

Golden Research Thoughts

Abstract:-

Human Response to natural hazards and disasters has always been a subject of intense investigation and study. Historically earthquakes are supposed to be one of the major natural hazards that have caused devastation in terms of high number of human lives, wide spread building and infrastructure failures and sufferings, as remains of an earthquake. This study aims to analyze temporal evolution of seismic activity during the period 1963-2013 in Koyana Region of Patan Tahsil, Maharashtra. The seismicity analysis carried out here is based on reliable compilation of earthquake data obtained from Seismological Dept. Koyana dam, Koyananagar, Patan Tahsil Maharashtra. The homogeneity of the



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A TEMPORAL EVOLUTION OF SEISMIC ACTIVITY IN KOYANAREGION OF PATAN TAHSIL, DIST. SATARA, (MAHARASHTRA)

catalog is ensured by the conversion of intensities in the historical part of the catalog and different magnitude scales in the instrumental part to surface magnitude M_s , using appropriate relationships. The residual catalog obtained after declustering including 119506 events with $Mgt. 3$ and $\geq 3 < 4$ is used for the estimation of various parameters characterizing the temporal seismic activity. The results presented as seismicity rate changes and values shows recent decrease in seismic activity around Patan region.

Keywords:

Devastation, Seismic activity, Compilation, Magnitude.

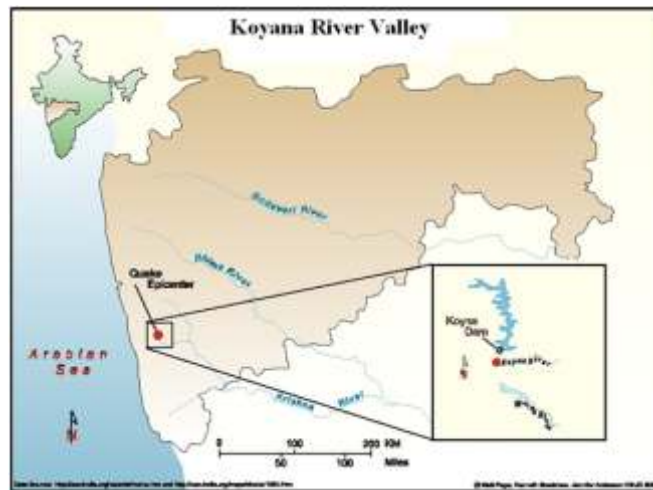
INTRODUCTION

Human Response to natural hazards and disasters has always been a subject of intense investigation and study. Historically earthquakes are supposed to be one of the major natural hazards that have caused devastation in terms of high number of human lives, wide spread building and infrastructure failures and sufferings, as remains of an earthquake. A quick review of the history of seismic activity in Koyana Region of Patan Tahsil shows that the Koyana seismic zone forming part of western ghat in the south-western part of the Deccan volcanic province is a region of prolific seismicity. Our present knowledge about the seismicity of this region spans over five decades, during which over 1,19,608 earthquakes have been recorded. The record of seismicity before 1963 is limited because of the absent of seismic stations in this area. This region has been shaken since the early of last millennium by many earthquakes that destroyed several buildings and caused severe casualties (Koyana, 1967). In particular, the 1967 earthquakes with intensity I=X, M 7.3 earthquake. To evolution of the seismic activity between 1963 and 2013. Recently, several studies showed that in this context, the study of number of seismic shocks and their variations may help to characterize stress changes before big earthquakes. In particular, we found significant temporal variation after the occurrence of 1967 M6.9 earthquakes of Koyana Region of Patan Tahsil.

STUDY AREA:-

The Koyana region is located in Satara district, nestled in the Western Ghats. Coordinated 17° 24' 6" N, 73° 45' 8" E. Koyana valley is the region in the Sahyadris, covering over 400 sq km in Maharashtra. The famous Koyana Dam which is India's largest hydroelectric project is also nearby. Koyana regions Average high temperature 28.8°C (83.8 °F) Average low temperature 13.7 °C (56.7 °F). Mean temperature range is 24°C (75°F). Rainfall in this region averages 3000–4000 mm (120–160 inches). About 200 inches of rainfall in 345 sq miles watershed above.

Location Map of Study Area



OBJECTIVES:-

- The present study is based on the following objectives.
- 1) To analyze the earthquakes data science 1962 onwards in study area.
 - 2) To analyze the temporal change in seismicity of Koyana Region.

DATABASE AND METHODOLOGY:-

Majority of primary data regarding earthquakes is being collected through field work. e.g. Field visits, Surveying and Interviews with local and officials. And secondary data collected through the Seismological Dept. Koyana dam, Koyananagar, Patan Tahsil the statistical technique use to study the decadal change in seismicity for different places with different altitude & different distance on the western ghat in study region. Particularly in Koyana valley. The secondary data is be collected through Seismological Dept. Koyana dam, Koyananagar, Patan Tahsil and related reference books, magazines, published unpublished Articles, journals, and published Govt. Report, District Census hand book, Newspapers, Other media reports and relegated websites.

We evaluate the data of seismic shocks from year 1963 to 2014. For this Number of Shocks as Recorded per Magnitude of 3 & $\geq 3 < 4$ are taken in to the consideration to study the decadal versions in the earthquakes using formula:

$$(\text{Decadal Version}) = \sqrt{\frac{\sum(x - \bar{x})^2}{N}}$$

Where \bar{X} is the average of number of earthquake in ten years

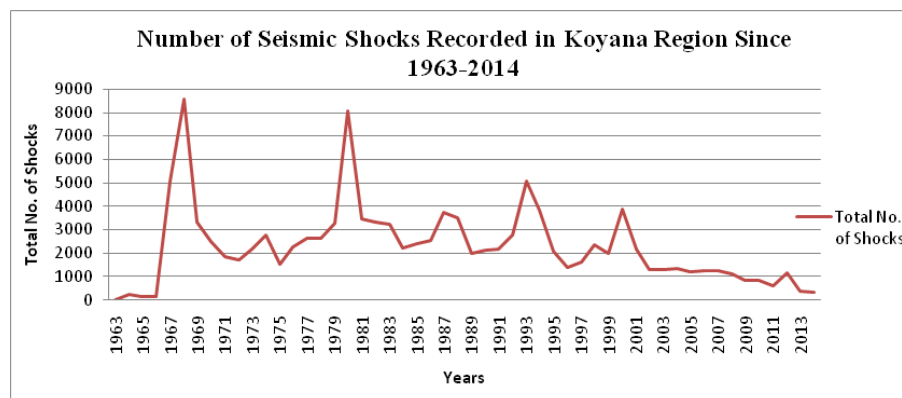
N is total number of years.

DISCUSSION AND CONCLUSIONS

The Koyana Valley in this region is not true mountains, but is the faulted edge of the Deccan Plateau. They are believed to have been formed during the break-up of the super continent of Gondwana some 150 million years ago. Geophysicists Barron and Harrison from the University of Miami advocate the theory that the west coast of India came into being somewhere around 100 to 80 mynas after it broke away from Madagascar. After the break-up, the western coast of India would have appeared as an abrupt cliff some 1,000 m (3,300 ft) in elevation.

Basalt is the predominant rock found in the hills reaching a depth of 3 km (2 mi). Other rock types found are charnockites, granite gneiss, khondalites, leptynites, metamorphic gneisses with detached occurrences of crystalline limestone, iron ore, dolerites and anorthosites. Residual laterite and bauxite ores are also found in the southern hills. (From www.Wikipedia.com, the free encyclopedia).

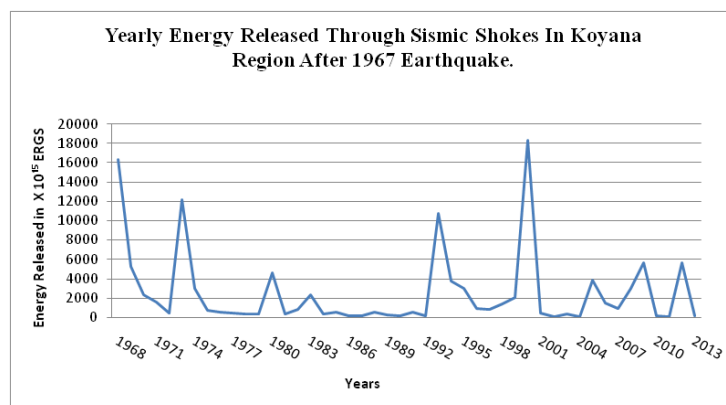
There is the N-S trending west coast and Chiplun fault zone in this region. The Koyana region is a highly active seismic zone Koyana, the region as unique as very severe earthquakes continue to occur there four decades after the initial spurt in activity. The area used to be considered aseismic. However, after the construction of dam and filling up of reservoir in 1962, the seismic activity increased significantly. The main shock of December 10, 1967. The maximum shaking intensity was assigned as VIII on the MM scale.



Seismic Data of Koyana Region Science 1963-2014

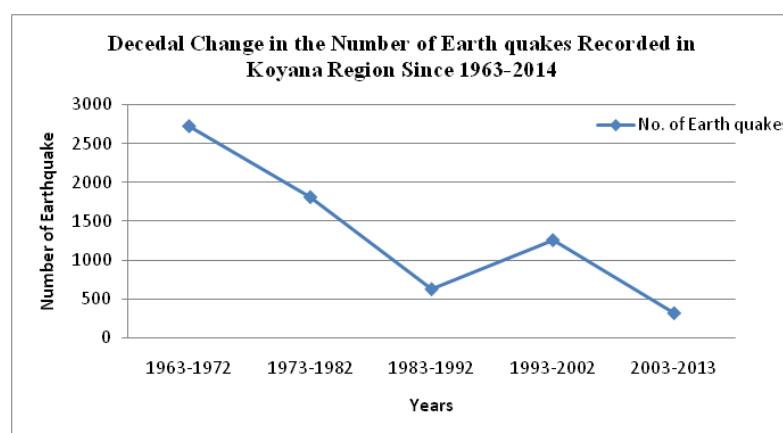
Sr. No.	Year	Mgt. 3	Mgt. >=3<4	Total No. of Shocks	Energy Released in X 10 ⁵ ERGS
1	1963	9	4	13	9.9
2	1964	246	16	262	134.5
3	1965	153	16	169	205.9
4	1966	137	15	152	216.4
5	1967	4800	228	5028	5538409
6	1968	8396	151	8547	16351.2
7	1969	3252	58	3310	5301.9
8	1970	2472	31	2503	2325.7
9	1971	1773	56	1829	1579.7
10	1972	1659	46	1705	465.5

11	1973	2151	30	2181	12129.3
12	1974	2719	52	2771	2997
13	1975	1476	45	1521	713.1
14	1976	2206	38	2244	500.4
15	1977	2606	24	2630	449.5
16	1978	2587	24	2611	354
17	1979	3230	25	3255	324.6
18	1980	7933	133	8066	4600.5
19	1981	3434	43	3477	357
20	1982	3289	19	3308	815.3
21	1983	3211	37	3248	2321.1
22	1984	2219	12	2231	349.5
23	1985	2356	31	2387	561.2
24	1986	2529	11	2540	134.4
25	1987	3739	12	3751	190.5
26	1988	3491	15	3506	564.1
27	1989	1984	10	1994	241.4
28	1990	2119	11	2130	158.3
29	1991	2179	14	2193	500.1
30	1992	2764	10	2774	195.2
31	1993	5005	39	5044	10713.6
32	1994	3771	48	3819	3709.3
33	1995	2053	29	2082	3028.3
34	1996	1364	29	1393	880.3
35	1997	1588	18	1606	808.1
36	1998	2312	22	2334	1406.2
37	1999	1954	19	1973	2052.6
38	2000	3800	66	3866	18303.43
39	2001	2146	11	2157	456.65
40	2002	1284	2	1286	89.16
41	2003	1275	10	1285	354.78
42	2004	1345	8	1353	83.86
43	2005	1168	28	1196	3840.33
44	2006	1239	21	1260	1527.11
45	2007	1253	13	1266	938.08
46	2008	1111	7	1118	3043.07
47	2009	809	11	820	5638.33
48	2010	810	16	826	199.06
49	2011	610	8	618	70.99
50	2012	1136	3	1139	5674.06
51	2013	395	6	401	194.44
52	2014	327	1	328	27.67
	Total	117874	1632		



Decadal Change in the Number of Earthquakes Recorded in Koyana Region since 1963-2014

Sr. No.	Years	No. of Earth Quakes
1	1963-1972	2720.625
2	1973-1982	1807.274
3	1983-1992	621.6359
4	1993-2002	1253.547
5	2003-2013	312.4136



By analyzing the 52 years of temporal data of the number of earthquakes in Koyana region shows that there are total 1,19,608 seismic shocks are recorded. From them Mgt.>=5 is 09, Mgt.>=4<5 is 93, Mgt.>=3<4 is 1632 and Mgt. <3 is 1, 17,874 shocks. This means the number of big shocks of Mgt.>=5 are 09. But the number of small shocks between less than Mgt. 3 <4 is more that is 1, 17,874 and 1632. But By analyzing the number of seismic shocks occurred yearly and decadal the result shows that the number of seismic activities are gradually decreasing and also the result also shows that the rate of Energy Released in X 10⁵ERGS is decreasing accept the year 1993 (10713.6) and 2000(18303.43). After the earthquake Mw 6.6 of 10 December 1967 – Koyana area, Maharashtra.

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