

FIELD BASED ASSESSMENT OF THE EFFECTS OF RECENT EARTHQUAKE IN KOLLAM DISTRICT OF KERALA



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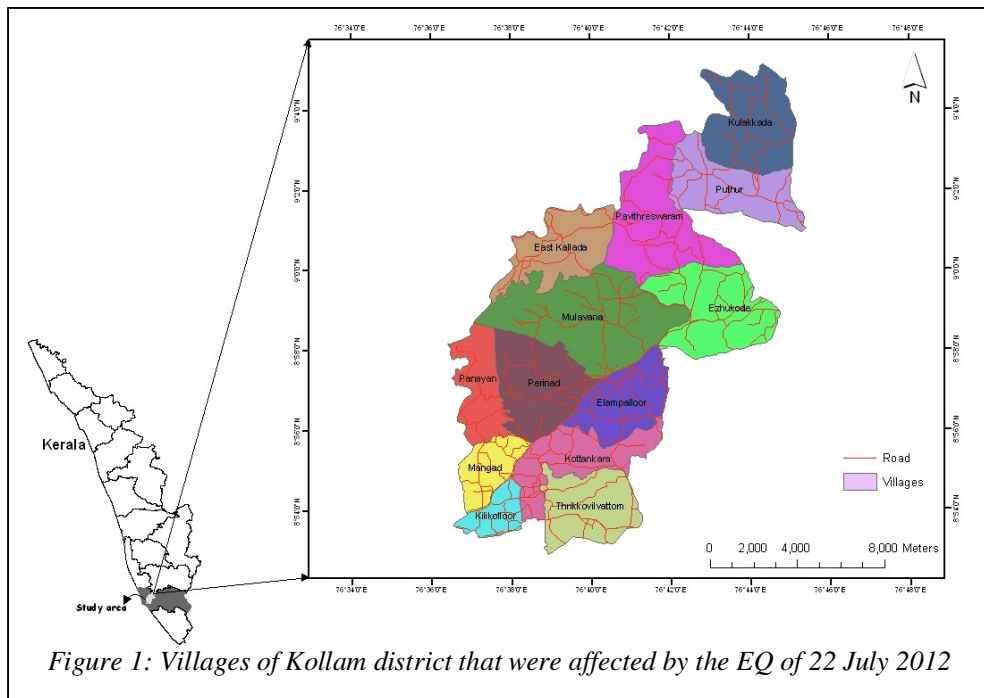


INTRODUCTION

In the month of July, 2012 certain parts of Kollam district witnessed repeated seismic activity with varying magnitudes. The first earthquake was reported on 18th Wednesday July, 2012 at 08.30 AM with a 2.7 M and the associated tremors were reported in the eastern region of Kollam namely Kundara, Mullavana, Puthoor and Pavithreswaram areas and no damages to life and properties were reported. Following this, on 22nd Sunday July, 2012 at 10.29 AM another quake was reported with a 3.1 M with felt reports from Kundara, Ezhukone, Shasthankotta, and Kottarakara. After receiving the earthquake damage claim report from the local administrative offices, field verification of earthquake felt area and visual screening of building damages were also carried out on 29th July, 2012.

EARTHQUAKE AFFECTED AREAS

An earthquake of 3.2 M occurred in the northern and north-eastern parts of the Kollam districts in Kerala on 22nd July, 2012 around 10.29 am. It was



reported that, earthquake associated tremors and sounds were felt in six villages in Kollam Taluk, they being Elampallor, Thrikkovilvattom, East Kallada, Mulavana, Kottankara and Panayam which is enclosed between East longitudes $76^{\circ} 36' 31'' - 76^{\circ} 44' 40''$ and North latitudes $8^{\circ} 53' 36''$ to $9^{\circ} 05' 31''$ (Fig. 1). A list containing the houses affected by earthquake was collected from the respective village offices and a total of 38 houses were claimed to be damaged by the quake.

The field traverse was conducted from Elampallor near Keralapuram. Houses that were reported to be damaged were visited and visually screened and individuals were interviewed based on a questionnaire. Details of the survey are given as Appendix - I.

ISOSEISMAL SURFACE MAP AND EPICENTRE IDENTIFICATION

In order to locate the epicentre of the earthquake, an isoseismal map was prepared based on the felt report collected from the field. For the same the earthquake felt reports were recorded and assigned corresponding values of Modified Mercalli Intensity Scale

(MMI). The MMI measures the intensity of an earthquake's effects in a given locality. The values on MMI scale ranges from I to XII were I - represents "not felt" and XII represents "total damage" (Appendix II). Coordinates of every observation were converted into point feature, with its corresponding MMI scale as its attribute (Fig. 2). These values were interpolated with the Inverse Distance Weighted (IDW) method to produce an isoseismal surface map (Fig. 3). The surface map thus created shows, isoseismic areas in the

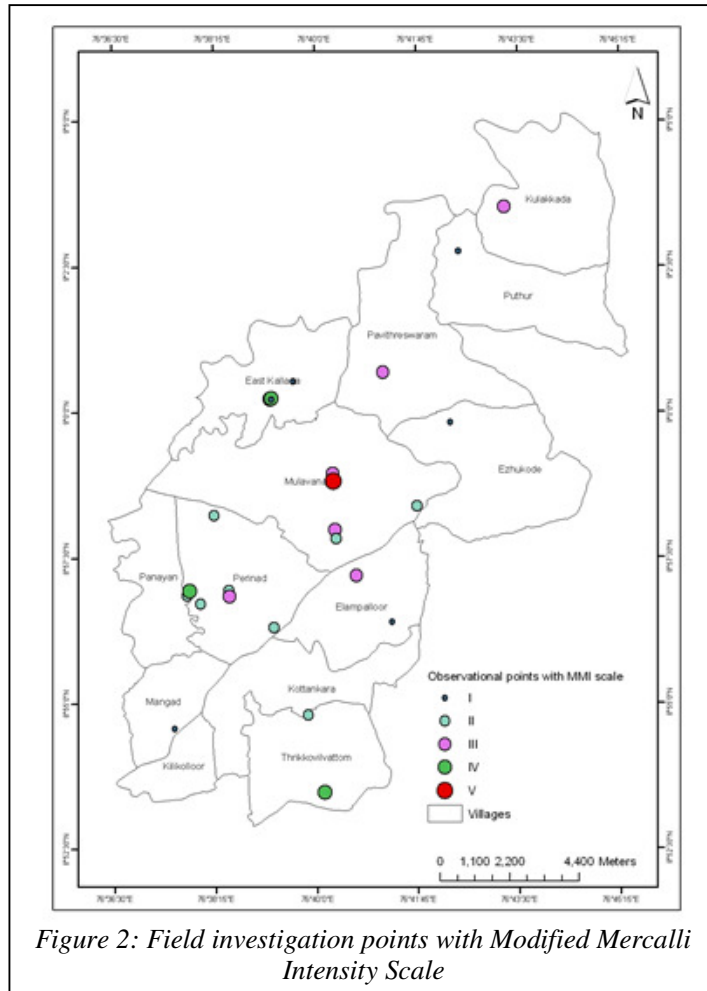
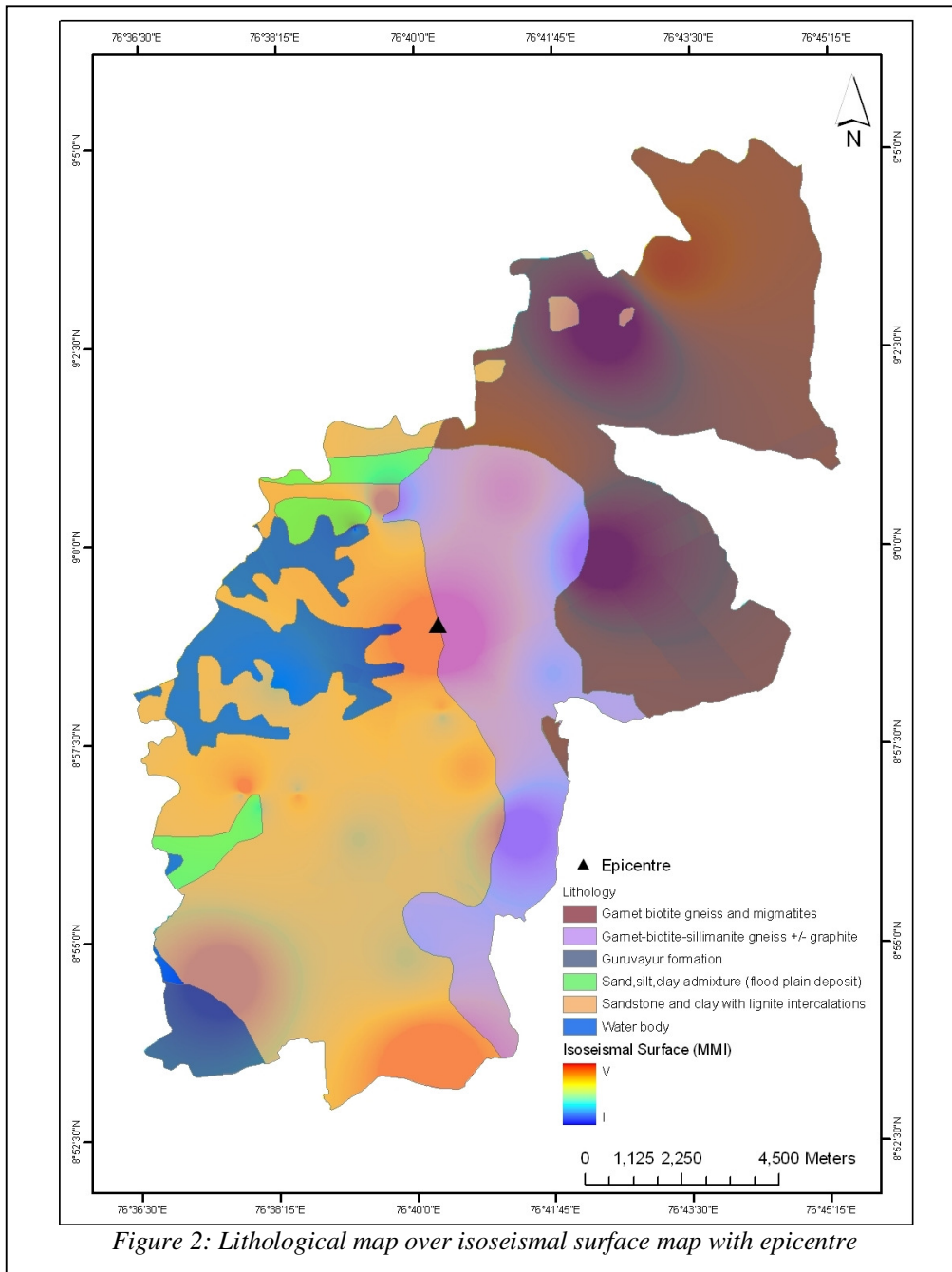


Figure 2: Field investigation points with Modified Mercalli Intensity Scale

earthquake affected areas based on direct field observations. From the isoseismal map, it may be seen that the intensity of earthquake was the highest in Mulavana and Trikkovilvattom areas (Fig. 3). The spatial distribution of earthquake intensity map indicates the distribution pattern of earthquake related tremors, sounds and other associated features of earthquake in the affected areas. The map indicates a north-south trend of earthquake ground motion.





Photographs of cracks developed over masonry structures during the earthquake





Photographs of cracks developed over masonry structures during the earthquake



APPENDIX - I DETAILED FIELD INVESTIGATION DATA SHEET AND FELT REPORT

Date & time of occurrence	Place	Name & Address	Lat/Long extents	Remarks
22/07/2012, 10.25 am	Keralapuram	Subaerkutty	8°56.308' N,76°39.265'E	Shaking for 2 seconds, Slight ground vibration, Hearing unusual sound like thunder, People frightened & ran out from the house, No damages reported
22/07/2012, 10.25 am	Kilikolloor	Abdul Salam,Saneer Manzil	8°54.573' N,76°37.537'E	Tremor not reported
22/07/2012, 10.25 am	Chemmakkadu, Panayam	Thomas, St.Thomas Cottege, Charukadu	8°56.712' N,76°37.998'E	Hearing unusual sound, shook vessels
22/07/2012, 10.25 am	Chemmakkadu, Panayam	Suresh, Kinattinmoodu veedu	8°56.937' N,76°37.800'E	Terraced house, sound of thunder, roof and wall cracked, people lying in the bed fell down, shook vessels and furniture's.
22/07/2012, 10.25 am	Chemmakkadu, Panayam	M.S Mohanan, Kuttippuram	8°56.857' N,76°37.767'E	Body shook,sound of thunder bolt,wall cracked
22/07/2012, 10.25 am	Kuzhiyam	Babu,Thavitt veedu (Tea shop)	8°56.840' N,76°38.495'E	Sound of lightning and thunder, people ran out from the shop, wall cracked.
22/07/2012, 10.25 am	Kuzhiyam, Chemmakkadu	Mohanan K, Mohinth Bhavan	8°56.942' N,76°38.488'E	Hearing unusual sound like thunder .
22/07/2012, 10.25 am	Kundara, Mulavana	Vargheese Raju, Arathi villa, Kanjarode	8°57.827' N,76°40.337'E	Sound of thunder, people ran out from the house, fluctuation in well water, crack widen.
22/07/2012, 10.25 am	Kanjarode, Mulavana	Antony ,Praveen Nivas	8°57.983' N,76°40.318'E	Structurally weak house,wall cracked, house is in dangerous situation, need maintenance.

22/07/2012, 10.25 am	Perayam, Mulavana	Nirmala, Mulluvila veedu	8°58.817' N,76°40.297'E	Shook vessels, person sitting on hard surface felt vibration on the feet, people frightened and ran out from buildings, experience something like electric shock, hearing sound like vehicle crash
22/07/2012, 10.25 am	Pearayam, Mulavana	Yoojin, Lailas House	8°58.955' N,76°40.290'E	Structurally weak house, crack widens, person sitting on the chair shook, standing person experienced small jerk
22/07/2012, 10.25 am	Padappakkara	Jaseentha, Sreeja Vilasam, Kanmukhathody	8°58.237' N,76°38.998'E	Standing person felt jerk, person sitting on the chair shook, sound of thunder bolt
22/07/2012, 10.25 am	Chittumala, Eastkallada	Vijayan, Indira vilasam	9°00.538' N,76°39.600'E	Hearing unusual sound, people ran out from the house
22/07/2012, 10.25 am	Thekkemuri, Eastkallada	P. Antony, Thadathil veedu	9°00.220' N,76°39.230'E	Hearing unusual sound
22/07/2012, 10.25 am	Thekkemuri, Eastkallada	Prabha, Neerayi Mandiram	9°00.240' N,76°39.232'E	People left out from the house, crack develops, sound similar to lightning bolt where heard by the people
22/07/2012, 10.25 am	Thekkemuri, Eastkallada	Nirmala, Valiya vilasam	9°00.238' N,76°39.210'E	Shook vessels, person sitting in the chair can be shooked, hearing unusual sound
22/07/2012, 10.25 am	Kaithakodu P.O	Gopinathan, Paravila veedu	9°00.690' N,76°41.163'E	Hearing unusual sound similar to lightning bolt, crack widens
22/07/2012, 10.25 am	Puthooru	C.K Thankachan, Mangalasseriyil	9°02.770' N,76°42.467'E	Tremor not reported
22/07/2012, 10.25 am	Attuvasserry, Puthooru	Bahulayan Pillai, Plankala Kizhakkethil	9°03.533' N,76°43.260'E	fluctuation in water level
22/07/2012, 10.25 am		Surendhran, Sarathi Travalers, Sethi bhavanam	8°59.822' N,76°42.325'E	Tremor not reported
22/07/2012, 10.25 am	Arumurikkada, Kundara	G. Daniel, Kochumelathil veedu	8°58.387' N,76°41.738'E	Hearing unusual sound, no damages reported

22/07/2012, 10.25 am	Punnamukku	Leela (Tea shop)	8°57.197' N,76°40.695'E	Just feel the tremor
22/07/2012, 10.25 am	Perumpuzha	Near Thrikkoikkal temple	8°56.400' N,76°41.303'E	Felt slight vibration
22/07/2012, 10.25 am	Cheriyela, Thrikkovilvattam	Radhakrishnan, Vadakkedathu Kizhakkathil	8°54.805' N,76°39.850'E	Hearing unusual sound, people experienced small jerks,no damages reported
22/07/2012, 10.25 am	Mukhathala	Anil Kumar, Chempakasserryil veedu,Kizhavor	8°53.473' N,76°40.133'E	Terraced house, unusual sound, shivering of vessels, people left out from the house, damaged pillar;cracks visible near the ceiling, observed water level fluctuation in well during last year

APPENDIX - II MODIFIED MERCALLI INTENSITY SCALE

MMI Value	Description of Shaking Severity	Description
I		No felt.
II		Felt by person at rest.
III		Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated.
IV		Hanging objects swing. Vibration like passing of heavy trucks or like heavy ball striking wall; windows, dishes, doors rattle. Crockery clashes, wooden walls and frames creak.
V	Light	Felt outdoors. Sleepers wakened. Direction estimated. Small objects displaced or upset. Doors swing, close open. Shutters, pictures move, clocks changes rate.
VI	Moderate	Felt by all. Many frightened and run outdoors. Persons walk unsteady. Glasses, windows, broken. Weak masonry cracks. Small bells ring.
VII	Strong	Difficult to stand. Damage to masonry or partial collapse. Waves on pond. Irrigation ditches damaged.
VIII	Very Strong	Steering of motor car affected. Masonry damage, partial collapse. Twisting of tall items. Cracks in steep wet grounds.
IX	Violent	General panic. Masonry destroyed / heavily damaged. Frame structures shifted off foundations. Underground pipes broken. Well developed cracks in ground. Serious damages to reservoirs.
X	Very Violent	Masonry structures with foundations collapsed. Serious damages to dams, dikes, embankments. Large landslides. Water thrown on banks of rivers, canals. Rails bent slightly.
XI		Rails bent. Underground pipelines completely out of services.
XII		Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown into the air.