excavation of slopes
Kallarkutty 2	Idukki	Subsidence	Toe erosion by one of the tributaries of Mutirapuzha
Valara	Idukki	Rockfall	Joint controlled failure
Ambazhachal	Idukki	Planar failure	Unscientific cutting of hillslope
Puthencaud- Ettamkallu	Thrissur	Debris flow	Breaching of irrigation canal
Kurupathu Valav-Thazhvaram Road	Thrissur	Debris flow	Teak plantation
Ettamkallu	Thrissur	Slab slide and soil piping	Subsurface tunnel erosion
Cheenivalavu	Thrissur	Planar failure	Very steep slope
Pulikanni	Thrissur	Slump	Soil piping in rubber plantation
Kolamkundu	Thrissur	Landslide	Unscientific construction
Pattilamkuzhi	Thrissur	Debris flow and slab slide	Steep slope
Vattapara	Thrissur	Slab slide	Rubber plantation and steep slopes
Kuranchery	Thrissur	Debris flow	Presence of a pond in the crown region
Malavayi	Thrissur	Debris flow	Improper drainage
Thumboormuzhi	Thrissur	Debris flow	Joint controlled slide
Karinchola Mala	Kozhikode	Debris flow	Hillslope modification
Vettiozhinjathottam	Kozhikode	Debris slide	Hillslope modification for construction of houses
Kattippara	Kozhikode	Debris flow	Steep slope of the contact phase
Kakkadampoyil	Kozhikode	Debris slide	Unscientific hillslope modification
Koodaranji	Kozhikode	Debris flow	Blockage of natural drainage
Muthappanpuzha	Kozhikode	Debris flow	Steep slope
Karimb	Kozhikode	Debris flow	At the contact of overburden and rock
Maripuzha	Kozhikode	Debris flow	Removal of toe support due to riverbank erosion
Jawahar Vidhya Nagar	Wayanad	Slump	Unscientific slope modification and unprotected cut slope made for construction
Veterinary college, Vythiri	Wayanad	Debris slide	Unscientific slope modification and unprotected cut slope made for construction
Parakkamala	Kannur	Debris flow	Steep slope and lithology

Table. 3: Normal and obtained rainfall in Kerala by district, June 1: August 22, 2018

No	Districts	Rainfall (mm)	Normal Rainfall (mm)
1	Thiruvananthapuram	966.7	672.1
2	Kollam	1579.3	1038.9
3	Pathanamthitta	1968	1357.5
4	Alappuzha	1784	1380.6
5	Kottayam	2307	1531.1
6	Ernakulam	2477.8	1680.4
7	Idukki	3555.5	1851.7
8	Thrissur	2077.6	1824.2
9	Malappuram	2637.2	1761.9-
10	Kozhikode	2898	2250.4
11	Palakkad	2285.6	1321.7
12	Wayanad	2884.5	2281.3
13	Kannur	2573.3	2333.2
14	Kasaragod	2287.1	2609.8

Source: IMD, 2018

## Modification of Natural Drainage

The agricultural land use in the highlands of Kerala has to be evaluated in this context. The rubber plantations occupy the majority of the area in the plantation sector. Younger rubber plantation areas are protected by terracing and pitting. The terracing and pitting will cut off surface runoff and increase groundwater infiltration. Studies show that the majority of the slope failures in the state are associated with rubber plantation on steep slopes.

In 2018, the first disastrous debris flow was reported from Kattipara in Kozhikode district, in early June. The construction of a check dam on a steep hillslope with thick overburden was the causative factor. To cite an early example, the Amboori landslide in Thiruvananthapuram district in November 2001 that resulted in 38 deaths too had occurred in a rubber estate where free drainage was blocked by contour bunding.





The majority of the slope failures in the state are associated with rubber plantations on steep slopes.

## Quarrying

In 2017, the number of quarries that operated in Kerala was 5,924. Out of these, 2,557 quarries were located close to natural drainages; 1,457 were within the forest and 1,486 quarries were within the fragile zone.<sup>5</sup> Strong blasting can create fresh cracks, or it can enhance the gap between the pre-existing joint planes in the host rock. These openings become the channels for water percolation which builds up pore pressure and weakens the strength of the rock.

## Land Use Practices

It is observed that 86 per cent of the landslides coincide with zones marked as moderate and highly susceptible as per the hazard zonation map published by Kerala State Disaster Management Authority. Some of the incidences were due to the cutting of the toe of the hill for construction which resulted in near vertical slopes with no provision for lateral support.

In the 2018 monsoon, a four-storeyed building on a loose overburden material had slipped down near Second Mile bus stop in Idukki district. This is an example for the lack of proper strengthening of the foundation and improper maintenance of drainage system. In Achoor in Wayanad, a house constructed with vertical cut slope, without any retaining wall, collapsed resulting in the death of one person.

For the past few decades, natural forest has been transformed into plantations and agricultural land. Deep rooted trees are replaced by shallow rooted trees and plants like rubber, cardamom, tea and coffee. The shallow rooted trees cannot hold the overburden and bolt it firmly to the rocks beneath.

## Conclusions

- The landslide hazard zonation map reveals that 14.4 per cent of the state's total area is vulnerable to

slope failures. The post-landslide assessment carried out by GSI revealed that a total of roughly 650 major landslide events were recorded in Kerala during the south-west monsoon period in 2018. The majority of the failures have occurred in the moderate and high hazardous zones identified in the map. The triggering factor of all the slope failures was the continuous and prolonged rainfall.

- Slope failures are not due to a single factor, but involve the cumulative effect of multiple factors. The reasons for slope failures are site specific and therefore mitigation measures should be site centred.
- Soil piping, slab slides, debris flows and slumps were the common types of failures observed in the high ranges. Widespread occurrence of soil piping and ground subsidence was observed throughout the hill ranges of Kerala. The locations

The human interventions in the ecologically sensitive areas have increased the magnitude of the damage. If the government had followed the environmental laws, a disaster of this proportion could have been averted.

where slab slide and soil piping have occurred are in a metastable condition and it requires five to six years for stabilization. Until then, the locations are susceptible to further failure if heavy and prolonged rainfall occurs again.

- Many of the disastrous landslides during the 2018 monsoon period were due to unscientific land use practices, cutting of slopes and creation of escarpment for construction purposes, diversion or blockage of first or second order streams, deforestation and

degradation of natural forest by fire in the recent past.

- The Western Ghats Ecology Expert Panel headed by Madhav Gadgil, constituted by the Ministry of Environment and Forests, Government of India had recommended a slew of measures for the prevention of the destruction of natural environment in the ecologically fragile Western Ghats, including strict curbs on mining, tree felling, quarrying and the use of land for non-forest purposes. Faced with objections from successive governments and a section of people, the report was re-examined. The Kasthurirangan Committee, which submitted its report in 2013, watered down the recommendations of the Western Ghats Ecology Expert Panel. The human interventions in ecologically sensitive areas have increased the magnitude of the damage. If the government had followed environmental laws, a disaster of this proportion could have been averted.

## Recommendations

**Revise the landslide susceptibility maps based on 2018 and 2019 events and utilise them for regional planning:** The land use policies and land management system in Kerala should be based on the landslide susceptibility map. The present landslide hazard zonation map for each district should be revised based on the landslides in 2018 and 2019. These maps are for regional planning and can be used by the local governments and the public for their future land use practices, use of resources and for identifying the type of activities that can be practiced and not, in low, moderate and high hazardous zones.

**Site-specific investigations and interventions are needed in moderate and high hazard zones where the risk is high:** Site-specific geological, geo-technical investigations and remediation are needed in moderate and high hazardous zones where the risk is high. Measures should be taken to make landslide hazard zonation map available to all the LSGs in the hilly areas of Kerala, at a scale appropriate for local planning<sup>1</sup>.

i Scale of 1:5,000 or 1:2,000





Revise policies to regulate construction, based on the lessons learned from the disasters and ensure compliance: Measures should be taken to ensure that the stability of slopes is established by geological and geo-technical investigations before construction or slope modification activities are initiated. Natural drains and hollows must be protected, and people should not be allowed to construct new houses within 10 metre distance of such drains on either side. Appropriate building rules must be developed and enforced. Retaining walls and provision for drainage should be made mandatory along road cuts.

**Inter-agency coordination is indispensable:** There is a dire need for coordination, networking and linkage among different government bodies such as KSDMA and various departments like Public Works, Irrigation, Forest, Agriculture, Mining and Geology, Soil Conservation and Groundwater.

**Ban quarrying completely in moderate and high hazardous zones:** Environmental clearance for quarries is issued based on certain stipulations. However, once permission is obtained, the quarries carry out blasting without adhering to the guidelines. The unscientific manner of blasting without the supervision of qualified explosive experts can cause strong ground vibrations and it can widen the gap in the

joints and add to the instability of slopes. There must be a robust mechanism to monitor the system periodically. Besides, quarrying must be banned in moderate and high hazardous zones.

**Undertake measures to revive degraded forests:** The crowns of many debris flows have started from degraded forest areas and therefore afforestation programmes must be initiated in such areas.

**The cut slopes are to be treated and stabilized:** Many of the disasters are due to cut slope failures. The cut slope has to be treated and stabilized and the drainage has to be maintained. A comprehensive assessment of the locality, identification of the types of plants suited for hillslopes, and planting the suitable variety of native species are necessary, which can be taken up by the panchayats.

**Plantations in vulnerable areas should have sufficient provisions for storm water drainage:** In plantations, at slopes greater than 20 degrees, settlements should have sufficient provision for storm water drainage. Irrigation canals situated on the upslope of settlement areas must be maintained before the onset of every monsoon.

**Strengthen the network of rain gauge stations in moderate and high hazardous zones:** Rainfall is the

triggering factor of all landslide events. However, sufficient data on rainfall is not available from many of the areas. It is necessary to have a network of rain gauge stations within all panchayats of hill ranges so that, in future, a proper correlation between intensity of rainfall and slope failures could be worked out in order to formulate a warning system for the moderate and high hazardous zones.

**Sensitise community and other key stakeholders:** It is important to sensitise and promote awareness among the public particularly the affected communities, on environment-friendly land use. In the case of casualties in remote areas, accessibility is a challenge. Awareness generation among the stakeholders with respect to response, first aid and rescue is important to mitigate the impact of such disasters.

**Promote Community-Based Disaster Preparedness Approaches:** Community-Based Disaster Preparedness Approaches (CBDP) are increasingly important elements of vulnerability reduction and disaster management strategies. CBDP may be instrumental not only in formulating local coping and adaptation strategies, but also for wider development planning. Training and capacity enhancement in the field of landslide risk reduction and management at local level is very much essential.





8

# Unfolding Climate Change in Kerala and Implications





# Markers of Climate Change in Kerala and the Path Ahead

George Chackacherry and Pratheesh C. Mammen

## Introduction

Climate change, the large-scale, long-term shifts in weather patterns of a region or a place or the planet earth as a whole is a complex global challenge. The abrupt and irreversible climate change that we currently experience is mainly due to anthropogenic activities in the world in the post-industrial revolution era. The primary reason for the climate change is the increase in greenhouse gases (GHG) in the atmosphere which in turn causes positive radiative forcing which warms the earth system. Due to increase in anthropogenic activities such as fossil fuel burning, mining, landfills and agriculture contributing to GHG emissions, global temperatures have shown a warming trend of 0.85°C over the period 1880-2012. Two-thirds of the warming has occurred since 1975, at a rate of roughly 0.15°C to 0.20°C per decade. Climate models predict a global average temperature rise of 1.5°C by 2050 and 3°C by 2100.

Kerala State is vulnerable to the changing climate dynamics owing to its location along the coast and steep gradient along the western slopes of the Western Ghats, peninsular India. Kerala has a very long coastline of about 580 km, out of which 322 km is prone to severe sea erosion. During the last 43 years, the mean maximum temperature in Kerala has risen about 0.80°C, the minimum by 0.20°C and the average temperature by 0.60°C, showing a clear upward trend. Kerala also witnesses an increase in

annual mean temperature by 0.01°C per year. The maximum temperatures recorded in many parts of the state either crossed or neared the critical level of 40°C. The year 2016 witnessed the record maximum temperature, with Palakkad registering 41.9°C.

On the other hand, India Meteorological Department (IMD) documents that Kerala is witnessing an average decline in the south-west monsoon rainfall by about 2.42 mm per year and the analysis of 146 years of rainfall data shows a significant decrease (10.9 mm in 10 years) in the south-west monsoon rainfall, and an increase (7.5 mm in 10 years) in post-monsoon season. The sea level is on the rise due to global warming and the projected sea level rise along the Kerala coast on a conservative estimation is about 100 to 200 mm over the next 100 years. The sea level rise in Kochi, in central Kerala, is estimated to have been 2 cm in the last one century. It is predicted that if the sea level rises by one metre, 169 square kilometres of the coastal region surrounding Kochi will be inundated.

Though the state has been blessed with rich natural resources such as forests, water and minerals, these have deteriorated in the recent years. Many of the rivers are drying up due to decrease in rainfall and change in basin ecology. Reclamation of wetlands is another factor adding to the ecological



## Reclamation of wetlands adds to the ecological transformation of the state.

transformation of the state. High population density and urbanisation result in increased per capita energy needs and carbon intensity. Kerala has undergone a rapid socio-economic evolution from an agrarian society to an acutely urban consumerist society in a short span of 80 years.<sup>1</sup> The state's socio-economic attributes are highly dependent on climate-sensitive sectors such as water, agriculture, health, fisheries and forests. As identified by State Disaster Management Plan 2016, the state is prone to 17 natural hazards and 22 anthropogenic hazards and many of them are climate change induced.<sup>2</sup> Nearly 14.5 per cent of the state's land area is prone to floods. Landslides along the Western Ghats in Wayanad, Kozhikode, Idukki and Kottayam districts are the major hazards. Seasonal drought-like conditions are also common during summer. Kerala experienced 66 drought years between 1881 and 2000 and its decadal frequency is rising.

### Emerging Markers of Climate Change in Kerala

According to the provisional statement of the State of Global Climate issued by the World Meteorological Organisation, 2018 was a catastrophic year with floods to forest fires in different countries across the continents. Kerala also experienced extreme climate events not only in 2018 but in 2019 as well, which reiterated the fact that climate change is a reality affecting people. The serious reservations about perceiving the changing climate variables in the past decades as climate change have vanished. The rainfall concentration at annual south-west monsoon, and winter scales exhibits significant decreasing trends, implying a decline in the degree of irregularity in annual and seasonal rainfall.<sup>3</sup> The occurrence of longer time scale droughts is becoming more frequent in the recent decades in Kerala.<sup>4</sup>

### Tropical Cyclones on the Kerala Coast and Ockhi

Global climate models show a substantial increase in tropical cyclone potential intensity with anthropogenic global warming, leading to the prediction that actual storm intensity should increase with time.<sup>5</sup> Region-specific studies related to tropical cyclones in the northern Indian Ocean show an upward trend in the rate of intensified tropical disturbances to severe cyclone stage.<sup>6</sup> An increase in the intensity of pre-monsoon tropical cyclones in the Arabian Sea during the period 1979 to 2010 shows that this change in storm strength is a consequence of a simultaneous upward trend in anthropogenic black carbon and sulphate emissions.<sup>7</sup> Tropical cyclone related events like intense rainfall, strong winds and storm surges are to be seriously dealt with for a landmass with a variable topography like Kerala.

Having originated near the south-western coast of Sri Lanka and ravaging the coastal areas of Tamil Nadu, Kerala, and the Lakshadweep islands after reaching India, Ockhi was unlike other cyclones. The rapid intensification in a short span of time from a deep depression into a cyclonic storm and the long gestation period were the peculiar characteristics of Ockhi that occurred in 2017. It gestated for 6.75 days at sea, much longer than the long period average life of 4.7 days for very severe cyclonic storms that occur over the north Indian Ocean. In Kerala 162 human lives were lost, 221 houses fully damaged, around 3,000 houses partially damaged and over 78 square kilometres of crop area affected due to Ockhi.<sup>8,9</sup>

## Floods of 2018

Acceleration of hydrologic cycle with climate change causes extreme events like flood to occur more frequently.<sup>10,11</sup> Kerala experienced an abnormally high rainfall from June 1, 2018 to August 19, 2018. This resulted in severe flooding in

13 out of 14 districts in the state. As per IMD data, Kerala received 2,346.6 mm of rainfall during the period in contrast to an expected 1,649.5 mm of rainfall, which was 42 per cent above the normal. The continuous, heavy precipitation that occurred in the steep and undulating terrain found its way into the main rivers through innumerable streams and water courses which were transformed by the population pressure. The land use pattern and the altered drainage system acted as factors of risk addition.

Thirty-five dams across the state were opened to release the flood runoff.<sup>12</sup> The rainfall recorded during August 2018 was comparable to the rainstorm that occurred in the year 1924. The year 1961 also had witnessed heavy floods and a rise in the water levels of reservoirs. Flood inundation maps of Kerala covering the days after August 15-17, 2018 show that the majority of the flooding occurred in the areas around the backwaters and the lower reaches of the rivers.<sup>13</sup> Extreme rainfall, immediate

runoff, low flood storage capacity in the reservoirs, poor drainage capacity of canals and sea outlets, and high spring tides resulted in extreme floods in Kerala.<sup>14</sup> The sudden flooding in the hilly areas caused the water to move to the midland. Following the heavy rains, the entire low-lying areas in the midland got inundated, causing heavy damages such as severe soil erosion, landslides and water logging. It affected the life and properties of the people residing in these densely populated areas in the state. The flood in Kerala is a combined impact of multiple factors such as extreme rainfall, high reservoir storage and unprecedented rainfall in the catchments.<sup>15</sup> The district administration did not have adequate information to convey to the people in the flood-prone areas, which led to an information gap.<sup>16</sup>

Kuttanad, which lies below sea level, and which has a unique ecosystem, had a prolonged waterlogging in 2018, in response to the two flood events over a period of around two months.



This resulted in extensive crop loss and loss of livelihood and added to the misery of the people for a prolonged period. The overall drainage capacity of the Kuttanad waterbody to the sea is far below the original capacity of the structures and the drainage canals/rivers draining.<sup>17</sup> The siltation of these canals, together with the overall poor state of maintenance, has drastically reduced the drainage capacities. Even a low inflow will lead to waterlogging of built-up areas although people do not seem to mind the water as small floods are often useful for flushing out polluted canals.

The human impact of 2018 floods continues even now, going beyond the death toll and displacement of people. Over 17,300 families lost their residential structures. More than 1,70,000 houses were partially destroyed along with 1,613 schools and a number of other public and private buildings. Biodiversity, agriculture, animal husbandry, fisheries, infrastructure, water supply system, etc. were severely affected by the floods. The estimated loss is equivalent to 6.6 per cent of the state's income in 2018. The floods in 2019 also have ravaged many districts in the state.

## Landslides in the High Ranges in 2018 and 2019

The state had experienced a large number of landslides in the year 2018, most of which occurred in the districts of Idukki, Wayanad and the hilly regions of Kozhikode. Kerala experienced over 500 major and minor landslides of which over 50 per cent occurred in Idukki.<sup>18</sup> While Idukki experienced a total of 143 major landslides, Wayanad was hit with almost 247 landslides, out of which 200 can be classified as road slips. Quarrying in vulnerable areas has also contributed to these degradations and is reported as a factor that can accelerate landslides at least in a few locations. Changing land use patterns act as a major driving factor for events like landslides. The landslides that occurred in August 2019 have been unprecedented in scale and impact, devastating large areas in several northern districts such as Wayanad and Malappuram.

## Addressing Climate Change in Kerala: Future Possibilities

Climate change is a crisis which affects multiple sectors and different facets of life. Impacts of climate change can be direct and indirect. Changing

environmental factors can act as risk additions which in turn aggravate the intensity. Activities leading to offset GHG through vegetation augmentation programmes and other sequestration activities are mitigation options. Adaptation is the only option through which the crisis situation can be transformed into an opportunity which includes sector-specific and cross-cutting measures. Multi-sectoral, multi-departmental adaptation activities will be efficient and sustainable since the stakeholders and beneficiaries are diverse. Long-term adaptation options with short-term targets have to be evolved. Therefore, a long-term vision is necessary when devising adaptive strategies. To cite an example, an integrated multi-cropping farming system like the paddy and fisheries for a longer duration enhances ecological, agricultural, and livelihood security and stability. Household farming options promote organic cultivation, healthy life and aesthetic values which augment the overall wellbeing.

## Dealing with Risk Addition Factors

Vagaries of climate such as heatwaves, cyclones and floods are threatening lives and livelihood due to risk addition to local factors like land use pattern, alterations in the hydrological system and habitations. The 2018 flood was transformed into a severe disaster in certain land parcels due to local factors like altered drainage system and land use patterns. The declining mangrove vegetation along the Kerala coast from 700 square kilometres in 1975 to just 9 square kilometres in 2017 makes the state highly vulnerable to ocean related climatic extremes.<sup>19,20</sup> Habitation patterns decide vulnerability to extreme heat events. Transforming these local factors for adapting to the changing climate is an important step towards our better future. Therefore, policies and strategies are essential for this kind of a transformation.





Climate change is a crisis which affects multiple sectors and different facets of life. Adaptation is the only option through which the crisis situation can be transformed into an opportunity.

Latheesh Poovathur

Nava Keralam is the Government of Kerala's vision of converting the crisis into an opportunity and Haritha Kerala Mission embeds the idea of building a green and resilient Kerala. As pointed out by the Post Disaster Needs Assessment report, it is necessary to reduce the risk of communities to disasters and emphasise a rebuilding process that addresses the root causes of vulnerabilities.<sup>21</sup> The Kerala State Action Plan on Climate Change (SAPCC) developed by the Government of Kerala aims to address the negative consequences of climate change and thus reduce the risks associated with it. It also envisages the need for integrating climate change strategies into development planning process in the state.<sup>22</sup> Adapting to the marker events or averting/avoiding the negative impacts of these events requires an integrated approach in analysing and solving the problem. There should exist a dynamic coherence with Nationally Determined Contribution, Sustainable Development Goals and also adherence to the rulebook formulated by COP24 Katowice 2018. The systems approach is the key to tackling climate change and resultant disasters in Kerala. The following factors are important in this approach:

**Emission reduction:** Being a state with extensive green cover compared to other Indian states, Kerala should adhere to mitigation targets and emission reduction activities, by changing consumption patterns and through emission reduction in transportation, agriculture and service sectors. A local level carbon budgeting assessment done in Meenangadi panchayat is a model initiative in this direction.<sup>23</sup> Integrating activities in local planning and implementation process based on this should be the next step which can be replicated widely.

**Integrated governance:** All actions related to climate change are divided by sector in SAPCC, which is being revised. Instead of departmental, sectarian actions in tackling climate change issues, a cross-cutting approach integrating different departments may be needed to finalize decisions and swing into sustainable actions. A possibility is to strengthen this integration at the local level through the Local Self-Government institutions.

**Strengthening the forecasting and warning capabilities:** The post-flood and post-cyclone analyses have stressed

upon the need for an early forecasting system. Forecasting the extreme rainfall situation is possible with existing body of knowledge and computing capabilities. For example, a recent study exhibited the possibility of an hourly forecasting of flooding with sufficient lead time in the Achankovil river basin in Kerala.<sup>24</sup> Another study analysed the long-term trend of measured streamflow and flood series spanning 43 gauge stations across the 25 west-flowing rivers.<sup>25</sup> A combination of the studies will help in long-term forecasting of different scenarios in tackling flood situations.

**Integration of scientific knowledge with decisions and actions:** Linkage between scientific analysis and decision-making is an important prerequisite for responding to climate change. In most cases, the scientific reports are not given due importance or the scientific community acts in isolation without the help of decision makers. This may lead to short-term actions which are not sustainable and which have negative impacts in the context of climate change. This results in inaction or delayed action, transforming a hazard into a disaster.



P.T/A. S. Sathesh



# Climate Change and the Vulnerable Populations in Kerala

Kavya Michael

## Introduction

There has been an increased understanding about the complex implications of the global environmental change among stakeholders from all walks of life, including eco-system communities, farmers, scientists and policymakers among others. The myriad socio-economic and bio-physical risks associated with climate change have been particularly highlighted in the Sustainable Development Goals, the Sendai Framework and the recent Special Report on the Impacts of 1.5°C Global Warming published by the Intergovernmental Panel on Climate Change (IPCC).<sup>1,2,3</sup> However, the literature on the vulnerability and adaptation has largely followed an impact-oriented view, projecting the implications of a certain climatic risk on socio-economic systems.<sup>4,5</sup> Such an approach, which focuses on the proximate causes, often leads to symptomatic solutions.

The vulnerabilities associated with climatic changes get filtered through the existing socio-economic and political scenarios. The implications of a disaster vary considerably among multiple socio-economic groups pointing to the need for understanding differential vulnerabilities. Analysing climate change through a vulnerability lens articulates the necessity of understanding 'causation, process and distribution' associated with the same.<sup>6</sup> Over the years, the state of Kerala has emerged as a hotspot of vulnerability owing to the multiple effects of climate

change including i) the sea level rise ii) erratic monsoon patterns iii) extreme temperature iv) droughts v) drying up of water sources vi) changes in land use patterns and emerging socio-economic scenarios.<sup>7</sup> The vulnerability and the capacity to adapt are the products of the processes through which climate risks coalesce with other stresses such as water scarcity and inadequate governance structures.<sup>8</sup> The recent disasters in Kerala have thrown light on the differential implications of a disaster event on multiple groups of people.

## Differential Vulnerability in Kerala

The state of Kerala is known for a unique model of development widely termed as the 'Kerala Model of Development' which is an ironical combination of high levels of human development (high life expectancy, educational achievement and quality of life), despite low levels of economic growth.<sup>9</sup> The redistributive policies of the state government, including land reforms, efficient public distribution system and emphasis on education and healthcare accompanied by low rates of inequality have been identified as the reasons for the unique model of development.<sup>10</sup> However post 1990s, the state witnessed accelerated inequality levels despite the high human development in the state.<sup>11</sup> The implications of climate change need to be carefully examined through this emerging socio-economic scenario in the state.



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Listed below are some of the key areas of concern influencing the causality of predetermined vulnerabilities associated with climate change in the state:

**Reduced adaptive capacity of the working classes:** There was a relative decline in the socio-economic status of the unskilled and semi-skilled working classes and their general bargaining power post nineties, owing to the neo-liberal policies adopted by the state and the cutbacks in social overhead expenditures.<sup>12</sup> This has adversely

affected the asset base and adaptive capacity of these classes.

**Hotspot for footloose labourers from across the country:** In recent years Kerala has experienced exponential growth in the number of migrant workers from states across the country. Most of these inter-state migrant workers are in search of temporary construction and other daily wage opportunities. This migrant labour force lacks significant access to the state's social security mechanism and often fails to avail their citizenship rights. Their livelihood and living conditions also contribute to increased exposure and sensitivity to climate related hazards.

**Demographic transition: an aging population:** Kerala is currently in the third phase of demographic transition with low birth rates and low death rates. Currently the state has around 4.2 million people above the age of 60 years constituting 12.6 per cent of the state's population. It is widely noted that older people constitute one of the most vulnerable categories in the event of climate-induced changes and extreme events due to their higher mortality risk, increased susceptibility to diseases, restricted mobility, heightened exposure as well as other socio-cultural factors.<sup>13</sup>

**Emerging gender dynamics:** One of the contradictory realities of Kerala's development trajectory is the emerging gender dynamics in the state. While women constitute 52 per cent of the workforce in the state, the labour force participation rate of women remains at 24.8 per cent, while the corresponding figure amounts to 57.8 per cent for men.<sup>14</sup> Limited asset base of women in the state and unequal burden of care activities typically accentuate their vulnerabilities.

**Discriminatory socio-cultural norms:** Despite the high level of human development in Kerala, the state continues to be plagued by discriminatory socio-economic norms along the lines of caste, class and gender. The tribal population in Kerala, popularly known as the Adivasis are significantly marginalised in the state due to land alienation and dispossession. The benefits of the Kerala model of development failed to percolate these groups. Economic liberalisation and globalisation also led to the loss of traditional livelihoods for these groups while concurrently failing to integrate them into the market-oriented economy. Persons with disabilities also emerge as one of the most vulnerable groups in the state without access to adequate welfare measures and restricted mobility.

## Post-Disaster Scenario and the Way Forward

The impact of the disasters in Kerala during 2018 and 2019 cut across the boundaries of class, caste, gender and other socio-economic conditions. However, pre-existing vulnerabilities described above led to disproportional effects of the disaster on multiple groups of people including the elderly, female-headed households, migrant workers, persons with disabilities, fishers, as well as Scheduled Caste (SC) and Scheduled Tribe (ST) populations.<sup>15</sup> The chapter on the impact of the 2018 disasters on vulnerable populations in this report provides a detailed account of the differential implications of the disaster on multiple groups of people. The following could be some of the potential strategies to understand and address the differential vulnerabilities of these multiple groups:

**Capturing the dynamics of disasters and marginality:** Variable experiences of vulnerability in the wake of climatic disasters in Kerala point to the need for renewed understanding of the everyday experiences, adaptive behaviours, and coping mechanisms of vulnerable communities when faced with complex reinforcing pressures of political marginality, environmental vulnerability, and economic disadvantage.

**Social protection as a tool for capacity building:** The government can effectively garner the potential of various social protection mechanisms to build the adaptive capacity of the vulnerable groups by aiding in climate proofing their assets and livelihoods.

**A growth model emphasising rights-based framework:** The concept of Nava Keralam as envisaged by the Government of Kerala needs to emphasise a rights-based framework

Differential experiences of vulnerability in the wake of climatic disasters in Kerala point to the need for renewed understanding of the everyday experiences, adaptive behaviours, and coping mechanisms of vulnerable communities when faced with complex reinforcing pressures of political marginality, environmental vulnerability, and economic disadvantage.

that ensures equitable access to resources for recovery and relief among all sections of the people. The foundations of the Kerala model of development, rooted in an inclusive and participatory mode of governance can serve as a platform to build equitable and just models of resilience building and adaptation measures in the state.



COVID/Beena Swan





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# Unnatural Disasters in Kerala





# Unnatural Disasters in Kerala

Josy John

## Unnatural Disasters

The highlight of the 2018 disasters in Kerala was certainly the floods and landslides which affected most parts of the state and killed nearly five hundred people. However, one may easily miss that even among natural disasters, flood is not the biggest killer. More people were killed in landslides than in floods even in 2018. But the number of people who died in floods and landslides combined pales into insignificance when we examine the unnatural disasters in Kerala.

In 2015, 40 people lost their lives in natural disasters in Kerala while 8,635 people died in unnatural disasters ranging from road accidents to animal attacks.<sup>1</sup> Though data on road accidents is available, data on other disasters is not regularly updated in Kerala which is a challenge the state is yet to resolve. In order to make Kerala a safer state,

we should invest a lot more attention and energy in eliminating the numerous but low intensity accidents.

## Road Accidents

India accounts for the largest number of deaths due to road accidents globally even though it does not rank first in terms of population or the number of automobiles. In India 4,64,910 road accidents occurred during 2017 which caused injuries to 4,70,975 persons and death of 1,47,913 persons.<sup>2</sup> This translates to over 400 deaths per day and one death in every four minutes.

Latest data reveals that Kerala ranks second among the Indian states in the number of accidents per population, with 107 road accidents per 1,00,000 population in 2017.<sup>3</sup> Also, Kerala ranks fourth among the states in 2016 with

Table. 1: Major unnatural disasters in Kerala causing 20 or more deaths, 2000-2018

Year	Districts	Deaths
2000	Hooch tragedy, Kalluvathukkal, Kollam	30
2001	Bus catching fire, Pookiparambu, Malappuram	40
2001	Train accident, Kadalundi, Kozhikode	52
2001	Landslides, Amboori, Thiruvananthapuram	39
2002	Boat accident, Kumarakom, Kottayam	29
2004	Tsunami on the Kerala coast	171
2009	Boat accident, Thekkadi, Idukki	45
2011	Stampede, Pullumedu, Pathanamthitta	102
2015	Boat accident, Vypin, Ernakulam	24
2016	Firework accident, Puttingal, Kollam	109

Source: Ho (Malayalam), Muralee Thummarukudy, 2017

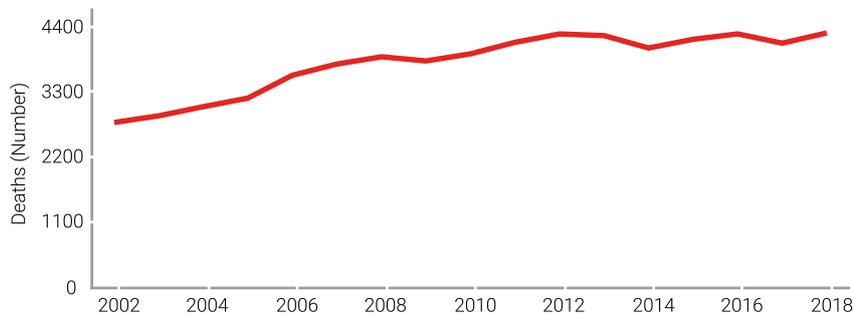
regards to accidents per 10,000 vehicles. In terms of the accidents per 10,000 km, the state is ranked sixth in 2016. The roads in Kerala are major killing fields and the only way to resolve this is by being a responsible road user and adopting a safe approach to prevent accidents while driving.

The number of road accidents in Kerala has increased from 38,470 in 2017 to 40,181 in 2018.<sup>4</sup> While 42,671 people were seriously injured during 2017, the figure rose to 45,458 in 2018. On an average, 11 persons die in a single day due to road accidents in Kerala. More than 98 per cent of the road accidents in Kerala are attributed to human errors and for the same reason, preventable, if adhered to agreed protocols.<sup>5</sup>

### Rail Accidents

In India, 25,167 people died due to rail accidents in 2015.<sup>6</sup> The majority of the rail accidents and deaths occur on the tracks where people either fall from the train, fall onto the tracks while trying to enter the train or are hit by the train while attempting to cross the tracks. While

Figure.1: Deaths due to road accidents, Kerala, 2002:2018



Source: Kerala Police, 2018

the government spends huge amounts on improving rail safety, accidents and deaths that occur on the tracks are currently not the focus of attention of the Indian Railways. In Kerala, 302 deaths occurred in 2015 in rail accidents.<sup>7</sup> More than 90 per cent of them occurred due to falls from trains or being hit by the trains on the track.

The rail network in India passes through thickly populated areas with encroachments along the lines. Frequent crossing across tracks with

limited visibility and awareness of train movements on multiple tracks leave the people exposed to being hit by trains. The Indian Railways is a vast network and runs through a variety of terrains which poses inherent challenges to manage the safety of people. The behaviour of the passengers as well as the residents on either side of the rail tracks is unpredictable. The infrastructure, both rolling stock and the tracks are being used far beyond their capacity and age, on the excuse that there is a shortage of resources for modernisation.



## Drowning: A Major Cause of Deaths in Kerala

Nearly 500 people died in the floods in Kerala in 2018, which is the biggest number of disaster deaths in recent times. In fact, if taken as a single disaster, it exceeds the number of deaths in the 2004 tsunami where 172 people died, which was the single largest disaster in the history of Kerala. However, when we examine the number of people who die due to drowning in Kerala every year, this is much lower. More than 1,200 people drown in Kerala every year, which means since August 2018 more people drowned in their backyards than in the major deluge in Kerala. Yet, there is no awareness about the gravity of the problem.

## Reducing Accidents: The Task Ahead

The total number of deaths in Kerala due to unnatural accidents a year comes around 8,000, which can be completely prevented.<sup>i</sup> Since the incidents happen sporadically, killing a few people at a time, these deaths neither get media attention, nor the requisite government follow-up action to eliminate the root cause. In most cases it is the same root cause which leads to the multiple accidents. The understanding of risk behaviour is very low in Kerala compared to developed nations resulting in a fatalistic approach on the roads. There needs to be a paradigm shift in the implementation of safety in the public domain. A radical change is needed in the thinking of those involved like the policy makers, bureaucrats, technocrats, enforcement agencies and the public if there has to be a reduction in the killing fields of Kerala.

The fact that human error is responsible for more than 90 per cent of the fatal accidents points towards the need for better sensitisation of the road users. This has to start from the schools so that the children grow up with a better understanding of the behaviour on the



roads even as pedestrians. Human error can also be attributed to the faulty layout and design of the roads. A detailed study of the locations where accidents are frequent needs to be initiated, particularly from the design perspective. The introduction of highly powerful vehicles in the market without creating roads catering to their higher speeds is also an area of concern. The authorities must expedite the construction of new roads with higher speed limits and existing roads need to be upgraded as well.

Digital monitoring of the movement of vehicles by installing cameras at busy intersections and highways is being introduced across the country including Kerala and has contributed to reducing accidents. However, the data available from these digital interventions is not put to use effectively for law enforcement on the erring motorists.

Indian Railways will have to embark on a program to ensure that doors on moving trains cannot be opened and it is technically feasible. The gap between the passenger coach and the platform has to be eliminated completely as implemented in the Metro Rail Stations which till date have not reported a single fatality since operations started fifteen years ago. The coaches in the suburban network urgently need doors that close automatically when the trains are in motion, eliminating the risk of people falling off during travel. This, again, requires a paradigm shift by the policy makers in the way the Railways has to function. Ignoring the fatalities due to faulty engineering and design of the platforms and the rolling stock will only add to the lives lost, leaving thousands of families in trauma in addition to the heavy payouts made as compensation.

<sup>i</sup> In addition to drowning, road and rail accidents, other causes of unnatural deaths include falls, electrocution, lightning, fires, and animal attacks including snake bites.





10

Fostering Inclusion  
and Resilience



# Living with the New Normal

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Muralee Thummarukudy

## Kerala and Natural Disasters

The state of Kerala, which has its geographical position in the south of India and sandwiched between the Lakshadweep Sea on one side and the Western Ghats on the other, is vulnerable to a range of natural disasters. With more than 3,000 mm rainfall per year and 44 rivers flowing across the state, chances of floods are always present. The mountain ranges with heights almost up to 2,700 metres can cause landslides. The coastal areas are always prone to sea erosion. Potential for cyclones formed in the Indian Ocean adds to the risk. The geographical area of Kerala is also classified as seismic zone III in the Indian classification of earthquakes, which means one could have an earthquake of intensity at least up to 6.2 on Moment scale. Though not originated within its boundaries, Kerala had the history of a tsunami hitting its coastline in 2004 and hence the repeat of the same cannot be ruled out.

With the vulnerability to all these natural hazards, the state has been exceptionally lucky for decades. Since its formation in 1956, there has never been a major natural disaster which impacted the state so much or killed more than 200 people in one go. As a consequence, the people in Kerala assumed disasters are things

that can happen only to other people and something that they would watch on television and provide assistance if need be.

## Myths Shattered

The myth that Kerala is immune to major natural disasters was shattered by the 2004 tsunami which killed over 170 people and caused a loss of over USD 190 million. As a response to the tsunami the Department of Disaster Management was constituted by the Government of Kerala, within a month, in January 2005. Later the Kerala State Disaster Management Authority was constituted as per the Disaster Management Act 2005. The state also formulated a disaster management plan.

Another natural disaster to hit Kerala in recent times was cyclone Ockhi which battered the coastline of the state in early December 2017, gaining strength as it crossed Sri Lanka. Though the eye of the storm did not make a landfall in Kerala, it caused significant loss of life and property. Fishers who were out in the sea were caught unguarded and more than one hundred of them perished in a day. There was also widespread damage along the coastline. The disaster demonstrated the shortcomings in the state's weather forecasting system as well as emergency response.



The unprecedented disasters came as a shock to most people

## The Disasters of 2018 and 2019

The sequence of disasters continued into 2018. Incessant rains that started from April 2018 slowly engulfed the state in a series of rain-linked disasters. Excess natural rainfall and the flooding of the low-lying Kuttanad area, where the evacuation capacity of the waterbodies was constrained, marked the starting point. Continuous rains saturated the hills in the high ranges, leading to landslides.

In the month of August 2018, the rainfall suddenly intensified and every river in the state started overflowing, requiring dams to release water. This ended up causing more floods downstream. At one point, 5.4 million people, one out of every six residents, had to leave his/her home and take shelter elsewhere. When the water subsided, the state had lost 498 people, over 18,000 houses got completely damaged and the state incurred damage and loss worth USD 3.8 billion. This was unprecedented in Kerala's history and hence came as a shock to most people.

The Government of Kerala, with the support of the Malayali Diaspora and the international community, put in place a comprehensive plan for recovery from the 2018 disasters. The Post-Disaster Needs Assessment document prepared in October 2018, involving the state government, the World Bank and the United Nations identified a number of key areas of vulnerability and suggested recommendations for recovery. A comprehensive Rebuild Kerala Development Plan prepared by the Rebuild Kerala Initiative and approved in May 2019, set out the road map to recovery. Financial resources, including own resources, Masala Bonds and foreign borrowings were lined up for the implementation of the recovery plans.

However, during the second week of August 2019, the state was once again exposed to another disaster when flash floods and massive landslides impacted large parts of the northern Kerala and killed over 120 people. The return of the disasters in 2019, and almost to the date in August, put the entire state

under tremendous stress. Many people living in the areas affected by the 2018 floods vacated their homes and went to the houses of their relatives, friends or to rescue shelters even though there was no imminent danger or warnings. Weather forecasts warned of additional heavy rains and educational institutions in the state remained closed for almost a week. However, the rains did not continue or intensify and both people and the government heaved a sigh of relief when the disasters subsided.

The succession of hydro-meteorological disasters since 2017 has raised doubts on the climate change in Kerala and whether the floods and winds would become a routine. The question is whether the state is entering an era of 'the new normal' where disasters will be more regular than what Kerala has experienced in the past.

It will take many years for experts to give a scientifically defensible answer on whether the winds, rains and floods observed in Kerala between 2017 to

Regardless of whether it is climate change or climate variability, it is appropriate for Kerala to learn the lessons and prepare to deal with increasing hydro-meteorological disasters. Natural hazards are always around and they will return. The only option societies have is to understand them and plan their lives and investments around them.

2019 are normal climatic variation or a systematic shift in climate. The Special Report on Extreme Events of Intergovernmental Panel on Climate Change (IPCC SREX 2012) states unambiguously:

*It is likely that the frequency of heavy precipitation or the proportion of total rainfall from heavy rainfalls will increase in the twenty-first century over many areas of the globe. This is particularly*

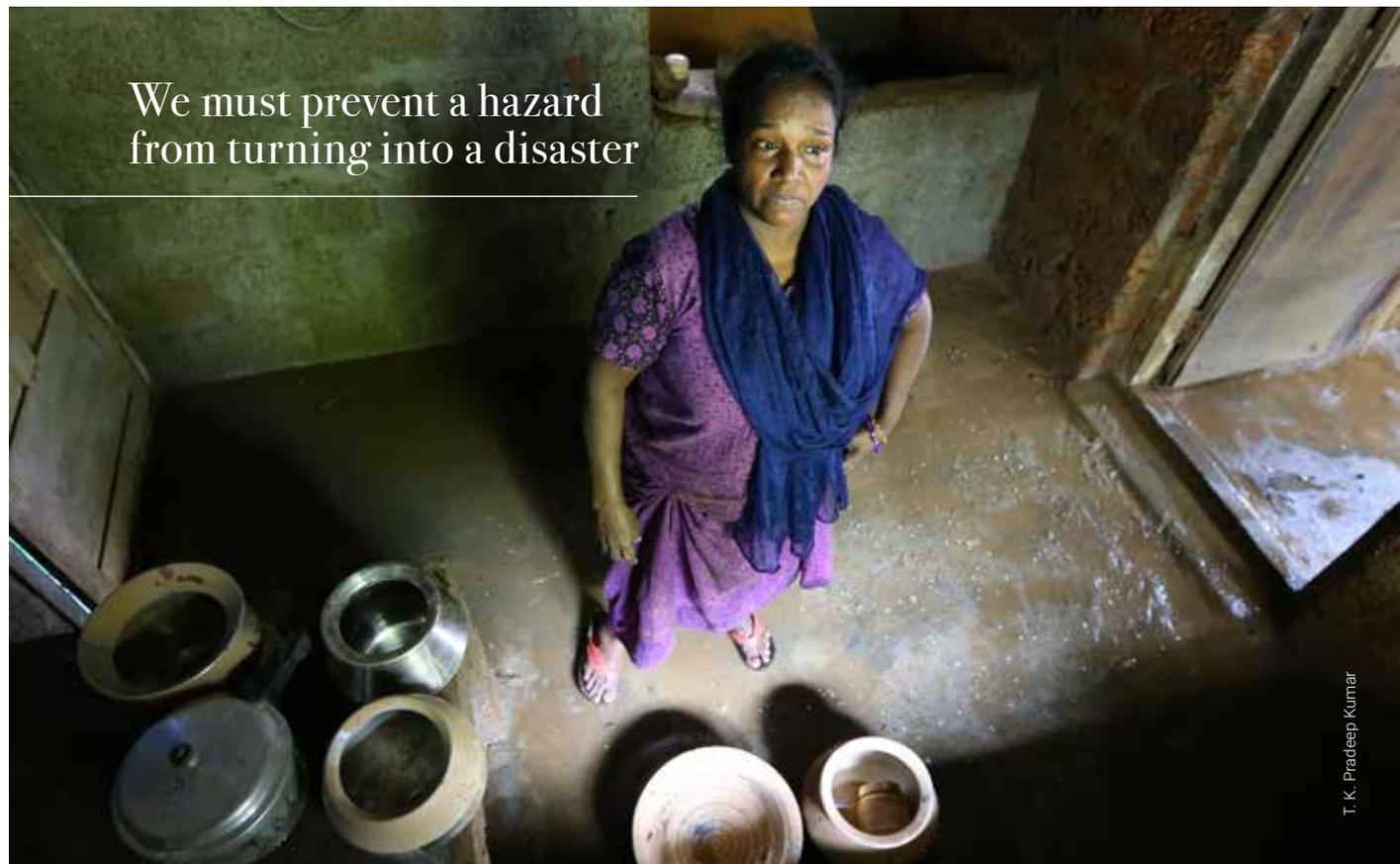
*the case in the high latitudes and tropical regions, and in winter in the northern mid-latitudes. Heavy rainfalls associated with tropical cyclones are likely to increase with continued warming induced by enhanced greenhouse gas concentrations. There is medium confidence that, in some regions, increases in heavy precipitation will occur despite projected decreases in total precipitation. For a range of emission scenarios (SRES A2, A1B, and B1), a 1-in-20-year annual maximum 24-hour precipitation rate is likely to become a 1-in-5 to 1-in-15-year event by the end of the twenty first century in many regions, and in most regions the higher emissions scenarios (A1B and A2) lead to a greater projected decrease in return period. Nevertheless, increases or statistically non-significant changes in return periods are projected in some regions.*

The observed trend in increased heavy precipitation, or proportion of total rain falling in short duration, is in line with the

IPCC forecasts. It may be interesting to note that in the 2019 flood and landslide events, rain of one entire month fell within a duration of 24 hours, even though the state has been undergoing a less than normal monsoon season.

## Learn the Lessons

Regardless of whether it is climate change or climate variability, it is appropriate for Kerala to learn the lessons and prepare to deal with increasing hydro-meteorological disasters in the coming decades. "Those who do not learn from history are condemned to repeat it", is a usage we often hear when one talks about the politics of the country or the conflicts which recur in many parts of the world. However, it is as true, and in fact even more true, for natural disasters. Natural hazards, such as rains and tsunamis, are always around and they will return. The only option societies have is to understand them and plan their lives and investments around them. To do so,





## Prepare for a changing climate

a thorough learning exercise is absolutely essential. In the following sections, a few lessons and suggestions are made:

### **Better weather forecasts are the**

**need of the hour:** All the recent natural disasters that shook Kerala like Ockhi, and the floods and landslides in 2018 and 2019, descended on Kerala giving little specific warning regarding the impending weather. After Ockhi, an open controversy erupted as to whether the India Meteorological Department gave sufficient warnings or not. After the floods in 2018, once again there was a controversy as to whether the dams could have been opened earlier based on the available weather forecasts. In 2019 as well, the state was caught unawares when very intense rains caused floods in the northern parts of Kerala. Regardless of what happened in the past, it is clear that we need a more robust weather forecasting system if wind or rainfalls turning into disasters is to be avoided.

Weather models focussed on Kerala are the need of the hour, coupled with more number of weather stations and radar

facilities to equip the state with better forecasting. In addition to improving the accuracy of the forecasts, gaining people's trust in weather forecasts is also important as without people taking the necessary preventive action even accurate forecasts will not lead to disaster risk reduction.

**Prepare for a changing climate:** The world over, climate is changing and Kerala is not an exception. Every hydro-climatic hazard which Kerala has faced in the past, such as heavy rains, droughts and cyclones will be seen in a higher frequency and with increased intensity in the future. As the sea level rises, there will be challenges in coastal cities like Kochi and low-lying areas like Kuttanad. Old solutions, such as building dykes and sea walls are no more going to protect the state. One needs to learn to live with impending climate changes and the sooner we accept and start our adaptation plan, the better for us. The starting point for this action is a good predictive model on what Kerala should expect in the coming 100 years in a changing climate. This should address

questions like how the temperatures will change, what will be the impact of sea level rise and what shall be the rainfall intensity and storms. One should then assess how that will impact the agriculture, tourism, other industries, infrastructure and so on. Investments we make today should be climate proof within the lifespan of what is being planned. On the top of it all, we need large-scale education of the society about climate change, its impacts, adaptation strategies and the reality that we have no Plan B.

### **Land use planning is fundamental to**

**risk reduction:** The potential natural hazards that can affect the geographical area of Kerala have come out clearly for a long time now. There is nothing human beings can do about which hazard is likely to affect our geographical area. However, one can do a lot to prevent this natural hazard from turning into a disaster. If we build houses and other infrastructure along the coastline, which was impacted by the tsunami, surely we will increase the risk for a disaster the next time the tsunami returns.

Similar is the case if we build airports, supermarkets, houses and hospitals in areas that could be flooded. Land use planning for disaster risk reduction is not always about creating restrictions for development. It is also about identifying opportunities, where on the one side we could have development without causing further disasters, while on the other, proactively conserve environmental features that could help to prevent disasters. Identifying peri-urban wetlands which can buffer the floods and creating a band of protection forests along the hillslopes are some of such ideas.

**Risk-informed building codes are imperative:** During the past three decades, as the affluence in Kerala increased due to remittances, the number of buildings and quality have taken a quantum leap. The use of timber for building roofs have almost disappeared and almost 100 per cent of new buildings in Kerala are built with reinforced cement concrete. Laterite, bricks, granite and concrete blocks remain the familiar building materials.

While Kerala has at least four distinct zones in terms of geography (high ranges, midlands, coastal areas as well as islands and low-lying areas), there is no difference in building codes in these zones. Consequently, identical designs of buildings are used across Kerala and increasingly it is clear that such buildings are not only damaged during natural disasters but also contribute to land settlement (in islands) and landslides (in the high ranges). It is high time that Kerala developed risk-informed building codes.

**Integrated Water Resources Management is essential:** Kerala is a narrow strip of land between the hills and the sea. There are 44 rivers and numerous waterbodies, some connected to the sea and others not. Currently, the approach to water management is fragmented geographically, institutionally and conceptually. The Kerala State Electricity Board builds and controls dams across the rivers in the state. Once built, the board considers them as their own 'property' and the water contained

in the reservoirs as something to be managed to optimize power production. The Department of Irrigation builds and operates irrigation facilities which are not linked to the changing agricultural landscape of the state. The capacity and footprint of the Department of Groundwater is too small to be an effective player in protecting and managing the groundwater in the state.

If water-linked hazards, such as floods and droughts, in the state have to be controlled, water management efforts have to be unified, both administratively and substantively. Every river has to be handled in a 'Ridge to Reef' approach and when multiple catchments are linked, they should be handled in an integrated manner. The 'ownership' of the various departments such as the Electricity Board or Irrigation on their hydraulic structures should end and, instead, they should be operated in a manner that is based on optimizing social good. This will need a merger of institutions and significantly enhanced capacity within these institutions.



Empower the society

**Inclusion is key to a resilient society:**

While the macro scenario of disaster response in Kerala presents a positive picture, there has been segments within the society whose vulnerabilities are heightened by the disasters. The older persons, children, persons with disability, women, migrants and tribes have different vulnerabilities, needs as well as access to the emergency response systems. Only when no one is left behind, can we claim the response to be robust and inclusive.

**Empower the society:** Something the disasters proved to the whole state is that there is tremendous amount of capacity, social cohesion and goodwill within the state (including the diaspora). If we cultivate and harness this cohesion, it will strengthen our resilience. This will need three interdependent actions.

**Information sharing:** The state, through its various departments, has collected significant amount of data regarding natural hazards. Yet they neither share it with the public nor with other departments. Even when modern technologies such as cloud computing and big data have arrived on the scene, the institutional culture of 'official

secrecy' is all pervasive. Unless proven otherwise, all data is considered private, privileged and secret. Even the very basic data on river flow or catchment maps are not made available, not even to researchers, even for academic purposes. This has to end. Instead, information relating to natural hazards in the state should be granularized and percolated to every household and made available to the public in a form that is accessible to all. Any person who is planning to build a house, an investor planning a hotel, or a government agency planning a road, should have ready and easy access to the hazard maps.

**Training the community:** we should aim to provide every stratum of the society with the basic understanding of disaster management by establishing a basic curriculum for civil defence, which includes identifying hazards, setting up early warning measures, getting ready the required first aid, setting up relief camps and preparing for disasters. While the curriculum development can be done by the State Civil Defence Institute, its scale is too small to be of any practical significance. A strategy to scale this to an appropriate level needs to be devised, incorporating modern approaches such

as e-learning and making such training mandatory for diverse purposes and groups of people, such as for obtaining a driving license, for getting elected to an office, securing the membership of a resident association or becoming a head teacher.

**Networking and leveraging:** Most of the government's plans on disaster response is either "government will do everything" or "government will tell others what to do". The fact is that when a disaster hits, the government is too small and not present to be effectively responding everywhere. The past two disasters have shown that the civil society in Kerala is often the first to respond and is filling the vacuum left by the government in all aspects from rescue to recovery. Hence, we should plan to network and leverage the social systems. If people are trained in emergency response and the standard systems of the government, then one could have them interoperable so that the community initiates actions whenever and wherever a disaster happens, and government reaches whenever they can and then supplement the efforts. That is the only way to achieve an effective DRR system in Kerala.





# Contributors



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