
International Multidisciplinary Research Journal

Golden Research Thoughts

Chief Editor
Dr.Tukaram Narayan Shinde

Publisher
Mrs.Laxmi Ashok Yakkaldevi

Associate Editor
Dr.Rajani Dalvi

Honorary
Mr.Ashok Yakkaldevi

Welcome to GRT

RNI MAHMUL/2011/38595

ISSN No.2231-5063

Golden Research Thoughts Journal is a multidisciplinary research journal, published monthly in English, Hindi & Marathi Language. All research papers submitted to the journal will be double - blind peer reviewed referred by members of the editorial board. Readers will include investigator in universities, research institutes government and industry with research interest in the general subjects.

International Advisory Board

| | | |
|--|--|---|
| Flávio de São Pedro Filho Federal University of Rondonia, Brazil | Mohammad Hailat Dept. of Mathematical Sciences, University of South Carolina Aiken | Hasan Baktir English Language and Literature Department, Kayseri |
| Kamani Perera Regional Center For Strategic Studies, Sri Lanka | Abdullah Sabbagh Engineering Studies, Sydney | Ghayoor Abbas Chotana Dept of Chemistry, Lahore University of Management Sciences[PK] |
| Janaki Sinnasamy Librarian, University of Malaya | Ecaterina Patrascu Spiru Haret University, Bucharest | Anna Maria Constantinovici AL. I. Cuza University, Romania |
| Romona Mihaila Spiru Haret University, Romania | Loredana Bosca Spiru Haret University, Romania | Ilie Pintea, Spiru Haret University, Romania |
| Delia Serbescu Spiru Haret University, Bucharest, Romania | Fabricio Moraes de Almeida Federal University of Rondonia, Brazil | Xiaohua Yang PhD, USA |
| Anurag Misra DBS College, Kanpur | George - Calin SERITAN Faculty of Philosophy and Socio-Political Sciences AL. I. Cuza University, Iasi |More |
| Titus PopPhD, Partium Christian University, Oradea,Romania | | |

Editorial Board

| | | |
|--|---|---|
| Pratap Vyamktrao Naikwade ASP College Devrukh,Ratnagiri,MS India | Iresh Swami Ex - VC. Solapur University, Solapur | Rajendra Shendge Director, B.C.U.D. Solapur University, Solapur |
| R. R. Patil Head Geology Department Solapur University,Solapur | N.S. Dhaygude Ex. Prin. Dayanand College, Solapur | R. R. Yaliker Director Management Institute, Solapur |
| Rama Bhosale Prin. and Jt. Director Higher Education, Panvel | Narendra Kadu Jt. Director Higher Education, Pune | Umesh Rajderkar Head Humanities & Social Science YCMOU,Nashik |
| Salve R. N. Department of Sociology, Shivaji University,Kolhapur | K. M. Bhandarkar Praful Patel College of Education, Gondia | S. R. Pandya Head Education Dept. Mumbai University, Mumbai |
| Govind P. Shinde Bharati Vidyapeeth School of Distance Education Center, Navi Mumbai | Sonal Singh Vikram University, Ujjain | Alka Darshan Shrivastava Shaskiya Snatkottar Mahavidyalaya, Dhar |
| Chakane Sanjay Dnyaneshwar Arts, Science & Commerce College, Indapur, Pune | G. P. Patankar S. D. M. Degree College, Honavar, Karnataka | Rahul Shriram Sudke Devi Ahilya Vishwavidyalaya, Indore |
| Awadhesh Kumar Shirotriya Secretary,Play India Play,Meerut(U.P.) | Maj. S. Bakhtiar Choudhary Director,Hyderabad AP India. | S.KANNAN Annamalai University,TN |
| | S.Parvathi Devi Ph.D.-University of Allahabad | Satish Kumar Kalhotra Maulana Azad National Urdu University |
| | Sonal Singh, Vikram University, Ujjain | |

Address:-Ashok Yakkaldevi 258/34, Raviwar Peth, Solapur - 413 005 Maharashtra, India
Cell : 9595 359 435, Ph No: 02172372010 Email: ayisrj@yahoo.in Website: www.aygrt.isrj.org



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

S. S. Tadakhe¹ and C. U. Mane²

¹Research Student , Balasaheb Desai College, Patan, Dist. Satara, Mahasashtra.

²Guide , Balasaheb Desai College, Patan, Dist. Satara, Mahasashtra.

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 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.

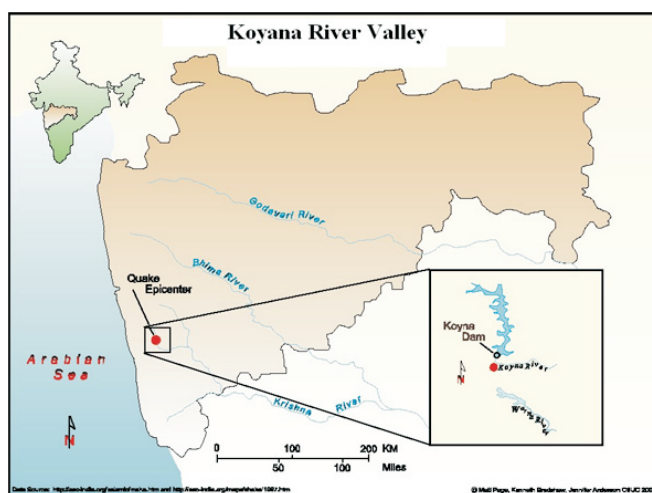
INTRODUCTION

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). 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. They are believed to have been super continent. Geophysicists Barron and Harrison from the University of Miami advocate the theory mynas 1,000 m (3,300 ft) a depth of 3 km (2 mi). (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

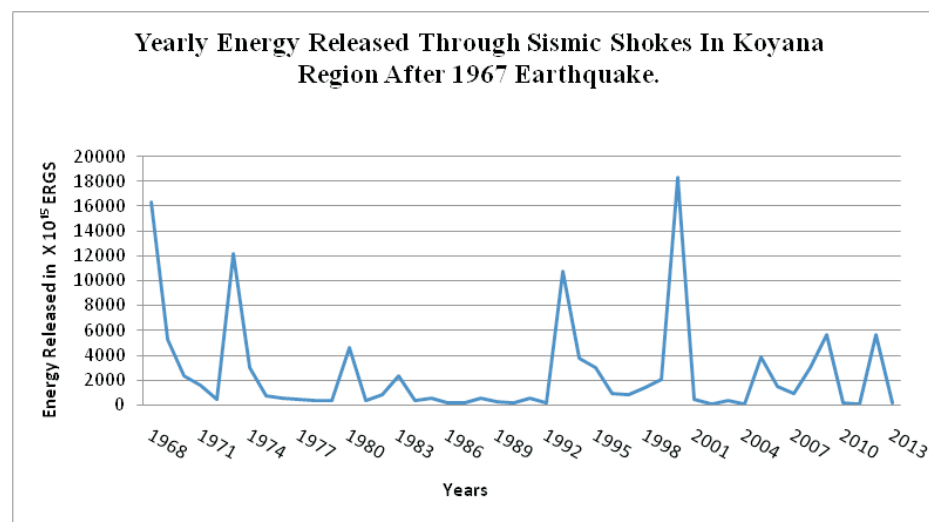
| Sr. No. | Year | Mgt. 3 | Mgt. >=3<4 | Total No. of Shocks | Energy Released in X 10 ⁵ ERGS |
|----------|-------------|-------------|------------|---------------------|---|
| 1 | 1963 | 9 | 4 | 13 | 9.9 |
| 2 | 1964 | 246 | 16 | 262 | 134.5 |
| 3 | 1965 | 153 | 16 | 169 | 205.9 |
| 4 | 1966 | 137 | 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 |

A Temporal Evolution Of Seismic Activity In Koyana Region Of Patan Tahsil, Dist. Satara, (Maharashtra)

| | | | | | |
|----|------|------|-----|------|----------|
| 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 |

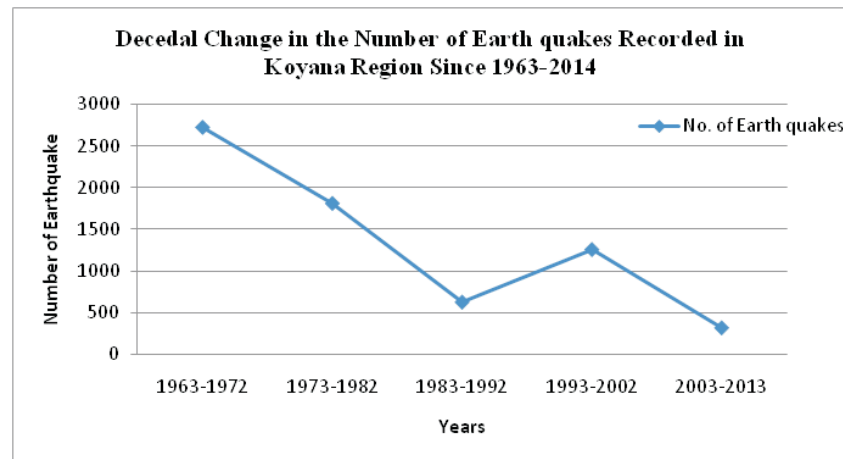
A Temporal Evolution Of Seismic Activity In Koyana Region Of Patan Tahsil, Dist. Satara, (Maharashtra)

| | | | | | |
|----|--------------|---------------|-------------|------|---------|
| 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. $\geq 4 < 5$ is 93, Mgt. $\geq 3 < 4$ 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 $\times 10^{15}$ ERGS 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.

REFERENCES:

1. Earthquake Data, the Seismological Dept. Koyana dam, Koyananagar, Patan Tahsil. 1963-2014.
2. Savinder Singh Environmental Geography.
3. P.K. Agarwal, O.P. Pandey and T.R.K. Chetty, National Geophys. Inst. Hyderabad, Aeromagnetic Anomalies lineaments and seismicity in Koyana Warana Region J. Ind. Geophys. Union (Oct. 2004) Vol. 8, No. 4.
4. S.S. Rai, Sunil K. Singh, P.V.S.S. Rajagopal Sharma, D. Shriganesh, K.N.S. Reddy, K.S. Prakasham And Y. Sytanarayana, National Geophys. Inst. Hyderabad. What Triggers Koyana Region Earthquakes? Preliminary Results From Seismic Tomography Digital Array.
5. Raju, P. S., Rao, N. P., Singh, A. and Kumar, M. R., The 14 February 2006 Sikkim earthquake of magnitude 5.3. Curr. Sci., 2007.
6. www.wikipedia.com.

Publish Research Article
International Level Multidisciplinary Research Journal
For All Subjects

Dear Sir/Mam,

We invite unpublished Research Paper, Summary of Research Project, Theses, Books and Book Review for publication, you will be pleased to know that our journals are

Associated and Indexed, India

- * International Scientific Journal Consortium
- * OPEN J-GATE

Associated and Indexed, USA

- * EBSCO
- * Index Copernicus
- * Publication Index
- * Academic Journal Database
- * Contemporary Research Index
- * Academic Paper Database
- * Digital Journals Database
- * Current Index to Scholarly Journals
- * Elite Scientific Journal Archive
- * Directory Of Academic Resources
- * Scholar Journal Index
- * Recent Science Index
- * Scientific Resources Database
- * Directory Of Research Journal Indexing

Golden Research Thoughts
258/34 Raviwar Peth Solapur-413005, Maharashtra
Contact-9595359435
E-Mail-ayisrj@yahoo.in/ayisrj2011@gmail.com
Website : www.aygrt.isrj.org