IQRA NATIONAL UNIVERSITY

GIS PROJECT REPORT

Topic Name ;

Disaster Assessment Of Earthquake Using GIS

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 # 08

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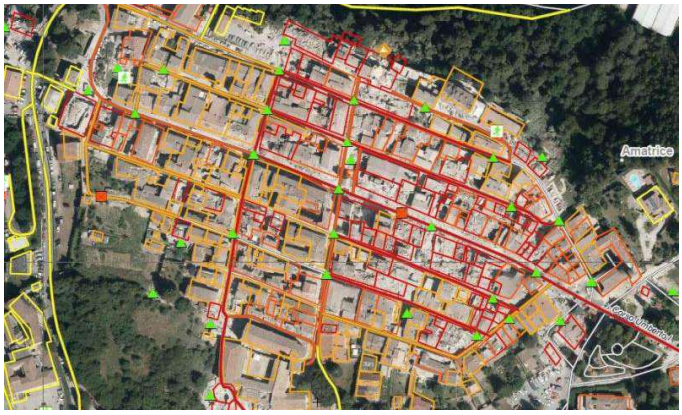
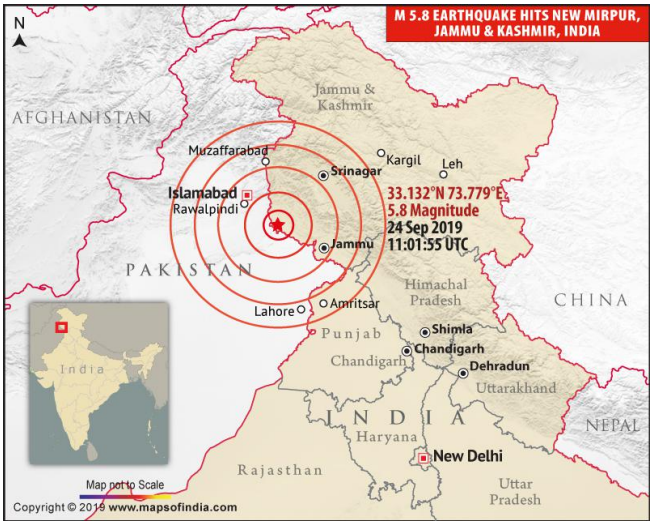
ABSTRACT:-

In this aspect of **earthquake** disasters, **GIS** also has an **important role** in identifying settlement infrastructure at risk based on data such as fault location and seismic records. ... The resulting hazard analysis methods need to be developed from factors known to influence structural survivability during **earthquakes.**

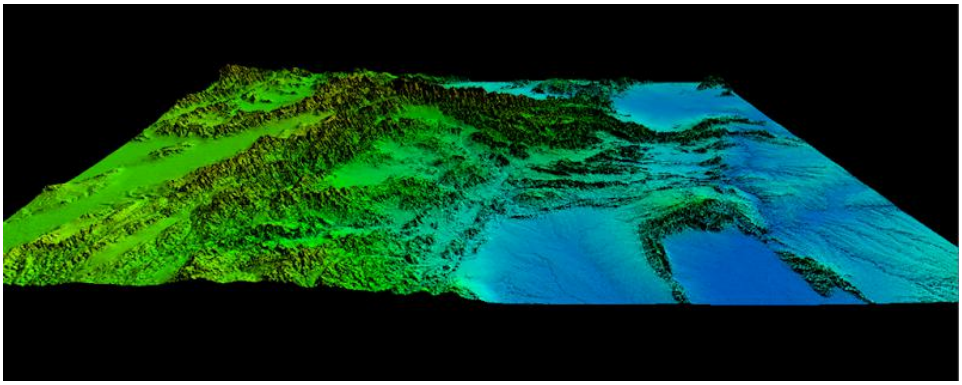
In order to identify the hazardous areas and changes after earthquake in these areas with the help of remote sensing and geographical information system, Maps, Satellite Images and Digital Elevation Model have been used as base data. For defining active landslides; Soil map, Aspect map and Slope map have also been used. Overlay Analysis between fault lines and Digital Elevation Model show that numbers of landslides have increased along these fault lines. The analysis between soil map and landslides shows that most of the landslides have found in Soil types of Rockland, Mani and Kurnol. Combination of Landslides map, Seismic map, Aspect map shows that 80 t0 85 percent landslides are found in those areas whose slope angle is greater than and equal to 450. So, it is analyzed that these are highly hazardous areas.



Satellite Image



MAP



DIGITAL ELEVATION MODEL

INTRODUCTION:-

An earthquake is a sudden movement of the earth, caused by the abrupt release of strain that has accumulated over a long time. For hundreds of millions of years, the forces of plate tectonics have shaped the earth as the huge plates that form the earth's surface slowly move over, under and past each other. Sometimes the movement is gradual. At other times, the plates are locked together, unable to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free. If the earthquake occurs in a populated area, it may cause many deaths and injuries and extensive property damage.

In Earthquake landslides are one of the hazardous phenomena. They create negative impacts, such as loss of life, property damage, and permanent landscape change. Type of landslide are described on the base of slope of the hillside, moisture content, and the nature of the underlying materials

Here we have to identify the dangerous areas regarding Landslides and potentially dangerous areas regarding Earthquake The major problems in Earthquake are Landslides and change in terrain features according to uplifting & down falling of earth. LANDSLIDES are rock; earth or debris flows on slopes due to gravity. These can occur on any terrain given the right conditions soil and the angle of slope.

BODY OF THE REPORT:-

Problem Statement ;

After an earthquake it is challenging task to determine the damage structure in an urban area within limited sources. Ground surveying is also time extensive and man power work.

Objectives ;

The objectives is identify the exact location of impacted areas in the first 72 hours after disaster for quick mobilization response and relief. This information is valuable for response activities, which includes search and rescue operations, access control and re-entry to the impacted area, debris clearance, restoration of utilities and lifeline repairs and inspection, condemnation or demolition of buildings and other structures.

Methadology ;

By using remote sensing, damage concentration in urban areas can be located in a shorter time compared to conventional ground survey methods. Satellite imagery and damage map shows the distribution of damage in urban areas. The information can be used in search and rescue

operations (SAR) and emergency actions, such as identification of damage areas, escape routes and estimation of causalities developing and implementing strategies for recovery and restoration activities, such as defining locations for temporary housing.

There are some limitations for the application of post-earthquake damage assessment to practical life.

Problem definition will be carried out according to this evaluation. Remotely sensed data can be carried out in several ways e.g. multi-temporal approach, which requires two main images (pre and post-earthquake) of the affected area that are compared to identify changes, It is used to shown change detection in the major methodology to access the post-earthquake damage.

The main principal assumption is that the time gap between pre and post-earthquake images main principal assumption should be as short as possible to eliminate and substantially reduce to occurrence of non-disaster related changes. The second assumption of the change detection analysis is that changes in land cover result in changes in radiance values.

The second methodology for damage assessment is to use post-earthquake images for visual interpretation (Chiroiu & Andre, 2001) or texture analysis (Mitomi et al., 2000). These methodologies provide much more flexible and practical solution, as they do not depend on the availability of pre-disaster imagery.

There are different limitations for accessing proper data e.g. for satellite imagery revisit time of the sensors, cloud coverage, cost of the high spatial resolution imagery etc.

The limitations can be overcome by integration of different data sources. Integration of moderate resolution of space-borne and airborne imagery can complement each other at regional and local level to improve the damage information.

TOOLS USED IN POJECT:-

Data collection ;

The data was collected from different websites along with their coordinates, location and earthquake areas in Pakistan.

Software used ;

Geoghrapical information system (GIS).

Tabular data for earthquake in Pakistan ;

Date	Locality, district, or province	Mag.	MMI	Deaths	Injuries	Notes	
2019-09-24	New Mirpur, Azad Kashmir	5.6 M_w	VII	40	852	Severe	[1]
2018-01-30	Badakhshan	6.1 M_w		1	9-11		
2015-12-25	Gilgit-Baltistan Khyber Pakhtunkhwa	6.3 M_w	V	4	100		
2015-10-26	Badakhshan	7.5 M_w	VII	399	2,536		
2015-07-24	Islamabad	5.1 M_w	V	3			
2014-05-08	Sindh	4.5 M_w		2	50		
2013-09-28	Awaran District, Balochistan	6.8 M_w	VII	22		Aftershock.	
2013-09-24	Awaran District, Balochistan	7.7 M_w	VII	825	700		
2013-04-16	Balochistan	7.7 M_w	IX	34	105		
2011-01-18	Dalbandin, Balochistan	7.2 M_w	VI	3	some		
2008-10-29	Ziarat District, Balochistan	6.4 M_w		215	200		
2005-10-08	Azad Kashmir, Balakot	7.6 M_w	VIII	86,000–87,351	69,000–75,266		
1997-02-27	Balochistan	7.0 M_w	VIII	57			
1992-05-20	Kohat Division, North West Frontier	6.0 M_w		36	100	Moderate	NGDC [2]
1983-12-31	Gilgit-Baltistan	7.2 M_w	VII	12–26	60–483	Severe	NGDC
1981-12-09	Gilgit-Baltistan	5.9 M_w		220			[3]
1974-12-28	Khyber Pakhtunkhwa	6.2 M_w		5,300	17,000		
1972-09-03	Peshawar, Khyber Pakhtunkhwa	6.2 M_w	VIII	100			[4]
1945-11-28	Makran Coast, British Baluchistan	8.1 M_w	X	300–400		Tsunami	
1935-05-31	Ali Jaan, Balochistan	7.7	X	30,000–60,000			
1931-08-27	Mach, Balochistan	7.4					[5]
1931-08-24	Sharigh Valley, Balochistan	7					[5]
1909-10-21	Sibi, Balochistan	7		100			[5]
1892-12-20	Qilla Abdullah, Balochistan	6.8				Chaman Fault	[6]
1885-01-22	Peshawar	6					[6]
1852-01-24	Kahan, Balochistan	8					[7]
1827-09-24	Lahore, Punjab	7.8		1,000			[7]
1819-06-16	Allahbund, Sindh	7.7–8.2 M_w	XI	>1,543		Tsunami	
1668-05-02	Shahbandar, Sindh	7.6		50,000			[8]

The inclusion criteria for adding events are based on WikiProject Earthquakes' notability guideline that was developed for stand alone articles. The principles described are also applicable to lists. In summary, only damaging, injurious, or deadly events should be recorded.

CONCLUSION:-

The disaster assessment is an evaluation of a natural occurrence. It should be accomplished through the field survey of the affected areas within the limited resources. There is a need for information about the extent and the concentration of damaged area in critical hours. The information should be accurate, reliable and provided in a timely and appropriate manner.

Remotely sensed data make us able to depict disturbed vegetation, denuded hill slopes, and shallow landslides etc in the natural terrain.

The identification of risk areas, rate of destructions/causalities and understanding of post and pre disaster scenario becomes easy to understand by using GIS and remote sensing derivation of hazard zonation maps.

According to the slope map and landslides analysis it is estimated that Maximum of the landslides occurred where slope angle is greater than 45 degree. Through analyzing Aspect map and landslides it is concluded that the 80 to 85 percent and slides occur at west, southwest and northwest directions.

RECOMMENDATION:-

The study has shown the dangerous areas regarding earthquake. GIS based research has also provided maps, which are helpful in planning and development. These are also useful in early warnings so we may save from further loss. Landslides have also identified in affected area within short time with the help of GIS tools. The further study can be proceed by using more topographic information or high-resolution spatial data.

1- By adding the more information like geomorphologic, Geologic, land use etc the Hazard map would be formed.

2- Further research can be made on the Elevation change.

REFERENCES:-

The study has shown the dangerous areas regarding earthquake. GIS based research has also provided maps, which are helpful in planning and development. These are also useful in early warnings so we may save from further loss. Landslides have also identified in affected area within short time with the help of GIS tools but it is not the end of research. The further study can be proceed by using more topographic information or high-resolution spatial data.

1- By adding the more information like geomorphologic, Geologic, land use etc the Hazard map would be formed.

2- Further research can be made on the Elevation change.