seems never to have been seriously concerned about the danger and the need for preventive measures. Daily life is marked by indifference and appears not to have been noticeably affected by major episodes. The historical repercussions have been none the less significant, particularly for the fates of certain cities. The decline of Qūmes in the 9th century, of Sīrāf in the 11th, and of Nīšāpūr after the 12th-14th centuries seems to have been largely owing to destructive earthquakes (Ambraseys and Melville, p. 109).

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(Xavier de Planhol)

iv. The Historical Record of Earthquakes in Persia

Introduction. The Iranian plateau, characterized by active faulting, active folding, recent volcanic activities, and considerable elevation contrasts along the Alpine-Himalayan mountain belt, has been frequently struck by catastrophic earthquakes during recorded history. These earthquakes have resulted in great loss of life and, by rendering large numbers of people homeless and disrupting the agricultural and industrial bases of their lives, have wasted natural resources.

Archaeoseismicity. Large, destructive earthquakes are very infrequent. The dormant period between large-magnitude earthquakes on a particular fault or fault segment in Persia ranges from many centuries to millennia (Berberian, 1981, pp. 44-45; Ambraseys and Melville, 1982, pp. 158-62; Berberian et al., 1992, pp. 1728-31). The great length of the earthquake cycle for most active faults in Persia results in a paucity of historical (pre-1900) and instrumental (20th century) data from which to assess earthquake hazards or derive an understanding of the mechanism of faulting. Unlike instrumental and historical seismic records, the archaeological and geological records of earthquake activity extend many earthquake cycles into the past. Archaeological sites and historical monuments may yield direct or indirect evidence of earthquake activity. They may contain episodes of rebuilding or repairs following earthquakes.

Several archaeological sites and monuments have provided earthquake information on Persia: Sagzābād about the middle of the 3rd millennium B.C.E. (Negahbān, 1973, pp. 11-13; Berberian et al., 1993, pp. 100-102), Ak-Tapa of 4,000 B.C.E. (Golinsky, 1982, p. 519), Gowdīn-Tapa of 4,000-3,350 B.C.E. (Young, 1968, p. 160), Mārlīk of 3,000-2,000 B.C.E. (Negahbān, 1990, p. 146; Berberian et al., 1992, pp. 1728-31), Parthian Nesā of 10 B.C.E.-10 C.E. (Golinsky, 1982, p. 519), Kangāvar Anāhītā Temple of the 17th century B.C.E. and 224-642 C.E. (Kāmbak̲š-Fard, 1974, p. 47), Bīšāpūr city of 293-302 and 531-79 C.E., late 10th century (Sarfarāz, 1987, pp. 45, 56, 71, and personal communication, January 1994; Berberian, 1994, p. 221), Nīšāpūr of 1145 and 1270 (Wilkinson, 1975, pp. xxxv, xxxvi), and Masjed-e-Jāmeʿ of Qāen of 1066 (Nāderī, 1980, pp. 103-07). The decline of civilization in the following cities seems to have been partly, if not largely, due to large-magnitude earthquakes, some of which were associated with long surface faulting: Sagzābād, Mārlīk, Kūmeš (after the 856 earthquake), Zarang/Sīstān (around 734, 805, and 815 C.E.), Sīrāf (978 and 1008 C.E.; Ṭāherī), Nīšāpūr (1145, 1209, 1251, 1270, 1389, and 1405), and Jīzd (1336). (For more information, see Berberian, 1994, pp. 53-161.)

Historical (pre-1900) earthquakes. Historical records of catastrophic earthquakes have survived for centuries. At least nine destructive earthquakes in Nīšāpūr/Šādyāk̲ have reduced the size and changed the location of the city several times (Melville, 1980, pp. 116-17). Ray has been devastated at least six times in its recorded history (Ambraseys, 1974, pp.

50-68; Berberian et al., 1985, pp. 221-30, 287). Almost all monuments in Tabrīz were destroyed or severely damaged by at least eight large-magnitude earthquakes, especially by the one on 29 Ḏu'l-Hejja 1193/7 January 1780, which reduced all buildings to rubble. Unfortunately, except for the Blue Mosque (Masjed-e-Moẓaffarīya) built in 870/1465, the city now has very few historical monuments (Ṭabāṭabā'ī-Tabrīzī, 1294/1877, p. 121; Berberian and Aršadī, 1976, pp. 397-418; Melville, 1981, p. 167; Golombeck and Wilber, 1988, pp. 31, 407-409). Table 44 below lists the most important historical earthquakes in the Iranian plateau. (For more precise information, see Ambraseys and Melville, 1982, pp. 158-62; Berberian, 1994, pp. 11-413; Figure 32.)

20th-century earthquakes. Since the beginning of this century at least 126,000 people have lost their lives in destructive earthquakes in Persia. These losses cannot be justified in light of existing scientific knowledge and expertise in disaster management. Table 45 lists the most important earthquakes in Persia since 1900.

The Ṭabas-e-Golšan earthquake of 25 Šahrīvar 1357/16 September 1978 (Ms=7.4; Berberian, 1979, pp. 1861-87; 1982, pp.449-530) and the Rūdbār-Ṭārom earthquake of 31 Ḵordād 1369/20 June 1990 (Ms=7.4; Berberian et al., 1992, pp. 1726-55) were the most catastrophic earthquakes to have occurred in Persia to date in the 20th century. The Ṭabas-e-Golšan earthquake destroyed or severely damaged

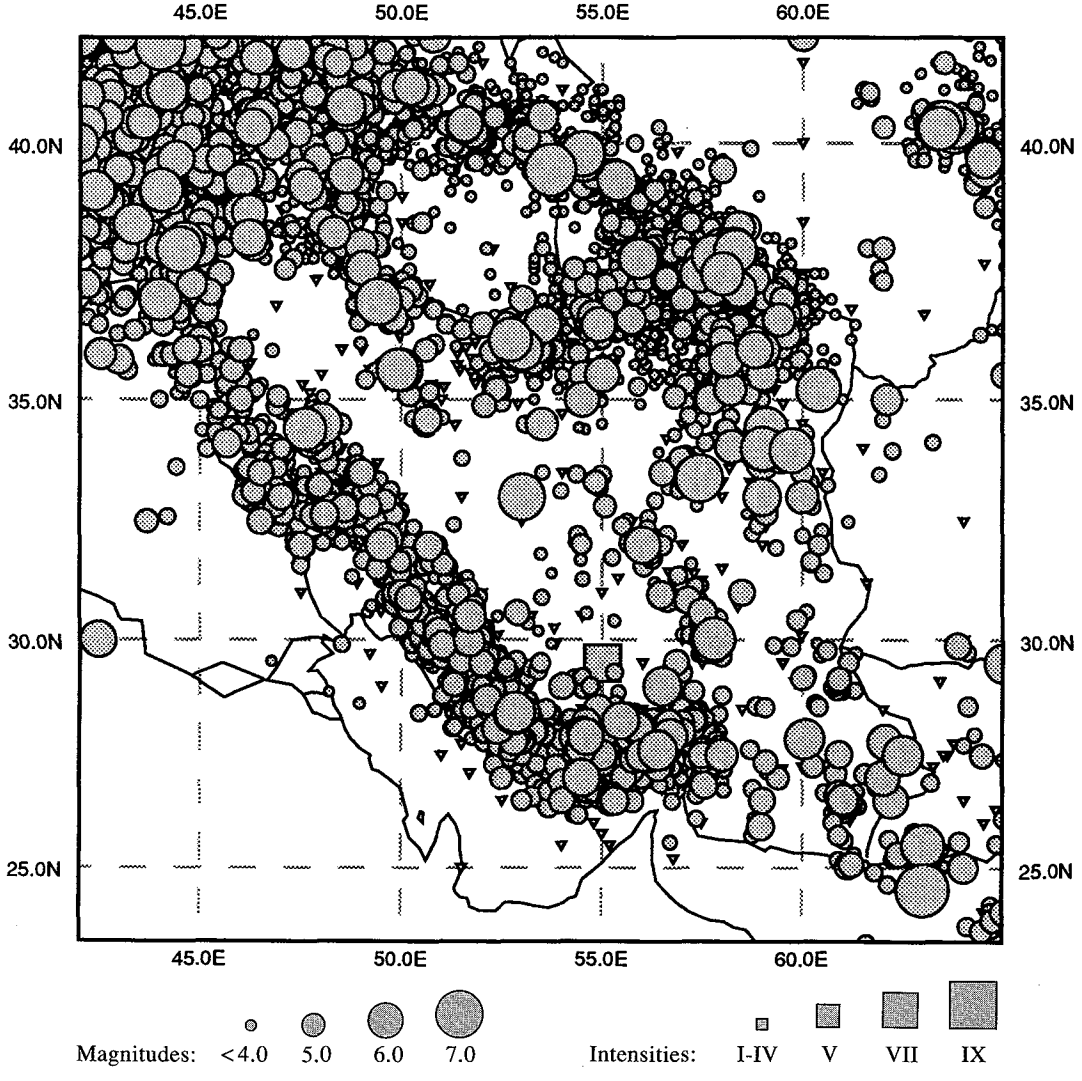

Figure 32. Seismicity of Persia, by the author

Table 44
HISTORICAL (PRE-1900) DESTRUCTIVE EARTHQUAKES IN PERSIA

Date	Location	Reported Casualties
10 B.C.E.-10 C.E.	Parthian Nesā	K+
ca. 734/111-120	Zarang/Sīstān	n.a.
743/125	Tang-e Sār Darra	K
840/225	Ahvāz	K
855/241	Ray	K+
856/242	Dāmḡān/Kūmeš	45,096
872/258	Saymara-Darra Šahr	20,000
943/331	Samalqān	5,000
958/346	Ray-Rūyān	K
1008/398	Dīnavar	16,000+
1008/398	Sīrāf (Tāharī)	K
1042/434	Tabrīz	40,000
1052/444	Bayhaq (Sabzavār)	K
1052/444	Arjān	K
1107/500	Kargsar/Dīnavar	K
1119/513	Qazvīn	K
1127/521	Farīm	K
1177/572	Ray-Karaj-Qazvīn	K
1209/605	Nīšāpūr	10,000
1270/669	Nīšāpūr	10,000
1273/671	Tabrīz	250
1301/700	Farīm	K
1304/704	Tabrīz	K
1336/737	Jīzd-Zūzan	20,000
1389/791	Nīšāpūr	K+
1405/808	Nīšāpūr	30,000
1440/844	Kārzīn-Qīr	10,000
1485/890	Šakūr-Tonekābon	K+
1493/898	Nowzād	K+
1497/902	Hormoz-Bandar-e ʿAbbās	K+
1498/903	Jorjān (old Gorgān)	1,000
1593/100	Lār	K
1608/1017	Rūdbarāt-Tāleqān	K+
1619/1028	Dūḡābād	800
1641/1050	Dehk̲ʷārqān-Tabrīz	K+
1665/1075	Damāvand	K
1666/1076	NW Ardal	K
1673/1084	Mašhad	5,600
1678/1088	Lāhījān	K
1678/1089	Gonābād	K
1695/1106	Esfarāyen	K+
1721/1133	Šeblī-Tabrīz	40,000
1780/1194	Tabrīz	50,000
1808/1223	Rešm	K
1809/1224	Āmol	K
1825/1239	Harāz	K
1830/1245	Damāvand	K
1838/1254	Noṣratābād	K
1844/1260	Mīāna-Garmīrūd	K+
1851/1267	Sarvelāyat	2,000+
1871/1288	Qūčān	K
1879/1296	SE Bozqūš	2,000+
1890/1307	Tāš	K+
1893/1311	Qūčān	10,000+

- Continued on next page -

Table 44 (Continued)
HISTORICAL (PRE-1900) DESTRUCTIVE EARTHQUAKES IN PERSIA

Date	Location	Reported Casualties
1895/1312	Qūčān	1,000
1896/1313	Sangābād-Ḵalḵāl	1,100+

K: Unspecified number of fatalities; K+: Heavy casualties.

Source: Ambraseys and Melville, 1982, pp. 158-62; Berberian, 1994, pp. 11-413.

Table 45
DESTRUCTIVE EARTHQUAKES IN 20TH-CENTURY PERSIA

Date	Time (GMT)	MAG. (M_s)	Location	Casualties
1282Š./1903.09.25	01:20	5.9	Toršīz/Kāšmar	350
1287Š./1909.01.23	02:48	7.4	Sīlāḵor	6,000
1290Š./1911.04.18	18:14	6.2	Rāvar-Lakar Kūh	50
1302Š./1923.05.25	22:21	5.5	Kāj Deraḵt	2,200
1302Š./1923.09.22	20:47	6.7	Lālahzār	290
1308Š./1929.05.01	15:37	7.3	Baḡān-Garmāb	3,800
1309Š./1930.05.06	22:34	7.7	Salmās	2,500
1313Š./1934.06.13	22:10	6.9	Makrān	n.a.
1314Š./1935.04.11	23:14	6.8	Ḵosūt/Tajan Rūd	400
1324Š./1945.11.27	21:56	8.0	Makrān	4,100
1326Š./1947.08.05	14:24	7.6	Makrān	n.a.
1326Š./1947.09.23	12:28	6.8	Dūstābād	500
1327Š./1948.10.05	20:12	7.2	Ashkhabad	10,000
1331Š./1953.02.12	08:15	6.5	Torūd	930
1336Š./1957.07.02	00:42	6.8	Sangčāl	1,100
1336Š./1957.12.13	01:45	6.7	Farsīnaj	1,200
1337Š./1958.08.16	19:13	6.6	Fīrūzābād	130
1340Š./1961.06.11	05:10	6.5	Deh-Kūya	60
1341Š./1962.09.01	19:20	7.2	Būyīn Zahrā	12,200
1347Š./1968.08.31	10:47	7.4	Dašt-e-Bayāż	10,000
1347Š./1968.09.01	07:27	6.4	Ferdows	1,000
1351Š./1972.04.10	02:06	6.9	Qīr-Kārzīn	5,010
1356Š./1977.03.21	21:18	7.0	Ḵūrgū	152
1356Š./1977.04.06	13:36	6.1	Naḡān	366
1357Š./1978.09.16	15:35	7.4	Ṭabas-e-Golšan	20,000
1358Š./1979.11.14	02:21	6.6	Korīzān	171
1358Š./1979.11.27	17:10	7.1	Kolī	20
1360Š./1981.06.11	07:24	6.7	Golbāf	1,400
1360Š./1981.07.28	17:22	7.1	Sīrč	1,300
1369Š./1990.06.20	21:00	7.4	Rūdbār-Ṭārom	40,000
1369Š./1990.11.06	18.45	6.7	Fūrg	22
1372Š./1994.02.23	08:02	6.1	Safīdāba	6

MAG.: Magnitude. Ms:Surface-wave magnitude.

Source: Berberian, 1979, p. 1862; idem, 1981, pp. 42-50; idem et al., 1992, p. 1731; Ambraseys and Melville, pp. 164-66.

about ninety villages, slightly damaged another fifty villages in the region, and completely demolished the oasis town of Ṭabas-e-Golšan, where 85 percent of the inhabitants (11,000 out of 13,000) perished. Total fatalities were more than 20,000 with thousands injured. This earthquake, strongly felt over an area of 1,130,000 square km, destroyed over 15,000 housing units and thirty *qanāts* (q.v.) in the epicentral region (Berberian, 1989, pp. 1861-87). The Rūdbār-Ṭārom earthquake, the largest in this century to affect an urban area in Persia, killed over 40,000 people, injured 60,000, and left more than 500,000 homeless. The earthquake destroyed three towns (Rūdbār, Manjīl, and Lowšān) and 700 villages and damaged another 300 villages in Gīlān and Zanjān provinces of northwest Persia, southwest of

the Caspian Sea. Nearly 100,000 buildings were destroyed or badly damaged. Water supplies in 283 villages were destroyed or reduced by 70 percent, several thousand livestock were buried under debris, and farms and irrigation canals were seriously damaged. In addition, 1,200 km of rural roads now require repair or reconstruction (Berberian et al., 1992, pp. 1726-55). Economic losses caused by this earthquake have been estimated at $7.2 billion, constituting 7.2 percent of the GNP (UNESCO, *DHA News,* Department of Humanitarian Affairs, 1992, p. 30). The long-term effects of this catastrophic event, such as the disruption of major economic links between three large provinces, the resettlement of populations from at least three large towns and 700 villages, and the reconstruction of buildings according to modern standards will take decades to accomplish and will absorb a considerable part of the country's resources.

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(MANUEL BERBERIAN)

EAST AFRICA, Persian relations with the lands of the East African coast, particularly Somalia, Kenya, and Tanzania.

i. *Economic, political, and cultural relations through 1900.*
ii. *Persian loanwords in Swahili.*
iii. *Baluchi and Parsi communities.*
iv. *Bahai communities.*

i. ECONOMIC, POLITICAL, AND CULTURAL RELATIONS THROUGH 1900

From early times monsoon winds have permitted rapid maritime travel between East Africa and Western Asia. Persian relations with the African coastal regions were largely via this maritime trade network (Hourani, pp. 4-6, 38, 79-82). Although large-scale Persian settlement in East Africa is unlikely and the only known Persian inscription in East Africa comes from an imported glazed tile, now lost, decorating a tomb at Tongoni (Freeman-Grenville and Martin, p. 116), Persian cultural and religious influences nonetheless were felt. Ki-Swahili, the language of the East African coastal regions, contains Persian loan words (q.v.), mainly nautical terms. Archeological evidence from East Africa shows economic connections with the ports of southern Persia from the 3rd to the 15th centuries C.E., and African traditional history connects the founding of some of the East African ports with Shiraz.

Sasanian interest in East Africa seems to have been largely directed toward the Red Sea and the northern coast of Somalia. Competition between Ethiopian and Persian merchants for the lucrative Indian trade may have been one cause of the Persian campaigns in Yemen during the reign of Ḵosrow I (r. 531-79), which campaigns led to Sasanian control of the Red Sea route to the Indian Ocean (Cosmas Indicopleustes apud Wolska-Conus, pp. 141, 159, 197; Procopius, *de bello Persico* 1.20.9-12). Persia may also have been after slaves, who in the pre-Islamic period were obtained from the Horn of Africa. Duan Chengshi, in *Yuyang za zu* (ca. 850 C.E.), describing an earlier period, also refers to "Possu" (probably here meaning "Persian") merchants on the coast of Bobali (possibly northern Somalia) who formed caravans of several thousand men to obtain ivory and ambergris (Duyvendak, pp. 13-14). Before trading, these merchants were forced to draw blood and swear an oath. Persian ceramics of the 3rd/ 5th centuries C.E. have been found at the site of Ras Hafun (probably ancient Opone) in northern Somalia (Smith and Wright, pp. 125, 138-40), though 5th century ceramics, very similar to those from Ras Hafun, have been claimed from Chibuene in southern Mozambique and from the island of Ngazidja in the Comoro archipelago (Sinclair, p. 190). The 4th/10th-century *Ḥodūd al-ʿālam* (tr. Minorsky, pp. 163-64, with commentary), the only surviving early Persian geographical text with detained evidence on East Africa, describes the coast, termed Zangestān, as lying opposite Fārs, Kermān, and Sind; the people are described as extremely black, with curly hair and the nature of wild animals. Three towns are noted: M.ljān (possibly Unguja, the original name of Zanzibar Island), the port visited by foreign merchants; Sofāla, the royal capital, in modern Mozambique; and Hwfl (a corruption of Waqwāq?), the richest in goods. Gold is important, and ancient gold mines are well known from the basement rock complex of southern Africa (Summers, pp. 11-17, 31-104; settlement sites in the interior, such as Mapungubwe/K2, were in contact with the coast by at least the 10th century C.E. and probably much earlier (Hall, pp. 74-90).

Masʿūdī (*Morūj*, ed. Pellat, I, pp. 112-13, 124-25; II, p. 113), who last visited East Africa in 304/916 on a ship owned by two brothers from Sīrāf, suggests that regular voyages were made from Oman and Sīrāf to the Belād al-Zanj, and in particular to the port of Qanbalū (most likely Pemba Island). Masʿūdī (who was writing after the Zanj revolt) suggests ivory was the main export. Jāḥeẓ suggests (*Rasāʾel*, written ca. 235/850, para. 210-213) that many Zanj slaves came from Lanjuya (Unguja, Zanzibar Island) and Qanbalū. These claims are supported by recent archaeological work that has yielded 6th-century-C.E. radiocarbon dates from Unguja Ukuu on Zanzibar and 3rd-4th/9-10th century occupation at Ras Mkumbuu and Mtambwe Mkuu on Pemba. Other African exports were ambergris and timber, especially mangrove poles. Ebn Ḥawqal (q.v.; tr. Kramers, p. 277) records that Sīrāf was built with *sāj* (teakwood) and other kinds of wood from East Africa.

The ports in the Lamu archipelago, though not mentioned in the literary sources, are known from archeological evidence to have also played a central part in the maritime trade. Excavations at Manda (Chittick, pp. 65-106) and Shanga (Horton, forthcoming) have produced ceramic assemblages very similar to those from Sīrāf, including numerous unglazed storage jars that were actually made in Sīrāf as well as the more widely distributed Sasanian-Islamic glazed jars and white-glazed wares. Chinese stonewares have also been found at these levels.

By the 5th/11th century the Indian Ocean trade had shifted to the ports at the head of the Persian Gulf, in