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ENVIRONMENTAL PROTECTION
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ENVIRONMENTAL PROTECTION, efforts to protect natural resources, wildlife, and ecosystems and to control pollution in Persia.

i. IN PERSIA

Environmental protection efforts before the 1979 Revolution. In Persia conservation consciousness began, as it so often does, with concern for wildlife. In the absence of protective legislation, the more conspicuous plains species—notably gazelles and the wild ass—had been relentlessly pursued by hunters using Jeeps all too often and were obviously threatened with extinction. The efforts of a group of sportsmen resulted in 1956 in the nation's first conservation law and the creation of the Game Council of Persia (Kānūn-e šekār-e Īrān; Firouz, Hassinger, and Fergusen, p. 37). These measures were soon followed by others: the nationalization of all forest and rangelands in 1963 and of all water resources in 1966. In 1967 the progressive Game and Fish Law (Qānūn-e šekār wa ṣayd), still in effect in 1994, established the Game and Fish Department (Sāzmān-e šekārbānī wa naẓārat bar ṣayd), which was

responsible for wildlife, protected areas, inland fishing, and conservation. It was incorporated into the Department of Environmental Conservation (Sāzmān-e ḥefāẓat-e moḥīṭ-e zīst), established in 1971, which was also responsible for controlling environmental degradation in general. The Environmental Protection and Enhancement Act (Qānūn-e ḥefāẓat wa behsāzī-e moḥīṭ-e zīst) of 1974 created the present Department of the Environment, attached to the office of the prime minister. This legislation recognized the complexity of environmental problems and gave wider authority to the Department of the Environment for control of air and water pollution than is found in many other countries. Apart from administering the Game and Fish Law, the department administered the several categories of protected areas created by the law and all wetlands, including associated outdoor recreation; set emissions and quality standards for air, water, soil, wastes, and noise; oversaw ecosystem protection and the sustainable use of resources; protected natural landscapes; conducted research on the adverse effects of biocides and alternative means of pest control; educated the public in all fields of environmental protection and enhancement; and assisted in the establishment of natural history museums and zoos (Firouz and Wambold, pp. 8-9).

Recent history. After the 1979 revolution, the legacy of environmental protection was also suspect. With law enforcement in disarray, forests and rangelands, including national parks and protected areas, were pillaged and ploughed, and wildlife was massacred. Environmental regulations were often either suspended as unnecessary or rejected by some judiciary courts, factories, poachers, and some of the public. The contraction of the country's economy in subsequent years encouraged the destructive exploitation of the environment and its resources. Most damaging was the explosive growth in population, from 36 million in 1978 to 60 million in 1991. With a growth rate measured in the 1986 census at 3.91percent (*Sāl-nāma-ye āmārī*, 1366 Š./1987, p. 26), among the highest in the world, the population is projected to exceed 75 million by the year 2000. The population explosion has placed a tremendous strain on the environment in both the urban and rural areas. The influx of people into towns and cities has produced uncontrolled urban growth that often uses up scarce agricultural land, unprecedented population densities, air pollution, water shortages and polluted aquifers, and enormous increases in the volume of waste. Green spaces have disappeared, and recreation areas are increasingly threatened. Important sectors such as energy production and industry face environmental problems similar to those in other countries and thus will not be discussed in detail here.

Recognizing the need to deal with these problems through a coordinated national plan and to make wiser use of the country's natural resources and environment, while protecting its cultural heritage, the government has begun some of the programs initiated before the Revolution. The programs had included measures requiring master plans for all urban developments and a "national spatial strategy plan" for the country that were begun in the early to mid-1970s. Similar to the latter and as a result of the resolutions adopted at the Rio Conference of June 1992, sustainable development is putatively slated to be initiated in collaboration with the relevant UN and international agencies.

Pollution. In the major cities of Persia air pollution has become an accepted part of everyday life, and the media have repeatedly stated that Tehran is among the most polluted cities in the world. Emission inventories demonstrate that 70 percent of Tehran's air pollution is from motor vehicles (Sāzmān, *Āmār-e ālūdagī*; Firouz and Wambold, pp. 17-18). Structural measures to improve traffic, the use of natural gas in homes, industries, and vehicles (especially taxis, and the expansion of public transport to include a subway and additional buses) were among the measures proposed, begun, or implemented in the mid- to late-1970s (Plan and Budget Organization, pp. 314-15). The increased pollution of the 1980s created political pressure for remedial action, and by the early 1990s some of these measures had been undertaken; however, the project for the conversion of taxis to gasoline has yet to be broadly implemented (*Rūz-nāma-ye rasmī*, p. 9). But the capital's population had doubled in the previous dozen years to about 9 million, and abating the truly hazardous pollution had become increasingly difficult. More than a million pre-revolutionary vehicles were still on the road; simply requiring proper servicing of these vehicles would probably reduce pollution by more than the sum of all other efforts. Although industrial air pollution is so far only a problem near particular plants, it threatens to become critical on a national level if existing regulations are not enforced and standards of monitoring and site selection are not firmly imposed.

In an arid land such as Persia water is obviously a precious natural resource, yet, in practice, it is treated as a product "to be managed according to user's needs" (Plan and Budget Organization, p. 319). Inefficient and often excessive irrigation subjects much farmland to salinization; the resultant saline runoff harms downstream areas as well. The indiscriminate sinking of wells in the past decade has dangerously lowered the water table in regions such as Khorasan. Tehran, its population rising implacably toward 12 and 13 million,

requires more than double the 500 million cubic m per year of treated water it received on average through the 1980s. Plans are underway to bring some of the needed water from the central Caspian region. But urbanization of parts of the central Caspian region—a reasonably plentiful supply of water notwithstanding—is threatening that region with water shortage too. Furthermore, raw sewage there is dumped into wells, although the water table is often only about a meter below ground level. This state of affairs threatens to cause irreversible pollution of groundwater.

Appropriate pollution-control laws and regulations are in force, but their application is haphazard and invariably directed at point sources, particularly industrial plants. For example, in 1991 a fine of $3.5 million was imposed on a sugar factory whose effluents had badly contaminated the Zarrīnarūd. But little effort is made to exert comprehensive control over urban or agricultural units.

Soils and agriculture. Persia's cultivable land is estimated to be 16.6 million hectares (Plan and Budget Organization, 1976, Pers., *ḵolāṣa*, p. 114), 10 percent of the area of the country, or slightly less than the area presently under cultivation. This is 0.25 hectares per person compared to 0.48 in Turkey and 0.74 in the United States (World Resources Institute, pp. 294-95). Per capita cultivable land in Persia is thus very low and is diminishing proportionately to the rapidly expanding population. In a television broadcast in November 1991, it was stated by the agricultural-planning task force of the second five year plan (*setād-e barnāma-rīzī-e kešāvarzī-e barnāma-ye panj-sāla-ye dowwom*) that the country's agricultural capacity could presently supply the needs of a population of 45 million and, with the application of the best agricultural techniques, could support no more than 67 million.

Soil loss through erosion is very great in Persia due to destructive practices such as ploughing slopes against contour lines, irrigating with erosive gravity techniques and destroying natural plant cover, and overgrazing (Plate I and Plate II). Soil loss is estimated to exceed 1.5 billion tons per annum, equivalent to the loss of 400,000 hectares of farmland (Ḡarawī, p. 12). Virtually all of the country's artificial lakes are rapidly filling with silt. Thirty years after the completion of the Safīdrūd dam more than half of the reservoir's capacity of 1.8 billion cubic m is filled with sediments (Reynolds, p. 5). The loss of storage capacity has already compromised the function of the reservoir for irrigation and power and threatens to terminate, within ten to fifteen years, the project's usefulness.

Destruction and protection of forests, rangelands, and wildlife. Situated in the Palearctic faunal region, tangential to the Oriental and within the influence of the Ethiopian region, Persia also comprises four phytogeographical regions: Irano-Turanian, Euro-Siberian, Saharo-Arabian, and Sudanian. Persia is one of the large speciation centers of the Holarctic desert and mountain flora, and its great variety of fauna and flora is thus not surprising. Scientists have recorded 149 species of mammals (Żīāʾī); 501 species of birds (Reports accessible at the Department of the environment), and about 150 species of freshwater fish (Coad). The number of plant species is variously estimated at between eight and ten thousand.

The appreciation of wildlife and the importance of the conservation of natural resources that emerged in the 1970s was not sustained in the early post-revolutionary period. Despite Art. 50 of the new Constitution making the protection of the environment a public duty and prohibiting pollution and despoliation, there was little sign of environmental awareness within the public sector until the late 1980s. Of greatest concern is the destruction of ecosystems. Earlier, the alteration of a specific plant community might have required centuries, but the rampant population growth and the abusive utilization of technology have provoked radical transformations in a mere decade.

From the steppic pistachio and almond forests of the southeast to the oak forests of the Zagros range and the humid rain forests of the Caspian, the forests of Persia reflect its great ecological and climatic variations. The immense economical, environmental, and aesthetical value of these forests in an arid country like Persia has often been either ignored or misunderstood. Although the destruction of the Persian forests began millenia ago, the recent acceleration of this trend has been devastating. In 1942 the area of the Zagros forests was estimated at 10 million hectares; in 1961, 5 million; in 1970, 3.5 million (Moḥammadī, p. 13; Rīāżī, p. 31); and in 1991, according to all indications from forestry personnel, less than one million hectares remains of what can barely be described as forest. The Caspian forests, unique among the temperate forests of the world and in part a legacy of the Tertiary period, are disappearing with alarming rapidity. A survey conducted in 1975 showed an area of 1.84 million hectares of prime forest (*Sāl-nāma-ye āmārī*, 1362 Š./1983, p. 328); according to forestry experts, more than three quarters of this area has been destroyed since the 1980s. This is a staggering loss, apart from devastating damage to watersheds and the resultant soil erosion and floods.

The Caspian rain forests, unlike the Zagros forests, are commercially valuable; timber valued at billions of dollars, which could have been a sustainable resource, has been lost.

Ironically, during the 1980s more than 100,000 hectares were reforested at great expense, while several million hectares of natural forest were being eradicated. By 1991 the Ministry of Reconstruction (Wezārat-e jehād-e sāzandagī), newly responsible for forests and rangelands, had begun a drive, supported by the media, to halt the destruction of forests and rangeland (Plate III). Notwithstanding this, however, it has now become apparent that 300,000 ha of forest land were transferred to private ownership in the course of the first five-year plan (1989-94); another 300,000 ha of forest will be privatized in the course of the next five-year plan. A similar program is being implemented with respect to rangeland, and it would appear that several million hectares of rangeland is being, and will be, privatized within the same period. The justification for this program appears to be an increase in agricultural production, but experts agree (ref. Behbahānī, Ašrafī, and Jalālī, p. 54; Šeydāʾī and Neʿmatī, p. 236) that, on the one hand, it will actually result in a net economic loss (i.e., reduced yield) and, on the other, that the ecological consequences will be irreversible damage to watersheds, accelerated erosion, and the destruction of valuable ecosystems.

Rangelands, which formerly comprised more than 60 percent of Persia, have also been destroyed on an unprecedented scale. Rangeland production in 1970 was estimated to be 20 million tons of forage per year (Niknam, pp. 35-39), which was inadequate for the number of grazing animals in the country. The policy in the mid-1970s was to ensure pasture recovery through both better control and reduction of grazing, as well as incorporation of grazing animals into fodder-growing agricultural units. An estimate made in 1983 (Naẓarī, p. 17) showed forage production to have decreased to about 10 million tons per annum, i.e., half the amount it had been thirteen years before. Yet very little additional fodder was provided by the agricultural sector. In another estimate made in 1990 it is demonstrated that the population of domestic grazing animals in Persia exceeds pasture capacity by a factor of four (Rīāżī, p. 35). Excessive grazing, the cutting of vegetation, and the indiscriminate ploughing of range for dry farming on land invariably ill-suited for the purpose are the main practices leading to rangeland destruction. The result has been the total loss of vegetation over wide areas, desertification, erosion, floods, and dust storms (Plate IV).

Parks and protected areas. The areas that Persia began protecting in the late 1950s (Firouz and Harrington, p. 8) had been incorporated by 1976-77 into one of the most comprehensive programs for nature conservation in Asia and the Middle East. The Department of the Environment placed great emphasis on natural processes and on minimizing human interference with nature. The reserves were developed strictly on an ecological basis. The Department of the Environment's strategy was to establish priority-use reserves to protect renewable natural resources, viable remnants of Persian ecosystems, and endangered or threatened species of fauna and flora (Firouz, 1974, pp. 33-42). By the mid-1970s there were eleven national parks, twenty wildlife refuges, twenty-three protected areas, and two national nature monuments, totalling an area of about 7.5 million hectares. Eight of these reserves were selected as part of UNESCO's biosphere reserves (Firouz and Wambold, p. 26-34). Serious harm was done to the various reserves after the Revolution. By the time the authorities reacted, many of the areas had been damaged or altered beyond recall. The area of these reserves in 1991 was slightly greater than before 1977, with seven national parks, twenty-three wildlife refuges, thirty-eight protected areas, and four national nature monuments (Department of the Environment, "Manāṭeq-e taḥt-e ḥefāẓat-e moḥīṭ-e zīst/Map and Tabulation," Tehran, 1367 Š./1988), but the majority of them are neglected. Often there is little control by wardens, and most of the reserves have minimal restrictions on the grazing of domestic sheep and goats (Bayāt et al., 1984, p. 37; 1985, pp. 91-94; Majnūnīān).

Persia has some of the finest wetlands in Southwest Asia, all of which came under the jurisdiction of the Department of the environment. Eighteen were designated as wetlands of international importance and listed at the ratification of the Rāmsar Convention in 1975. Although this treaty is still in force, a number of these wetlands have been subjected to ecological disturbance and one, the 10,000 hectare Kamjān marsh in Fārs province, no longer exists (Darrašūrī, pp. 31-32; International Union, pp. 181-201). Error and neglect notwithstanding, Persia remains a leader in comparison to other countries in its region in the domain of nature reserves.

Wildlife. When the system of nature reserves was being established, the initial strategy was to make certain that viable remnants of each species remained in the reserves. Endangered and rare species were fully protected. By the early 1970s no existing species was deemed truly endangered (Firouz and Wambold p. 35). But for the reserve system and the dedication of the environmental wardens and guards, dozens (if not hundreds) of species of mammals, birds,

fish, reptiles, and plants would probably have become extinct. Among the more dramatic successes were the protection of the Persian fallow deer (*Dama mesopotamica*, Plate V), the cheetah (*Acinonyx jubatus*, Plate VI), the Caucasian black grouse (*Tetrao mlokosiewiczi*), and the great bustard (*Otis tarda*; Firouz, 1974, pp. 33-37; 1976, pp. 37-39). By 1991 many species were once again threatened. Departmental experts estimate that there are less than fifty cheetahs, a vulnerable species wherever it still occurs in the world, as against 350 in the 1970s (Ḵalīlī, p. 6). Other mammals threatened by habitat destruction and/or hunting are the Baluchestan black bear (*Selenarctos thibetanus*), Blanford's fox (*Vulpes cana*), the Manul cat (*Felis manul*), and the honey badger (*Mellivora capensis*). Many species of birds are becoming rare or threatened: the peregrine falcon (*Falco peregrinus*), the previously abundant white-tailed eagle (*Haliaeetus albicilla*), and the three species of bustards, to name only a few of the more prominent ones. Habitat destruction in particular and also hunting, pollution, and pesticides are the main factors for such declines and for the great decrease of many other species of waterfowl and passerines. Evidently, various species of fish and reptiles are suffering similar decline (Plate VII and PLATE VIII).

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(ESKANDAR FIROUZ)

ii. ENVIRONMENTAL PROTECTION IN AFGHANISTAN

A policy of systematic environmental protection began to appear in Afghanistan only in the 1970s. It was officially managed by the Department of Forests and Range of the Ministry of Agriculture, within which a Directorate of

Wildlife and National Parks was established in 1352 Š./1973. However, elementary concern about environmental protection, mainly wild game, dates back to earlier times in the form of small royal hunting reserves which were established during the reign of Moḥammad-Ẓāher Shah (1312-52 Š./1933-73). In these areas not only hunting, but also settlement, agricultural land use, and grazing were restricted under military protection. Two phases in the history of environmental protection in Afghanistan must therefore be distinguished: a pre-modern phase, dominated by royal initiatives, enforced by military power, and restricted to hunting purposes; and a modern one, based on legal procedures, more ambitious in scope, but not more successful in its results, which eventually ended with the war of the 1980s. The Afghan environment, especially the wooded areas, has been severely damaged during the last fifteen years.

Pre-modern environmental protection. The first royal hunting reserve was Kōl-e Ḥešmat Khan, a small (191 ha) lake on the southeastern outskirts of Kabul, which attracts from March to November large numbers of long-distance migratory waterfowl (mainly ducks, teals, coots, and wayders, but also spoonbills, pelicans, etc.). It was declared a waterfowl reserve in the 1930s (Rahim and Larsson). A second royal hunting reserve was established about 1955 in the Ajar valley (Darra-ye Ajar) of Hazārajāt, some 55 km northwest of Bāmīān (q.v). This 50,000 hectare area has an abundant population of big herbivores (ibex [*Capra ibex*] and urial [*Ovis orientalis*], along with the introduced Bactrian deer and feral yak) and their carnivore predators (snow leopard [*Panthera uncia*], leopard [*Panthera pardus*], lynx [*Felis lynx*], and wolf [*Canis lupus*Cervus elaphus bactrianus) and pheasant (*Phasianus colchicus bianchii*) live, were also declared as royal hunting reserves, but they were never officially gazetted, and after the fall of the monarchy became occupied by settlers (Sayer and van der Zon, I, p. 99). A last royal hunting reserve was established in the Tulibay valley of the Pamir, the use of which was granted by the Afghan Tourist Organization in 1347 Š./1968 (Petocz. p. 7). The area is particularly notable for its populations of Marco Polo sheep (*Ovis ammon poloi*) and Siberian ibex (*Capra ibex sibericus*).

New environmental policy. In the 1970s a systematic schedule of natural sites to be protected was established at the instigation of the United Nations Development Programme (Wildlife Preservation Project AFG/74/016). Uniqueness, representativeness, diversity, and size were reckoned as the main criteria to select the areas to be protected (Sayer and van der Zon, I, p. 80). Two

different categories of protected areas were consequently designated: large natural parks and smaller wildlife reserves. In both cases the aim was to utilize and maintain ecological potential by ensuring that the wildlife, particularly big fauna, thrive in a ecological framework in harmony with human population. This goal implies that any human usage which shows a deleterious effect on the environment should be excluded. The application of these principles has been very slow, however. The Band-e Amīr lakes (q.v.), with their unique scenery and important waterfowl habitat, were declared Afghanistan's first national park on 8 Mīzān 1351 Š./30 September, 1973, at the instigation of the Afghan Tourist Authority, but this decision was never formally gazetted by the Ministry of Justice, nor were the boundaries of the park clearly defined. Therefore, given inadequate jurisdiction and lack of legislation and the ecological degradation by residents and tourists actually allowed to proceed unchecked (duck hunting, cutting of water-reeds, extensive shrub collection for fuel, overgrazing, rock quarrying), the area has never met the international standards for a national park. When, in spring 1977, the Department of Forests and Range sent a letter to the local authorities stating that all farming was to be declared illegal within 5 km of the lakes, the directive was ignored by the population (Shank and Larsson). Āb-e Estāda (see ĀB-E ĪSTĀDA), about 130 km south of Ḡaznī, and Dašt-e Nāwor (q.v.), about 55 km west of Ḡaznī, are two large shallow perennial alkaline lakes which are important breeding places of the greater flamingo (*Phoenicopterus ruber roseus*, 1-2 percent of the world's population), avocet, redshank, greater sandplover, and common tern, as well as important halting places for almost fifty species of migratory waders and shorebirds, including, in the case of Āb-e Estāda, the near-extinct Siberian crane (*Grus leucogeranus)*, 33 cranes sited in 1980. The lakes were posted as National Flamingo and Waterfowl Sanctuaries in 1353 Š./1974 and gazetted on 16 Jawzā 1356 Š./6 June 1977. Ill-trained guards were stationed in both areas during the summer months to prevent hunting, egg-collecting, farming, and grazing, with little effect, if any (Shank and Rodenburg).

Two other wildlife reserves, both originating from former royal hunting reserves, were gazetted on 19 Sonbola 1357 Š./10 September 1978: the Big Pāmīr reserve, with an area of 67,938 ha, which significantly expanded the former royal hunting reserve; and the Ajar valley, which covers the same area as the former royal hunting reserve. The latter has certainly been the best managed of all protected areas in the country. In both areas, however, problems of competition in grazing by domestic stock and uncontrolled

hunting occur. Other wildlife reserves were suggested, but decisions were postponed due to the collapse of central authority after 1978. Besides the Darqad and Emām Ṣāḥeb former royal hunting reserves, suggested sites included the Hāmūn-e Pūzak (Sīstān), the most important wetlands of Afghanistan with the largest number of wintering waterfowl; Nūrestān, which has the least distributed conifer and hardwood forests of the country, species-rich ecosystems, and a significant population of spectacular large mammals (the endangered *mārḵor* [*Capra falconeri*], Himalayan black bear [*Selenarctos thibetanus*], and snow leopard, with many other oriental mammals having their westernmost habitat here; Petocz and Larsson); the Rēgestān desert of southern Afghanistan, already heavily overgrazed and overhunted; and a representative area of the northwestern *Artemisia* steppe and *Pistacia vera* woodlands, the habitat of the urial, Persian wild goat (*Capra aegragus*), and endangered wild ass (*Equus hemionus kulan*

In spite of their great economic importance and steady deterioration, the rangelands and forests of Afghanistan seem to have benefited much less from protective measures than its wild fauna have (Fischer). A draft forest law exists but has never been legislated. A range law was issued on 19 Ḥūt 1350 Š./10 March 1970, but it contains no practical provision for a conservation strategy. The only effectively protected forest in the 1970s was the magnificent Mandaher state forest (5,000 ha, mainly cedars), on the western side of the Paywār pass (Paktīā). It is reported to have heavily suffered during the subsequent war years. As far as the protection of the rangelands is concerned, almost nothing has been done besides the creation of nine experimental range improvement stations (Tonchev, pp. 14 ff.). An integrated rangeland development plan for Herat province was being prepared in the late 1970s with a view to encourage a more concerned use of grazing resources, but it was never finalized (McArthur, Sayad, and Nawin). Desertification through overgrazing and shrub collection, therefore, remains a major threat throughout the country.

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