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SNOW

SNOW or N. Pers. ‘barf’ (from OIr. **vafra-* “snow,” root *vap-* “to toss in the air, to pile up”; cf. OInd. *vápati* “to disperse, to scatter,” *vapra-* “heap, mound”; Pokorny, I, p. 1149; Mayrhofer, *Etymological Sanskrit Dictionary* III, pp. 144-45). This word and forms derived from it designate the snow in all western and most eastern Iranian languages and dialects; some East Iranian languages, Khotanese, Sogdian, Pashto, and Yidgha-Munji, have feminine forms derived from **vafrā-*, possibly an old collective plural (see Bailey, *Dictionary of Khotan Saka*, pp. 305-06). Other words for snow are found in Wakhi, which has *zəm* (cf. Av. *zyam–* “winter”), Shughni, which has *`inij* (cf. Av. *snaēža-* < OIr. **snaija-*), and Ossete, which has a loanword, Digor *met* and Iron *mit.*

If all Iranian languages have at least one word and sometimes several to designate snow, it is because snow is known in all the areas where these languages are currently spoken. There is a very clear contrast, however, between the southern part, which is largely inhospitable to habitation and where snow is only a negligible meteorological phenomenon, and the more densely settled northern part, where snow is, on the other hand, a major component of the climate, the landscape, and the framework of daily life.

On the tropical margins of the Irano-Afghan plateau, snow is in fact exceptional below an altitude of 1,000 meters. Not that it cannot fall in abundance there, but then it is a memorable event and as such duly recorded by local chroniclers (e.g., *Tārīḵ-e Sīstān*, pp.174, 293). As a rule, snow falls rarely, once every ten or twenty years, and melts as soon as it touches the

ground. From the Nangrahār basin in the east (a single day of snow has been recorded at Jalālābād between 1972 and 1983), to Ḵūzestān in the west (also one day of snow, at Dezfūl, between 1960 and 1979) and passing through the endorheic basins of Sīstān, Jāz Mūrīān, Lūt, and the Dašt-e Kavīr (two days of snow at Zaranj between 1969 and 1983, four at Zābol), the isarithm for one day of snow a year constitutes a good criterion for delimiting the type of geographic milieu traditionally called in Persian “warm lands” (*garmsīr*).When not too arid, warm lands offer nomads good winter pasturage precisely because they are never covered with snow (Figure 23). In the far south, on the shore of the Persian Gulf, precipitation in the form of snow is still rarer.

In the remaining two-thirds of the territory of Iran and Afghanistan snow is a common occurrence. The high average altitude and the continental climate favor the conversion into snow of most winter precipitation there and ensure its remaining on the ground; however, the frequency and abundance of snowfalls, on the one hand, and the duration and thickness of the snow cover, on the other, show great variations both in space and time.

The principal factors determining spatial variations in snowfall are altitude and latitude. Altitude appears to be the more important factor, to the degree that the snowfall map, like that of total precipitation, largely replicates the relief map (see Figure 23). The close correlation between altitude and snowfall can be illustrated by a section along the valley of the Harīrūd between Herat and Laʿl (Table 36) or, better still, along a single mountain slope.

The role of latitude is no less obvious; at identical altitudes of 1,300-1,350 meters, two days of snow a year on the average are received at Terīn Kōt (32° 37’ N), fourteen days at Ōbe (34° 22’ N), twenty days at Dar(r)a-ye Ṣūf (35° 55’ N), and twenty-eight days at Darwāz (38° 26’ N). Because of this fact, the snowfall isarithms drop lower toward the north; in Afghanistan the isarithm for twenty days of snow a year, which is at an altitude of 1,800 meters at Kabul (34° 33’ N), thus passes along the northern slopes of the central mountains (Qādes, Dara-ye Ṣūf) at 1,300 meters and along those of the Hindu Kush (Tāloqān, 36° 44’ N) at 800 meters. In western Iran the oblique course of the Zagros chain imposes on this snowfall gradient a northwest-southeast orientation, with, on average, thirty days of snow a year at Tabrīz (1,349 meters, 38° 08’ N), twenty at Arak (1,753 meters, 34° 60’ N), seven at Isfahan (1,570 meters, 32° 19’ N), and three at Yazd (1,230 meters, 31° 54’ N).

On a regional level, the extreme continental climate of lower central Asia disturbs the regularity of this pattern. Because the low-lying plains of Afghan Turkistan and northern Khorasan lie in a zone of very stable winter anticyclonic air, they are so dry that, despite their high latitude, snowfalls are infrequent and the snow cover does not last long below altitudes of 1,200-1,500 meters. This also explains why nomadic wintering is possible in such an area, which is obviously not warm land (see, for example, Mazār-e Šarīf, Table 36).

Finally, the role of exposure must be mentioned; it is especially significant in intramontane basins, which are sheltered from moist western winds (the principal carriers of snow) and, for this reason, enjoy abnormally light snowfall: Bāmīān, at an elevation of 2,550 meters, records only twenty-five days with snowfall a year and Zēbāk (2,600 meters) in Badaḵšān only seventeen; furthermore, since the beginning of meteorological observation, the depth of snow cover has never exceeded 11 centimeters at the latter station (70 centimeters at Bāmīān).

Temporal variations in snowfall. These are expressed in both the great irregularity in snowfall from year to year and in the unequal duration of the snowy season. In both instances, altitude remains the determining factor; the lower the altitude and therefore the rarer the snow, the greater the annual variation (Table 36, column 2) and the shorter the snowy season (Table 37).

Up to an altitude of about 2,500 meters, snowfall is spread over five or six months (November to March or April), except along a narrow transitional zone at the edge of the warm lands, where the snow season does not exceed three months (December-February). Occasional snowfalls can, however, take place as early as October, especially in northern latitudes (Afghan Turkistan, northern Khorasan). The snow showers of spring are particularly feared because of the irreparable damage that the snow can cause to young trees. At these moderate altitudes, the maximum snowfall and minimum temperature always coincide; they generally occur in January, except on the Caspian littoral, where both tend to shift into February because of the maritime climate, which moderates early winter temperatures and thus counteracts snowy precipitation. In any case, the snowy season is everywhere interspersed with thaws (described as *barf-ḵōrak* “snow eaters” if they are rainy), which periodically bring about melting of the normally thin snow cover (20-30 centimeters’ normal thickness, with records above one meter). The intermittent presence of snow on the ground is thus the rule here, even though its cumulative duration can be high (an average of six weeks at Kabul, with

recorded extremes of eighty-seven days in 1974-75 and of six days in 1978-79).

Above an altitude of 2,500 meters snowfall conditions change radically. First of all, the snowy season lasts longer, up to more than half the year; it snows frequently until May, and the maximum snowfall occurs toward the end of winter, approaching, even coinciding with, the maximum monthly precipitation. Above 3,000 meters, only the two or three hottest months of the year are without snowfall. On the high southern slopes of the Hindu Kush, exposed to the Indian monsoon (south Sālang), as on the summits of the Alborz (Demāvand, ʿAlamkūh, Sabalān) and the Zagros (Zardkūh), which exceed 4,000 meters, it can snow at any time, including high summer. It is also above 2,500 meters that winter precipitation falls exclusively in solid form and that the persistence of the cold brings with it an uninterrupted snow cover lasting several months. The depth of the snow exceeds 50 centimeters between 2,500 and 3,000 meters and a full meter at higher elevations; drifts can reach more than 10 meters, as on the high plain of Kūhrang in the central Zagros (Preu, p. 54), and as a result avalanches are common.

Finally, at very high altitudes there are perennial snowfields and local glaciers. The snow line is located around 4,150 meters on the northern slopes of the Alborz (Taḵt-e Solaymān) and on the northeast face of Demāvand, 4,500 meters in Azarbaijan (Sabalān), and 4,000-4,200 meters in the central Zagros (Zardkūh, Šīrkūh). In more continental and drier Afghanistan the snowline rises toward 4,600-4,800 meters on the northern slopes of the central Hindu Kush (in the region of the Sālang pass) and 5,000-5,200 meters in its eastern (high Monjān valley, Pamirs) and western (Kūh-e Bābā) parts. On certain well-sheltered shady slopes, however, small cliff glaciers and firns are found at considerably lower altitudes, e.g., 4,200 and 3,500 meters respectively in the Sālang region. On the southern slopes, the snowline is about 400 meters above the levels cited.

Overall, the glaciated area is limited; there are no more than about 3,000 square kilometers of glaciers in Afghanistan (Pulyarkin, p. 6) and still fewer in Iran, where there is only a single valley glacier, the ʿAlamčāl glacier in the Taḵt-e Solaymān massif (Alborz), which is nearly 4 kilometers long at an altitude between 3,900 and 4,200 meters. Flanked entirely by moraines and covered with rocks for almost its entire length, it moves very slowly. It is fed mostly by avalanches and the accumulation of wind-drifted snow.

During the cold periods of the Quaternary, the snow line was located about

1,000 meters lower than the present line, and glaciers had descended as far as 2,300 meters on the northern slopes of the central Hindu Kush, an area which is today entirely within the zone of permanent settlement. The line had even dipped below 2,000 meters on the northern piedmont of the Kermān mountains.

The significant snowfall on the Irano-Afghan highlands imposes serious constraints on their inhabitants. In the mountains, avalanches (*bahman* in Iran, *barfkōč* in Afghanistan) represent a real danger. Because of the generally heavy but brief snowfall and the usually large, bare, and rectangular mountain slopes, which do not hold snow well, avalanches of powdery snow are the most frequent. Avalanches can occur during snowfalls, notably when there is a storm; but they occur most often soon after the snow stops, when it begins to melt and thus becomes heavier on the surface. This type of avalanche can be triggered across wide areas, completely sweeping a slope over more than 1,000 meters. On the other hand, spring avalanches of heavy snow are rarer and channeled through fairly narrow corridors; these are unleashed when the first thaw or interlude of mild, rainy weather loosens the masses of snow accumulated during the winter on the summits of the slopes. In general, avalanches pose a serious threat only at well-defined times of the year; they are rare during the cold, clear, sunny periods of the winter.

In order to shelter caravans from snowstorms and to permit them to wait out series of consecutive avalanches, small “mountain caravansaries” (Siroux, pp. 35ff.) used to be built on the principal routes across the Alborz. Winter traffic, however, always has been quite limited in the mountains, because snow closes the passes from December to April in the Alborz and from October to May in the Hindu Kush. The modern highway network built for automobile traffic has resulted in the construction of tunnels to ensure the permanence of the great road links across the mountains. The one-way tunnel through the Kendovān pass (2,750 meters) was dug in 1937 on the Tehran-Čālūs road. Since 1982, it has been augmented to the east by the tunnels between Tehran and Sārī on the Fīrūzkūh road. In the Hindu Kush, the two-way Sālang tunnel (3,360 meters) between Kabul and Afghan Turkistan was not opened till 1343 Š./1964. Several modern routes have also been provided with protection against avalanches (e.g., the Harāz road between Tehran and Amol in 1964 and the Sālang road). Though, thanks to modern equipment, state authorities can clear the major roads, the same is not true of the secondary road system, which is put back into service each year only after the thaw, often by the users themselves.

The great difficulties in communication caused by snowfall explain why, in winter, village life comes to a standstill in the mountains. Once the livestock are shut up in the stables, peasant communities turn in on themselves and live, for long months, totally cut off from the outside world. Even within the villages the narrow lanes are blocked by snow cleared off the flat roofs, so that tunnels must sometimes be dug out to permit passage from one house to another (Iven, p. 41). Nor are the large cities spared; in Tehran, as in Kabul, it is not rare for heavy snowfall to paralyze traffic and social life totally. This situation seems to reflect not only objective technical difficulties but also mental attitudes rooted in the more or less distant rural past of the great majority of city dwellers.

On the other hand, the heavy mountain snowfall offers decisive advantages for rural life. Snow constitutes an important reservoir of water for the soil and vegetation, while at the same time providing insulation against frost. In contrast to the rainfall, which runs off, melted snow soaks deep into the ground, which is very advantageous for the pasturage and unirrigated cereals. Dry-farmed wheat, whether the winter wheat of Iran or the spring wheat of Afghanistan, given sufficient winter snowfall, can grow properly, even if the spring rains fail. Farther down, along the valleys and on the piedmonts, melting snow swells the rivers and refills the aquifers, which favors spring and even summer irrigation. Overall, it is on winter snowfall, rather than on spring rains, that the level of agricultural production in most of Iran and Afghanistan depends. Popular wisdom aptly celebrates the benefits of snow in a series of sayings, of which the most widespread in Afghanistan conforms to the following pattern: *Kabul* (or whatever other locality) *bī zar šawa(d), bī barf našawa(d),* “Kabul can live without gold, but not without snow.”

Snow itself also plays an important economic role. For centuries it was the sole means of cooling drinks and making sherbets in the large towns of Iran and Afghanistan. Two types of supply traditionally coexisted: In winter snow was collected in urban or suburban snow pits (*barfdān*) or snow caves (*barf-ambār*), where it was preserved until summer; at the same time, the closest mountain firns were exploited, which gave rise to a thriving snow trade from antiquity onward. The towns in Iran and Afghanistan were thus supplied with snow by caravans, traveling for the most part by night to bring snow from neighboring mountains (a maximum distance of 50 to 60 kilometers). Today the construction of commercial ice factories and the spread of refrigerators have ruined this trade (it disappeared around 1960 at Kermānšāh and

Tehran). In the central Alborz, however, snow continued to be used until about 1975 to cool drinks and fruit on festive occasions. Industrial backwardness and limited electrification explain why the snow trade has declined much less in Afghanistan than in Iran; quite recently several large commercial truck delivery routes, originating in the firns of the Sālang pass and radiating out toward Kabul, Jalālābād, and Mazār-e Šarīf have developed.

Another kind of economic exploitation of snow in the form of winter sports for tourists was introduced quite recently in Iran. This business exists only on the southern slopes of the Tehran Alborz, where, after the construction of a snow bowl at Āb-e ʿAlī (ca. 1960), the Iranian Ski Federation undertook the building of genuine ski resorts. First built was the one at Šemšak (1966); then came one at Dīzīn (1970). Both are well-equipped and attract a growing number of sportsmen. The Towčāl massif, which dominates Tehran, has had mechanical ski lifts since 1980. There is nothing comparable in Afghanistan, where the Kabul bourgeoisie is content with the simpler pleasures of tobogganing at Qarḡa, atthe gates of the capital, and where the foreign colony introduced cross-country skiing in the 1970s.

Iranian civilization, in the broad sense, has been ambivalent in relation to snow. Numerous expressions in the spoken language refer to snow, and a rich vocabulary exists for describing its different forms (Dehḵodā, s.v. *barf*); this vernacular vocabulary, often very little known, grows richer, as is logical, the higher the terrain. The word for snow also occurs in the formation of different toponyms (i.e., Barfak, a form in which the suffix *–ak* has a locative sense: “place where there is a great deal of snow”; Barfa, a form probably derived from the preceding one; Barfīān and Barfrīz, forms resulting from commercial exploitation of snow; etc.). The frequent mountain names in Kūh-e Sefīd or Sefīdkūh (Pashto, Spīngar) also refer to it indirectly. It has an important place in folklore related to winter, especially to its beginning, *šab-e čella*. Children also know how to take advantage of it to diversify their games (*barfī kardan* and *barf jangī* “snow fights”; van Oudenhoven, pp. 56, 68). Finally, snow constitutes a recurrent literary theme, notably in classical poetry.

Iranian material culture, on the other hand, shows many signs of failure to adapt to snow. The ubiquity of houses with flat terraced or slightly gabled roofs is a particularly striking example. To prevent roofs from collapsing and water from leaking in, snow must be rapidly cleared away whenever there is a heavy snowfall. This is an arduous task, not without risks, which, in towns, is often performed by laborers hired especially for this purpose (*barfī* in Iran,

barf-pāk in Kabul). Even the most exposed high mountain villages are unacquainted with any form of protection against avalanches. The traditional clothing and means of transport also show no signs of adaptation, except for the existence of special shoes (*mūšag*) and particularly snowshoes, which have been noted among the Hazāra of Šahrestān and their neighbors the Taymanī of Ḡōr (Šahrestānī, pp. 181, 73). It is doubtless significant that the term denoting these last (respectively *čawḡāl* in Šahrestān and *čawḡān* in Taymanī country) is of Turkish, not Iranian origin.

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The data on snow are always very superficial. The absence of any information on the intensity of snowfalls and their cumulative depth prevents calculation of even an approximate proportion of snow in the total monthly or annual precipitation. Furthermore, the exact duration of snow cover on the ground has been recorded only since 1974 in Afghanistan and not at all in Iran. Finally, the single consistently usable figure for the majority of weather stations is the number of days with snowfall. Despite its crude character, it has been used to construct the snowfall map and to define the different types of snowfall systems.

The lack of data doubtless explains why snowfall remains one of the least known chapters in Irano-Afghan climatology. The classic climatic monographs accord it only a few, generally imprecise lines, and none provides a map. Among the most useful on this subject, despite their dates, are: E. Stenz, “Precipitation, Evaporation and Aridity in Afghanistan,” *Acta Geophysica Polonica*

5, 1957, pp. 245-66; and, for its very detailed notes, H.-E. Iven, *DasKlima von Kabul*, Breslau, 1933. The accounts of travelers do not fail to comment on the difficulties encountered because of snow, and an examination of them, as well as of historical chronicles and even diplomatic reports, is very suggestive. A first use of such accounts, still very incomplete, has been made in C. Melville, "Meterological Hazards and Disasters in Iran: A Preliminary Survey to 1950," *Iran* 22, 1984, pp. 113-50 (see especially pp. 136-39). Among studies specifically devoted to snow A. Roch, "Avalanche Danger in Iran," *Journal of Glaciology* 3, 1961, pp. 979-83, and N. Rostaqī and R. V. Tskhvitava, *Arzyābī-e moqaddamātī dar mawred-e ḏaḵāyer-e barfī-e kūhhā-ye Afḡānestān*, Kabul, 1358 Š./1979, can be cited.

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Search terms:

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