



FLOODS

FLOODS (sayl, sayl-âb) in Persia.

i. *Geographical Survey.*

ii. *Historical Survey.*

i. GEOGRAPHICAL SURVEY

A common saying holds that probably more people died in deserts by being drowned than by thirst. Such a statement indicates that even in extremely dry environments flooding is a major factor not only in shaping the earth surface, but also causing severe damage to settlements, agriculture, and people.

Floods are usually considered to be climatically controlled events that, in connection with topography and vegetation cover, can be of considerable geomorphic significance. They may be caused either by intensive precipitation over small hilly watersheds, or by heavy rains and thunderstorms in longer periods of time over large watersheds, or as a result of rapid melting of large snow masses, e.g., in mountains. Extremely severe flooding occurs by the combination of excessive heavy rainfall and snow melt, leading to extensive fluvial runoff. Floods cause sedimentation of flood plains and, at the same time, erosion and other geomorphically relevant processes. Due to the fact that flood plains are preferred locations of human settlements and agricultural activities, floods often cause loss of human lives as well as economic disasters.



In Persia, heavy temporary rainfalls and/or, sometimes even in combination with, snow melt are the prime causes of floods and flooding. Surplus or deficit of water, mainly caused by Persia's topography, undergoes seasonal variations with decisively stronger precipitation during the winter months (see *EIr.V*, fig. 45 and Table 52), which explains why floods occur predominantly during these periods. Due to an unfavorable, but by no means unusual, meteorological situation southwestern Persia was exposed to extremely heavy precipitation over parts of the Zagros between 16 March and 22 March 1972. Rainfall of up to 300 mm in a few days in combination with snow melt caused extreme runoffs in the catchment areas of Karkā and Kārūn rivers, causing heavy erosion in the narrow mountain valleys and disastrous floods in the low lying flood plains around Sūsangerd and south of Ahvāz.

From a geomorphological and ecological perspective, floods in Persia and their distribution and effects are characterized by two basic forms: (1) river floods, especially in low-lying environments such as the coastal area of the Persian Gulf or the Caspian Sea; and (2) sheetfloods, in most parts of central Persia, especially in and around the many endorheic basins that are so characteristic of Persia's highlands and plateaus. River floods in Persia are mainly caused by the combined factors of heavy rainfall and snow melt. As such they are especially typical of the lower parts of all those drainage systems that discharge into the drainage area of the Persian Gulf. While flooding is mostly not a problem for the upper reaches and headwaters of the fluvial systems, the lower parts of the Kārūn-Karkā drainage area are, for instance, very sensitive to periodical and episodic extreme runoff events. The reason for this is the combination of temporarily extreme discharge, slow runoff in the lower reaches of the river system, and low, sometimes levee-type, embankments of the rivers.

Sheetfloods are a common feature in arid and semiarid environments, for which Persia is typical. While precipitation is scanty (see [BĀRĀN](#); [CLIMATE](#)), short and concentrated rainfalls can be extremely heavy, for instance as a result of local thunderstorms. In such cases, existing drainage systems, especially those ending in endorheic basins, tend to create heavy surface runoffs discharging into desert (q.v.; *kavīr*). [DRAINAGE](#)). The central desert (Dašt-e Kavīr; HĀMŪN) has an east-west extension of approx. 500 km and a north-south extension of more than 300 km. As such, this depression is the most eastern of the big endorheic basins of the Persian highlands. Its specific character stems from its more or less regular flooding by four perennial



rivers, all of which originate in the western Hindu Kush, namely Hārūtrūd, Farāhrūd, Kāšrūd, and Hīrmand (see [HELMAND](#)). The last mentioned tributary, with a length of approximately 1500 km, is the largest and most important for the annual flooding of the basins, creating three periodic lakes (Hāmūn-e Kūh-e K̄vāja, Hāmūn-e Šāberī, and Hāmūn-e Pūzak). The fourth and lowest depression at 467 m above mean sea-level is the Gowd-e Zereh, which, however, is flooded only under extremely high runoff conditions. The specific situation of the Hāmūn-e Hīrmand is distinguished by the fact that, unlike almost all other endorheic basins of Persia, the flood plain is characterized by a very specific flora and fauna that is also of great, but mainly regional and/or local, economic importance. The harvesting of reeds (*Aypha angustifolia*) is especially widespread and used for the production of mats and curtains (*parda*, *kolak*, *ḥašīr*), which are exported as far as Tehran. Fishing is also of importance.

The lowlands of Kūzestān

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(ECKART EHLERS)

ii. HISTORICAL SURVEY

Persia, essentially an arid land with almost no major perennial rivers, has nevertheless been subject to devastating floods throughout her recorded history. In terms of lives lost and material damage, flooding does not constitute so severe a hazard as earthquakes (q.v.), but some large-scale events have been reported, in addition to the flash floods that strike isolated riverbeds following localized storms in the mountains, carrying away unwary travelers, transport, and bridges.

Flooding is usually triggered by rapid melting of winter snows (see [BARF](#)), sometimes compounded by a period of intense rainfall. Most of the recorded floods in history (see Melville, 1984, for a preliminary survey of the literature) have occurred in the spring months (March-May). Winter precipitation (see [BĀRĀN](#)) can itself be directly responsible for flooding, as in *Ķūzestān* in December 1921, January 1924, and February 1934, and in *Anār* and *Rafsanjān* (Kermān) in December 1924, following downpours throughout southern Persia. It is not surprising therefore that the worst instances of flooding are often associated either directly or indirectly with severe winter weather. Exceptionally, summer storms also generate destructive floods, as for example in *Sarāb* in 1001/1593 (*Afūšta'ī Naṭanzī*, p. 528), and *Rašt* in August 1923 (after which *Rezā Khan* ordered that money intended for a statue of himself should be set aside for relief of the victims). Nevertheless, the beneficial effects of heavy rainfall sometimes more than compensate the short-term damage caused. When possible, surface runoff was channeled into cisterns and tanks for later use for irrigation (see [ĀB-ANBĀR](#)

The devastation caused by floods depends on whether they affect chiefly rural areas and damage agriculture, with the loss of livestock, interruption of communications and blocking or collapse of *qanāts*(q.v.), or mainly towns and cities, resulting in more concentrated damage to property and goods. Among examples of the damage to rural *qanāts* are the floods that affected parts of Kermān province in the winter of 1088/1677 and spring 1091/1680, both years also associated with heavy snowfalls (*Māšīzī Bardasīrī*, pp. 462-63, 480-81). The former type need not be associated with river overflow so much as surface runoff of storm water. Damage to rural dwellings, relatively easily replaced,



though common, is perhaps not the most important aspect of such disasters, even though loss of life can be heavy. Thousands of people are said to have been downed in the Harāz valley and in Āmol in 1600 (Mahjūrī, III, p. 369), and over five hundred people in the districts round Dehkord (modern Šahr-e Kord) in 1914 (Nīkzād, p. 44). On the whole, however, reported casualties seldom exceed one hundred to two hundred people, and are usually measured in tens rather than hundreds.

Urban floods are usually due to the sudden inundation of a normally dry riverbed running through the town center. Such incidents are reported for most of the major provincial cities in Persia (though not to any great extent for Tehran itself, nor for Hamadān, probably due in the latter case to a lack of local chronicles). Notable examples of this are the 1929 and 1934 floods in Tabrīz, reflecting a persistent problem visible in the sources since the Safavid period (Eskandar Beg, p. 160; Melville, 1983). Other cities for which famous flood disasters are reported include Qazvīn (floods in 965/1558, 1002/1594, 1267/1851, c. 1898); Qom (in 294/905, 1045/1636, 1080/1670, 1881, 1893; see Calmard; Houtum-Schindler, pp. 65-66); Shiraz (1079/1688, January 1908 and March 1910); Yazd (673/1275, 860/1456 and April 1941); and Kermān (notably in July 1932). Some floods affected more than one of these cities at the same time. In the case of large-scale events, triggered by prolonged and widespread periods of heavy rainfall, flooding can affect both towns and their rural hinterland over a large area, as in the case of the floods of February 1594 all around the edges of the Kavīr from Qazvīn to Kermān (Afūšta'ī Naṭanzī, pp. 530-34) and, more recently, in March 1910, particularly severe around Anār and Rafsanjān.

Given the incompleteness of the data currently available, and the distorting effects of the documentary emphasis on the major towns, it is not useful to plot either the spatial or time distribution of floods in Persia. Predictably, however, the most persistent incidences of flooding are connected with the main river regimes, namely the Kārūn in Kūzestān (see. e.g. the floods mentioned above) and the Helmand (Hīrmand) in Sīstān. The *Tārīk-e Sīstān* contains information on floods round the capital, Zarang, in 429/1037 and 640-41/1243-44, and, more interestingly, on the budget set aside for the repair to damage caused by floods, constructing dams, and maintaining dykes and embankments (ed. Bahār, pp. 32-33, 364-65, 397-98). Many of these irrigation and flood management systems were destroyed in the Timurid period (see Christensen, pp. 237-42). The sources are then silent until the present century, when several



instances of flooding and the measures taken to channel and contain the unruly waters of the Hāmūn basin are detailed in various reports by British diplomatic and consular officials (see also Tate, esp. Part II).

Responses to the flood hazard in the pre-modern period were on the whole ad hoc, and typically consisted of the construction of canals, drainage ditches, barriers or dams (*band*, q.v.). If the onset of flooding was relatively slow, the inhabitants could try to construct defenses to bar or deflect the rising waters, but more usually new defenses were built, or inadequately maintained banks and canals were restored, only in the aftermath of a destructive flood. Little attempt was made to reduce vulnerability by avoiding building in the flood plain, despite evidence that people were aware of the risks (see the examples in Melville, 1984, from the floods of 1908 in Shiraz and 1950 in Mašhad). On the contrary, in the early Pahlavi period vulnerability was often enhanced by the filling in of city moats, destruction of town walls, and the creation of wide boulevards, which facilitated the inroads of flood waters. It is only in recent times that government relief measures have provided support for flood victims.

The current flood risk in Persia, greatly modified by enormous changes in population density and urban topography, the use of new building materials and techniques, the construction of large dams and altered land-use patterns, cannot be evaluated solely on the basis of past experience. Nevertheless, a fuller historical record would be useful in identifying the areas most at risk over the long-term. See also [ĀB](#), [ĀBYĀRĪ](#).

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