

World Heritage Sites

Protected Areas and World Heritage



NANDA DEVI & VALLEY OF FLOWERS NATIONAL PARKS INDIA

Nanda Devi National Park is one of the most spectacular wilderness areas in the Himalayas. It is dominated by the 7,800m peak of Nanda Devi, India's second highest mountain which is approached through the Rishi Ganga gorge, one of the deepest in the world. No humans live in the Park which has remained more or less intact because of its rugged inaccessibility. It has a very diverse flora and is the habitat of several endangered mammal: the snow leopard, serow, Himalayan musk deer and bharal.

The Valley of Flowers National Park nearby protects one of the most beautiful mountain wildernesses of the western Himalayas, celebrated for its meadows of endemic alpine flowers where more than 600 Himalayan species grow in an area of less than 2,500 hectares. It is also the habitat of the snow leopard, Asiatic black bear, brown bear, Himalayan musk deer and bharal. Together, the parks preserve a transition zone between the eastern and western Himalayan flora, the Zaskar mountains and the Great Himalayas, long praised in Hindu mythology and for over a century by botanists and mountaineers.

COUNTRY

India

NAME

Nanda Devi & Valley of Flowers National Park

NATURAL WORLD HERITAGE SERIAL SITE

1988: Nanda Devi National Park inscribed on the World Heritage List under Natural Criteria vii and x.

2005: Extended to include the Valley of Flowers National Park under the same criteria.

STATEMENT OF OUTSTANDING UNIVERSAL VALUE [pending]

The UNESCO World Heritage Committee issued the following statement at the time of inscription:

Justification for Inscription

Criterion (vii): The Valley of Flowers is an outstandingly beautiful high-altitude Himalayan valley that has been acknowledged as such by renowned mountaineers and botanists in literature for over a century and in Hindu mythology for much longer. Its 'gentle' landscape, breath-takingly beautiful meadows of alpine flowers and ease of access complement the rugged, mountain wilderness for which the inner basin of Nanda Devi National Park is renowned.

Criterion (x): The Valley of Flowers is internationally important on account of its diverse alpine flora, representative of the West Himalaya biogeographic zone. The rich diversity of species reflects the valley's location within a transition zone between the Zaskar and Great Himalaya ranges to the north and south, respectively, and between the Eastern and Western Himalaya flora. A number of plant species are internationally threatened, several have not been recorded from elsewhere in Uttaranchal and two have not been recorded in Nanda Devi National Park. The diversity of threatened species of medicinal plants is higher than has been recorded in other Indian Himalayan protected areas. The entire Nanda Devi Biosphere Reserve lies within the Western Himalayas Endemic Bird Area (EBA). Seven restricted-range bird species are endemic to this part of the EBA.

INTERNATIONAL DESIGNATIONS

2004: Both Parks designated as core zones of Nanda Devi Biosphere Reserve under the UNESCO Man and Biosphere Programme (586,069ha).

IUCN MANAGEMENT CATEGORY

Nanda Devi National Park:

Ia Strict Nature Reserve

Valley Of Flowers National Park:

II National Park

BIOGEOGRAPHICAL PROVINCE

Himalayan Highlands (2.38.12)

GEOGRAPHICAL LOCATION

Nanda Devi National Park lies in eastern Uttaranchal State, near the Tibetan border in the Garhwal (western) Himalaya, 300 km northeast of Delhi. The main entrance to the Park is via Lata and Tolma villages, 25 km and 31 km east of Joshimath township. It leads through the almost inaccessible gorge of Rishi Ganga to a basin surrounded by high mountain ridges and peaks except to the west, lying between 30° 16' to 30° 32'N and 79° 44' to 80° 02'E. The Valley of Flowers is in the Paspawati valley 23 km north-northwest of Nanda Devi Park, It lies between 30° 41' to 30° 48'N and 79° 33' to 79° 46'E.

DATES AND HISTORY OF ESTABLISHMENT

- 1862: The Paspawati valley was discovered by Col. Edmund Smyth;
- 1931: The valley visited by the climber F. Smythe who wrote a book publicising the "Valley of Flowers";
- 1936: The upper Nanda Devi basin was reached and described by mountaineers E. Shipton & N. Odell who climbed Nanda Devi;
- 1939: The basin established as the Nanda Devi Game Sanctuary by Government Order 1493/XIV- 28 of 7/01;
- 1962: Border disputes closed the area to traffic, altering the local economy;
- 1974-82: The Sanctuary was opened to mountaineering but the ensuing degradation led to its closure to all users;
- 1980: The Park was established as Sanjay Gandhi National Park by Notification 3912/ XIV 3-35-80; grazing and mountaineering stopped;
- 1980: The Valley of Flowers was declared a National Park by Government Order 4278/XIV-3-66-80 under the provisions of the Wildlife Protection Act of 1972, for the conservation of its flora;
- 1982: The Park was renamed Nanda Devi National Park;
- 1988: The Nanda Devi National Biosphere Reserve established (223,674 ha) with the National Park as core zone (62,462 ha) and a 514,857 ha buffer area surrounding both sites; restrictions were imposed on the rights of nearby villagers;
- 2000: The Biosphere Reserve extended by the government to 586,069 ha and the Valley of Flowers National Park was added as the second core zone (62,462 ha+ 8,750 ha, totalling core areas of 71,212 ha);
- 2004: The two core zones and buffer zone designated a UNESCO MAB Reserve.

LAND TENURE

Uttaranchal State in Chamoli District. Administered by the Uttaranchal State Forestry Department of the national Ministry of Environment and Forests.

AREAS

The total area is 71,783 ha: Nanda Devi: 63,033 ha + Valley of Flowers: 8,750 ha. The Parks share a 514,246 ha buffer zone within the Biosphere Reserve which is not within the World Heritage site.

ALTITUDE

Nanda Devi: 1,900m (lower Rishi Gorge), 2,100m (the basin) - 7,817m (Nanda Devi West).

Valley of Flowers: 3,350m (valley floor) to 6,708m (Gauri Parbat).

PHYSICAL FEATURES

Nanda Devi:

The Park is in the catchment basin of the Rishi Ganga, an eastern tributary of the Dhaulti Ganga which flows into a major tributary of the Ganges, the Alaknanda River, at Joshimath. The area is a vast glacial basin, divided by a series of parallel north-south oriented ridges. These rise to the encircling mountain rim formed by sixteen peaks above 6,000m. The best known of these are Dunagiri (7,056m) and Kalanka (6,931m) to the north, Nanda Devi East (7,434m) on the eastern rim, Nanda Khat (6,811) in

the southeast and Trisul (7,127m) in the southwest. Nanda Devi West lies on a short ridge projecting from Nanda Devi East into the basin. It is India's second highest mountain. The upper Rishi Valley, known as the Inner Sanctuary, is fed by the Changbang, North Rishi and North Nanda Devi glaciers from the north and by the South Nanda Devi and South Rishi glaciers from the south. An impressive gorge cuts through the Devistan-Rishikot ridge below the confluence of the North and South Rishi rivers. The Trisuli and Ramani glaciers flow into the lower Rishi Valley or Outer Sanctuary, below which the Rishi Ganga enters the narrow, deep, steep-sided and virtually inaccessible lower gorge (Lavkumar, 1979).

The basin displays an array of periglacial and glacial forms which cover a wide range of phases of growth. The combinations of normal and perched glaciers on different rock types add to the interest of the basin (T. Reed, pers. comm., 1988). Most of the Park falls within the central crystallines, a zone of young granites and metamorphic rocks. Along the northern edge the Tibetan-Tethys is exposed, consisting of sandstones, micaceous quartzite, limestones and shales (Kumar & Sah, 1986). The Tethys sediments form Nanda Devi itself and with many of the surrounding peaks, displays spectacular folding and evidence of thrust movements, while other mountains like Changbang are granite (M. Searle, pers. comm., 1988). The crystalline rocks of the Vaikrita Group and lower part of the Tethys sediments have been tentatively subdivided into four, the Lata, Ramani, Kharapatal and Martoli formations (Maruo, 1979). Further geological details are given by Lamba (1987).

The Valley of Flowers:

The Valley is 20 km northwest of Nanda Devi National Park across the wide valley of the Bhiundhar Ganga. It is one of two hanging valleys lying at the head of the Bhiundhar valley, the other being the shorter Hemkund valley which runs parallel some 10 km south. It runs east-west approximately 15 km by an average of 6 km wide, in the basin of the Paspawati river, a small tributary flowing from the Tipra glacier which descends from Gauri Parbat in the east. Its central valley, lying at about 3,500m, is a gently inclined basin of some 1,000 hectares of alpine meadows, known as the Kundalinisen plateau, the forested slopes of which rise sharply through moraines to rocky ridges, perpetually snow-covered peaks and glaciers which together cover 73% of the valley. Alpine meadows cover 21% and forests 6% of the rest. The high surrounding mountains are not impassable and open to the south at Ghangrea (3,072m), 7 km downstream. There, the Paspawati meets the Lakshman Ganga, becoming the Bhiundhar Ganga which flows 15 km to Govindghat at its confluence with the Alaknanda, a tributary of the Ganges. The main surrounding peaks are Nar Parbat (5,245m) to the northwest, Nilgiri Parbat (6,479m) to the north, Rataban (6,126m) across the Bhiundhar Pass, with Gauri Parbat (6,708m) to the east and Saptasring (5,038) to the south. The Lakshman Ganga flows from Lokpal lake (4,150m) in the Hemkund valley, a much visited place of pilgrimage. The well exposed bedrock comprises crystallines of the Vaikrita group with sedimentary, mica schist and shale rocks. The soils are acidic and retain moisture well.

CLIMATE

Being an inner Himalayan valley, the Nanda Devi Basin has a distinctive microclimate. Conditions are generally dry with low annual precipitation, but there is heavy monsoon rainfall from late June to early September. Prevailing mist and low cloud during the monsoon keeps the soil moist, hence the vegetation is lusher than is usual in the drier inner Himalayan valleys. From mid April to June temperatures are moderate to cool (19°C maximum). The Valley of Flowers also has the microclimate of an enclosed inner Himalayan valley, and is shielded from the full impact of the southwest summer monsoon by the Greater Himalaya range to its south. There is often dense fog and rain especially during the late summer monsoon. Both Basin and Valley are usually snow-bound for six to seven months between late October and late March, the snow accumulating deeper and at lower altitudes on the shadowed southern than on the northern side of the valleys (Lavkumar, 1979; Lamba, 1987).

VEGETATION

Nanda Devi:

Forests are restricted largely to the Rishi Gorge and are dominated by West Himalayan fir *Abies pindrow* and *Rhododendron campanulatum* with Himalayan birch *Betula utilis* up to about 3,350m. Forming a broad belt between these and the alpine meadows is birch forest, with an understorey of rhododendron. Conditions are drier within the inner basin becoming almost xeric up the main glaciers. Beyond Ramani, the vegetation changes from forest to dry alpine communities, with scrub juniper *Juniperus pseudosabina* becoming the dominant cover. With altitude, junipers give way to grasses, prone mosses and lichens, and on riverine soils to annual herbs and dwarf willow *Salix* spp. Woody

vegetation extends along the sides of the main glaciers before changing gradually to squat alpiners and lichens (Lavkumar, 1979; Hajra, 1983a).

A floristic analysis of the area based on the 1993 Nanda Devi Scientific and Ecological Expedition is given by Balodi (1993). A total of 312 species, distributed over 199 genera and 81 families, has been recorded and preserved in the herbarium of the Northern Circle Botanical Survey of India. At least 17 of these are considered rare (Hajra, 1983a). Not in this list is *Saussurea sudhanshui*, newly described from the area (Hajra, 1983b). Within the larger area of the Biosphere Reserve some 793 species from 400 genera and 120 families were listed by the 1993 Nanda Devi Scientific and Ecological Expedition (Hajra & Balodi, 1995). 8 nationally threatened species recorded include *Nardostachys grandiflora*, *Picrohiza kurroa* (VU), *Cypripedium elegans*, *C. himalaicum*, *Dioscorea deltoidea* (VU) and *Allium stracheyi* (VU). Local people use a total of 97 species, 17 for medicine, 55 as food plants, 15 as fodder, 16 for fuel, 5 for tools, 8 for house building, 2 as fibres, 6 for miscellaneous uses, and 11 for religious purposes.

The Valley of Flowers:

The valley has an unusually rich flora of over 600 species with many rarities. It lies in a transitional area between the Great Himalaya and Zaskar Mountains, also between the eastern and western Himalayan phytographic regions, and has several ecological zones which contribute to the valley's unusually rich flora. These comprise 25% of the vascular plants found in the Chamoli district though the valley is only 1.3% of its area. The valley has three main vegetation zones: sub-alpine between 3,200m and 3,500m which is the limit for trees, lower alpine between 3,500m and 3,700m, and higher alpine above 3,700m. The habitats include valley bottom, river bed, small forests, meadows, eroded, scrubby and stable slopes, moraine, plateau, bogs, stone desert and caves. The lower surrounding hills in the buffer zone are thickly forested. The Forest Research Institute in 1992 recorded 600 species of angiosperms and 30 pteridophytes in the valley and surroundings, discovering 58 new records for the valley of which 4 were new for Himalayan Uttar Pradesh. Of these plants, 5 out of 6 species globally threatened are not found in Nanda Devi National Park or elsewhere in Uttaranchal: *Aconitum falconeri*, *A. balfourii*, Himalayan maple *Acer caesium*, the blue Himalayan poppy *Mecanopsis aculeate* and *Saussurea atkinsoni* (Green & Peard, 2005). 31 species are classified as nationally rare. The dominant family is the Asteraceae with 62 species. 45 medicinal plants are used by local villagers and several species, such as *Saussurea obvallata* (*brahmakamal*) are collected as religious offerings to Nanda Devi and other deities. The site is designated a Centre of Plant Diversity.

Characteristic of the sub-alpine zone are high altitude forests which help to retain moisture and snow and support a large number of floral and faunal communities. It is dominated by the uncommon Himalayan maple *Acer caesium* (VU), west Himalayan fir *Abies pindrow*, Himalayan white birch *Betula utilis*, and *Rhododendron campanulatum* with Himalayan yew *Taxus wallichiana*, *Syringa emodi* and *Sorbus lanata*. Some of the common herbs are *Arisaema jacquemontii*, *Boschniakia himalaica*, *Corydalis cashmeriana*, *Polemonium caeruleum*, *Polygonum polystachyum* (a rampant tall weed), *Impatiens sulcata*, *Geranium wallichianum*, *Helinia elliptica*, *Galium aparine*, *Morina longifolia*, *Inula grandiflora*, *Nomochoris oxypetala*, *Anemone rivularis*, *Pedicularis pectinata*, *P. bicornuta*, *Primula denticulate* and *Trillidium govianum*. In trampled areas where past livestock congregated, Himalayan knotweed *Polygonum polystachyum* is a rampant weed.

The valley's lower alpine zone has greater moisture and deeper soil. A large number of herbaceous communities grow in great profusion and it supports the greatest diversity of alpine plants. Characteristic of the zone are dwarf shrubs, cushion herbs, grasses and sedges. Common and singleseed junipers *Juniperus communis* and *J. squamata*, *Rhododendron anthopogon*, *Salix* spp., *Lonicera myrtillus*, *Cotoneaster microphyllus*, and *Rubus ellipticus* are the major shrub species in this zone. The herbaceous flora gives a spectacular multicoloured array of flowers during the growing season. Their growth cycle is very short, and they give way to other communities later in the season. The dominant herbs of this zone are *Potentilla atosanguinea*, *Geranium wallichianum*, *Fritillaria roylei*, *Impatiens sulcata*, *Polygonum polystachyum*, *Angelica archangelica*, *Selinum vaginatum*. The common grasses of the zone are *Danthonia cachemyriana*, *Calamagrostis emodensis*, *Agrostis pilosula* and *Trisetum spicatum*; the main sedge species are *Kobresia roylei* and *Carex nubigena*.

The higher alpine zone is an area of pioneer species dispersed among moraines, boulders, and rocky slopes, dominated by scattered and stunted herbs with delicate flowers, mosses and lichens. The stable slopes on southern aspects typically have meadows of *Kobresia* sedge. On northern aspects and in sheltered areas are extensive shrubby patches of *Rhododendron lepidotum*, *Cassiope fastigiata*

and *Juniperus communis*. The zone's dominant species are *Kobresia royleana*, *Trachydium roylei* and *Danthonia cachemyriana*. There are also several colourful herbs like *Saussurea simpsoniana*, *Potentilla argyrophylla*, *Geum elatum*, *Senecio* spp., *Bistorta affinis*, *Bergenia stracheyi* and the flagship species blue Himalayan poppy *Mecanopsis aculeata*.

FAUNA

Nanda Devi:

An account of the 14 known species of mammals is given by Tak & Lamba (1985) and Lamba (1987), 6 being nationally endangered. The basin is renowned for the abundance of its ungulate populations, notably bharal or blue sheep *Pseudois nayaur*, estimated to number 820 in 1977 (Lavkumar, 1979), 440 in 1981-84 (Tak & Lamba, 1985) but 990 were sighted in 1993 (Shankaran). Preliminary surveys suggest that Himalayan musk deer *Moschus leucogaster*, Himalayan serow *Capricornus thar* and Himalayan tahr *Hemitragus jemlahicus*, are also common (Lavkumar, 1979; Tak & Lamba, 1985; Lamba, 1987), but are probably not as plentiful as they used to be due to hunting (Dang, 1961). However, numbers appear to have increased due to the closure of the Park to human activities since 1983. The Himalayan goral *Nemorhedus goral* does not seem to occur within the basin, although the species does occur near the Park (Tak & Lamba, 1985; Lamba, 1987). Snow leopard *Panthera uncia* (EN) is reported to have been "extraordinarily common" by Dang in 1961. This may reflect the relative ease with which the species is observed here and in the vicinity (Green, 1982) as it is very unlikely that the Park now supports a large snow leopard population because of its comparatively small size and the deep snow in winter (Green, 1988). Other large carnivores are Himalayan black bear *Ursus thibetanus* (VU) and brown bear *Ursus arctos*, the existence of which has yet to be confirmed, and common leopard *Panthera pardus fusca*. The only primate present is northern plains gray langur *Semnopithecus entellus* (Tak & Lamba, 1985; Lamba, 1987) although rhesus macaque *Macaca mulatta* has been sighted outside the Park boundaries. Some 83 animal species were reported from the area of the national Biosphere Reserve by the Indian National MAB Committee.

Shankaran recorded a total of 114 species of birds in 30 families during the 1993 Nanda Devi Scientific and Ecological Expedition. Some 67 of these species were not recorded during earlier surveys. Abundant species recorded during May to June include gray-crested tit *Parus dichrous* yellow-bellied fantail *Rhipidura hypoxantha*, orange-flanked bush-robin *Tarsiger cyanurus*, blue-fronted redstart *Phoenicurus frontalis*, olive-backed pipit *Anthus hodgsoni*, rosy pipit *A. roseatus*, common rosefinch *Carpodacus erythrinus*, and spotted nutcracker *Nucifraga caryocatactes*. Species richness was found to be highest in the temperate forests, with a significant decline in richness as elevation increased. Other expeditions for which bird lists are available include Reed (1979) and Tak & Kumar (1987). Lamba (1987) lists 80 species for the area but the distribution of some of these is restricted to lower altitudes in adjacent areas. Some 546 species are reported from the Biosphere Reserve area by the Indian National MAB Committee.

There is a lack of systematic surveys on invertebrate fauna. Baidur recorded 28 species of butterfly from six families during May-June 1993, including common yellow swallowtail *Papilio machaon*, common blue apollo *Parnassius hardwickei*, dark clouded yellow *Colias electo*, Queen of Spain *Issoria iathonia* and Indian tortoiseshell *Aglais cashmirensis*.

The Valley of Flowers:

The density of wild animals in the Valley is not high but all the animals found are nationally rare or endangered. 13 species of mammals are recorded for the Park and its vicinity although only 9 species have been sighted directly: northern plains gray langur *Semnopithecus entellus*, flying squirrel *Petaurista petaurista*, Himalayan black bear *Ursus thibetanus* (VU), red fox *Vulpes vulpes*, Himalayan weasel *Mustela sibirica*, and Himalayan yellow-throated marten *Martes flavigula*, Himalayan goral *Naemorhedus goral*, Himalayan musk deer *Moschus leucogaster*, Indian chevrotain *Moschiola indica*, Himalayan thar *Hemitragus jemlahicus* (VU) and serow *Capricornis sumatraensis* (VU). The tahr is common, the serow, goral, musk deer and bharal, blue sheep are rare. The common leopard *Panthera pardus* is reported from lower parts of the valley closer to the villages. Local people have also reported evidence of brown bear *Ursus arctos* and bharal or blue sheep *Pseudois nayaur*. A recent faunal survey in October 2004 has established the presence of snow leopard *Panthera uncia* (EN) in the National Park.

The area is within the West Himalayan Endemic Bird Area but there have been no surveys specific to the Valley. 114 species were seen in 1993 in Nanda Devi Park. Species frequently seen in the valley include lammergeier *Gypaetus barbatus*, Himalayan vulture *Gyps himalayensis*, yellow billed and red

billed choughs *Pyrhocorax graculus* and *P. pyrrhocorax*, koklass pheasant *Pucrasia macrolopha*, the nationally listed Himalayan monal pheasant *Lophophorus impejanus*, found in rhododendron thickets, scaly-bellied and yellow-nape woodpeckers *Picus squamatus* and *P. flavinucha*, great and blue-throated barbets *Megalaima virens* and *M. asiatica*, snow pigeon *Columba leuconota* and spotted dove *Stigmatopelia chinensis*. The area is relatively poor in reptiles: most often seen are the high altitude lizard *Agama tuberculata*, Himalayan ground skink *Leiolopisma himalayana* and Himalayan pit viper *Gloydius himalayanus*. Along with the flowers are wild bees and many species of butterfly which need to be more researched. A few of the more evident species are lime butterfly *Papilio demoleus demoleus*, common yellow swallowtail *Papilio machaon*, common mormon *Papilio polytes romulus*, spangle *Papilio protenor protenor* and common blue apollo *Parnassius hardwickei*.

CONSERVATION VALUE

Nanda Devi:

The area is one of the most spectacular wildernesses in the Himalayas. The basin is dominated by the pyramidal peak of Nanda Devi, India's second highest mountain, and drained by the Rishi Ganga which has cut one of the finest gorges in the world (Shipton, 1936; Kaur, 1982). It supports a diverse flora, largely because of the wide altitudinal range, and a number of rare or threatened animals. Unlike many other Himalayan valleys, it is free from human settlement and owing to its inaccessibility has remained largely unspoilt, particularly the forests of the lower Rishi Valley. The *Chipko* campaign made the site a symbol of participatory conservation and ecotourism in India. With the Valley of Flowers it is also a UNESCO Biosphere Reserve.

The Valley of Flowers:

The Valley is one of the two core zones of the Nanda Devi Biosphere Reserve which protects one of the most spectacular mountain wildernesses of the western Himalayas, among which the Paspawati valley is celebrated for its flowers. More than 500 species grow there in an area of less than 2,500 hectares. It is also the habitat of the endangered snow leopard, the serow and rare Himalayan musk deer. The whole area lies within a Conservation International-designated Conservation Hotspot, in a WWF Global 200 Eco-region, is in a WWF/IUCN Centre of Plant Diversity and in one of the world's Endemic Bird Areas.

CULTURAL HERITAGE

Nanda Devi:

Nanda Devi, named after Devi ('goddess'), consort of Shiva, is a manifestation of Parvati and has been revered since ancient times (Reinhard, 1987). Hindus have deified the entire basin and every twelfth year devotees make the Nanda Devi Raj Jat pilgrimage to the foot of Trisul to worship their patroness the 'Bliss-giving Goddess' Nanda Devi (Kaur, 1982). The local people are the *Bhotiya*, an ethnic Tibetan group who lived by trading with Tibet via the Niti valley until the 1962 war with China, by transhumant herding up and down the valley, and on resources from the forests.

The Valley of Flowers:

Seven kilometres south of the Park entrance, at Ghangrea, a track leads off to the Hemkund Sahib shrine sacred to Sikhs, and the Hindu temple to Lakshman, brother of Ram, beside Lake Lokpal. These have long been places of pilgrimage to both Sikhs and Hindus, and 400,000-500,000 pilgrims visit them every year. The valley itself was formerly used by migratory villagers for grazing two to three herds of 700-1,000 sheep and goats each and for 40-50 local cows and buffaloes. In 1862 the valley was chanced on by Col. Edmund Smyth who praised the floral beauty of the region in various periodicals. This attracted Dr. T.G. Longstaff and A.L. Mumm to the Bhuyundar Valley in 1907. It was also found by the mountaineers F. Smythe and R. Holdsworth in 1931 while coming down from an expedition to Mt. Kamet. In 1937 Smythe revisited the valley and next year published *The Valley of Flowers*, bringing it to world attention. There is the tombstone of a botanist from Kew, Margrett Legge, who died here in 1939.

LOCAL HUMAN POPULATION

Nanda Devi:

The Park is uninhabited but the buffer zone is home to 19 communities, five in permanent and 14 transhumant settlements. The most prominent villages are Reni and Lata (114 families), on the north-western side, and in the Niti valley there are eight other villages, totalling 2,250 residents in 1997. 17 of these are inhabited by the Indo-Mongoloid *Bhotiya* tribe who comprise *marchhas* (traders) and *tolchhyas* (farmers) who practise rain-fed subsistence farming, make products from wool, draw resources from the forest and, before the area was closed off, grazed 4,000 goats and sheep in the alpine pastures of Dharansi and Dibruggheta (Lavkumar, 1979). In 1974 proposed Forestry Department

clear-cutting of the local trees in Reni prompted the famous *Chipko* (hug the trees) movement among the villagers led by Gauri Devi, which spread across the region, halting government efforts to harvest the trees. The *marchhas*, no longer traders with Tibet, turned to a living as porters and guides. When the National Park was created in 1982 it was closed to all users, denying the villagers this trade as well as use of their native resources, which caused hardship and much resentment.

When the Biosphere Reserve was created in 1988, restrictions were extended to the buffer zone without prior consultation with the communities affected. Owing to their apprehensions about the Reserve there was a concerted protest from ten villages in the Niti valley in 1998 led by the villagers of Lata in the *Jhapto Cheeno* (swoop and grab) movement, against the Reserve management and the Forestry Department's restrictions on mountaineering and grazing. In 2001 the Lata village council, set up the Nanda Devi Development Authority to convince the government to reconsider the ban on mountaineering so that the local community rather than outside interests might once again benefit from ecotourism. A trail has been created and the communities now receive a share in the trail management collected fees from visitors while they support fire prevention and anti poaching activities, and provide guides and tourist accommodation. They also offer home stays, which are becoming increasingly popular amongst visitors.

The Valley of Flowers:

The valley itself is uninhabited. The local people are mostly *Bhotiya*, non-tribal Rajput farmers and transhumant herdsman, who winter their flocks at the area's main permanent village of Pulna 12km south of the Park and 1,750m lower in elevation. 5 km and 9 km south of the Park entrance are the seasonal villages of Ghangrea (at 3,060m) and Bhiundhar (at 2,240m), occupied in summer to serve the pilgrims and tourists (when some 400 stalls line the pilgrim trail). The people of Bhiundhar who numbered about 330 in 1999, may no longer graze the valley and some families are still poor but others earn well from tourism and the pilgrimage and are very supportive of the Park (Srivastava, 1999). With support from the Forest Department, the local communities have formed Eco-Development Committees (EDCs). The EDCs at Bhiundhar and Govindghat provide support to the Park management and look after the waste disposal and management of visitor facilities along the trail outside the National Park. Over 70 tonnes of garbage was removed by these EDCs in the last two years alone.

VISITORS AND VISITOR FACILITIES

Nanda Devi:

The trek to Nanda Devi base camp is considered to be one of the toughest in the world. When the Park was open between 1974 and 1983 it became the second most popular Himalayan destination after Everest, attracting large numbers of mountaineers and trekkers from all over the world (Lamba, 1987): in 1982 there were some 4,000 visitors, mostly expedition members and porters (Aitken, 1981 & 1982). The Park was then closed to both tourists and villagers because of the disturbance caused: 1,000 kilograms of tourist litter were later removed by the Indian team who made the 13th ascent of the mountain in 1993. The inner sanctuary remains a Strict Nature Reserve open only to scientific expeditions under permit. There is one three-room hut for their use. The Park was only reopened in 2003 for regulated tourism following the new ecotourism policy of the state of Uttaranchal. The trail up to Dibrugetha in the National Park was opened to a maximum of 500 tourists per year in a program for ecotourism regulated by the Forest Department with active support from local communities. In the year 2003 over 2,200 tourists visited the Park and nearby eco-zone. In 2004 (to the end of November), 184 tourists visited the Park and 1,638 tourists visited the eco-zone. Camping sites have been developed in several places and the villagers offer home stays, which are becoming increasingly popular amongst visitors. Further facilities for pilgrimage, cycling, camping, mountaineering courses and cultural tourism are planned. Joshimath, where there are hotels, is about 170 km north of the railhead at Rishikesh, and 220 km from Jolly Grant airport at Dehra Dun.

The Valley of Flowers:

The valley is very accessible and some of the many pilgrims to the nearby shrines travel on to see it. Where Nanda Devi Park is closely regulated for mountaineering and ecotourism, the Valley of Flowers is open to both. Should tourism and mountaineering come to pose a threat to the animals here, such activities in the Valley would be regulated too. The valley is very accessible and some of the many pilgrims to the nearby shrines travel on to see it. In 1999, between 30 and 50 people visited the Park daily. In 2003-4, nearly 4,000 were recorded, 3,600 from India and 300 from abroad. Visits occur between May and early October, on foot once within the Park and guided by youths from the village to see that the flowers are not trampled. There is a Forest Department post and interpretation centre at

Ghangrea near the entrance, with brochures, books and posters and where entry fees are charged. For the last two years this has been managed by members of the EDC who present slide and film shows for visitors.

There are sign boards in the park and guided nature trails including a 19-kilometer trek. Regulations for trekking are being prepared. No camping is allowed in the valley. But mountaineering is allowed subject to permit and regulation, on two peaks, Rataban and Ghauri Parbat. There are also trails out of the park to the southwest and through bear-infested forest and over glacial ice to the northeast. There are some 25 visitor resthouses, lodges and hotels at Ghangrea near the Park entrance and down the Bhiundhar at Govindghat on the Alaknanda, including a very large Sikh gurudwara. There are Forest Department guesthouses at both Ghangrea and Govindghat, and camping near Bhiundhar village. The site is about 200 km north of the railhead at Rishikesh, and 250 km from Dehra Dun airport.

SCIENTIFIC RESEARCH AND FACILITIES

Nanda Devi:

The first recorded attempt to enter the sacred basin was by W. Graham in 1883, but he was unable to get beyond the gorge of the lower Rishi Ganga. Subsequent attempts by Dr T. Longstaff in 1907 and H. Ruttledge in 1926, 1927 and 1932 also failed. Finally, in 1934, Eric Shipton and H. W. Tilman pioneered a route to the 'Inner Sanctuary' by forcing a passage up the upper gorge of the Rishi Ganga. Later, in 1936, H. Tilman and N. Odell made the first ascent of Nanda Devi, reputed the outstanding climb of the pre-War era. Their accounts of this natural sanctuary first drew attention to this spectacular mountain wilderness (Tilman, 1935; Shipton, 1936) and led to its protection. A geological survey was conducted by Maruo in 1979. Among the first published observations on the wildlife of Nanda Devi are those of Dang (1961), Lavkumar (1977, 1979) and for birds, Reed (1979). Surveys of the flora and mammalian fauna were carried out by the Botanical Survey of India (Hajra, 1983a) and Zoological Survey of India (Tak & Lamba, 1984, 1985; Lamba, 1987), respectively. The Nanda Devi Scientific and Ecological Expedition conducted floral and faunal surveys and habitat assessments in 1993. Following the programme of decadal monitoring of the region, a combined team of the Forest Department, Wildlife Institute of India, G.B. Pant Institute of Himalayan Ecology & Development and Garhwal University conducted surveys in the region again in 2003 following indicator species such as the snow leopard, snow Apollo butterfly and blue poppy. This research will contribute to the management of the Park.

The Valley of Flowers:

The flora was surveyed and inventoried in 1987 by the Botanical Survey of India, in 1992 by the Forest Research Institute and in 1997 by the Wildlife Institute of India which found five species new to science. A research nursery and seed/rhizome/tuber bank for propagating rare plants and valuable medicinal herbs has been created at Musadhar near the entrance of the site. Rare and valuable medicinal plants are the subject of special programs. These include *Aconitum heterophyllum*, *A. falconeri*, *Arnebia benthamii*, *Dactylorhiza hatagirea*, *Gymnadenia orchides*, *Megacarpaea polyandra*, *Picrorhiza kurrooa*, *Podophyllum haxandrum* and *Taxus wallichiana*. Research plots have been set up to determine the best way to control the spread of the tall Himalayan knotweed *Polygonum polystachium* without damaging other plants or the surface of the soil. A first annual survey was conducted in 2004 and will be repeated annually

MANAGEMENT

Nanda Devi:

The upper Rishi Ganga valleys (the Outer and Inner Sanctuaries) were long preserved by the difficulty of penetrating the lower Rishi gorge which remained unexplored until 1934. Hunting, the collection of medicinal plants and other forms of exploitation followed until the 1962 war with China closed the border. From 1945 to 1974 the region remained closed to foreign visitors. Traditionally, the alpine pastures around Dharansi and Dibrugheta were grazed by livestock from Lata, Tolma and Peng villages, and latterly from villages as far up the Niti valley as Malari. A spate of mountaineering and trekking followed the re-opening of the Reserve in 1974 but caused such disturbance to the environment, that, on scientific advice, trekking, expeditions and grazing were banned by authority of the Chief Secretary of Uttar Pradesh (Aitken, 1981 & 1983). The 1983 ban covered grazing, hunting, harvesting herbs, wood-collection, mountaineering and trekking anywhere in the core area of the then projected Biosphere Reserve, including the whole National Park, Thus communities traditionally dependent on sheep rearing and local resources had to seek alternate pastures, change their vocations or emigrate. Over 25% left the valley (Silori, 2001).

A 10-year management plan was prepared in 1989, revised as a Landscape Plan in 2003. An Annual Plan of Operations based on it is submitted yearly for release of funding. Included in the plan were provisions for 3-day and 10-day patrols of the site, payment of compensation for crops raided by cattle and other animals, recommendations on the tourism ban and ways to provide employment for local people. (Forest Dept., 2003). Nanda Devi was earmarked as one of several protected areas for future inclusion under the Government of India's Project Snow Leopard (Ministry of Environment & Forests, 1987). The Pindari and Sundadhunga valleys at the southern edge of the Nanda Devi massif were recommended for designation as a sanctuary to protect their reportedly large and viable ungulate and pheasant populations (Rodgers & Panwar, 1988). In 1988, without local consultation, a long-projected national Biosphere Reserve was created to protect the region's biodiversity, with Nanda Devi National Park as the core area. Following the provisions of the Wildlife (Protection) Act 1972, restrictions were imposed on grazing and other human activities throughout the Biosphere Reserve with adjacent buffer areas remaining open for legitimate community needs. The condition of the flora and fauna greatly improved but the villagers' crops and cattle began to suffer increased losses to wild animals for which compensation was hard to obtain. As a result more than 75% of the residents developed a very negative attitude towards the Reserve management (Silori, 2001).

The 1998 *Jhapto Cheeno* protest against the restrictions on grazing and mountaineering and against official indifference enlisted world-wide interest. Faced with state support for potential development of the basin by national and multinational interests, the villagers created the Nanda Devi Development Authority in 2001. Following this initiative, the Protected Area management began to promote local entrepreneurship and actively involve local communities which had previously been ignored, in conservation activities. These now receive a share in the trail management fees and help to prevent fires and poaching. By 1993 the Nanda Devi Scientific and Ecological Expedition concluded that wildlife numbers were increasing and the ecosystem of the Park showed signs of recovery since its closure. This recovery and continued improvement in the biodiversity of the Park was re-confirmed in the decadal monitoring of the Park in 2003 carried out by the scientists of the Wildlife Institute of India, the Pant Institute of Himalayan Ecology & Development and Garhwal University. The demand to lift the restrictions on mountaineering is still raised occasionally, both by mountaineers for whom this region remains the final frontier and by villagers who see a potential for well paid employment as porters and guides.

With support from the MAB programme initiatives of the Indian government and the latest ecotourism policy of the newly created state of Uttaranchal, regulated tourism has been allowed. Community-based tourism plans for the villages around the Park (Lata, Tolma, Peng and Reni) have been prepared. Under these plans, capacity-building, the training and registration of local youths as guides, the creation of home stays for visitors, the establishment of local tour operator groups for eco- and cultural tours, the development of handicrafts and medical plant cultivation and the direct involvement of Women's Welfare Groups have all been introduced. As a result of these initiatives, over 2,200 tourists visited the Park and nearby eco-zone in 2003. Eco-Development Committees have been established in all the villages and PRA- (Participatory Rule Appraisal) based micro-plans have been prepared by them, supported with funds from various sources. This success was recognised in 2004 by an Ecotourism award, and by the presence of two local women at the Global Women's Conference on Environment at Nairobi.

The Valley of Flowers:

The Park is a natural laboratory for the conservation and study of the western Himalayan flora. When it became a National Park in 1982 livestock grazing ceased and restrictions were imposed on nearby villagers. However, the Park's staff have begun to train them by building up their capacity as wardens and plantsmen, trekking and mountaineering guides. As wardens they are trained in implementing regulations and handling offenders, in the use of instruments and fire arms, in high altitude survival strategies and resolving conflicts with wild animals and intruding hunters; as plantsmen they are trained in plant identification, field biodiversity monitoring, identifying and restoring rare plants and rehabilitating their habitats. All are provided with better facilities and equipment. The nursery at the entrance of the site is researching ways to mitigate the pressure on rare and valuable plants and in cooperation with the Eco-Development Committee of Bhiundhar villagers have been encouraged to grow them on. The EDCs also clear the waste and manage visitor facilities along the trail outside the National Park. In 2002-3 in cooperation with the villagers' Eco-Development Committee and Forest Committee of Bhiundhar the Forestry Department oversaw the clearing of 50 tons of litter and removed 120 temporary stalls from the pilgrim trail from Govindhar to Hekmund. The Committee is also spreading awareness of the need to suppress the rampant Himalayan knotweed.

Management is done within the 2003-2013 plan for Nanda Devi Biosphere Reserve which is implemented annually in consultation with local, district and state bodies but does not manage the parks directly. A new ten-year management plan for the Valley of Flowers Park is due for completion in 2005 based on the following objectives:

- The protection, in-situ and ex-situ conservation and monitoring of the flora and fauna;
- Restoration of and research into the flora and fauna;
- Management of the habitats of the park for endangered flora and fauna
- Development, upkeep and litter-clearing of trek routes and basic facilities for park visitors with active support and participation of the local communities.
- Education of local people about the biodiversity and protection of the park;
- Generating opportunities in the local community for sustainable livelihoods and building their capacity for responsible ecotourism.
- Key indicators for monitoring the state of conservation in the park are.
- The status of rare and endangered flora such as the populations of *Saussurea obvallata*, *Meconopsis aculeata*, *Cypripedium cordigerum*, *Dactyloctenium aegyptium*, *Aconitum* spp. in permanent plots;
- The assessment of cover at past camps and trails by invaders like Himalayan knotweed *Polygonum polystachyum*, *Rumex nepalensis*, *Impatiens sulcata* and *Osmunda claytoniana*;
- Signs of threats to the wild flora and fauna from illegal herb collection and poaching;
- Regeneration of birch and fir in landslide areas below 3300m.

MANAGEMENT CONSTRAINTS

Nanda Devi:

Hundreds of tons of litter, felling of trees and even cultural vandalism created by expeditions, along with the introduction of sheep and goats to the inner basin, reached serious proportions before the closure of the Park (Clarke, 1979; Aitken, 1981 & 1983). However, by 1993, after ten years of closure, the wildlife had recovered and increased in numbers to the point where there is crop raiding by bears, boars and cattle, and predation on the latter. Regular patrolling inside the Park during winters is very challenging. The two access routes into the inner basin are difficult to maintain because of the terrain and heavy snow fall, and manning the newly created checkpost at Lata Kharak throughout the year is also a challenge. Although their participation in ecotourism has been secured, their training for the work needs continued development. The number of staff has gone up but is still inadequate. A few of the wildlife staff have been trained at the Nehru Institute of Mountaineering, Uttarkashi, but they lack the necessary support for mountaineering equipment to patrol the higher reaches of the Park year-round.

The Valley of Flowers:

The main management issues are control of invasive knotweed within the Valley, and, on the way to it, tourist and pilgrim litter. Some 1,000 ha of meadow are infested with the tall fast growing Himalayan knotweed which controls erosion but crowds out and smothers the subalpine flora. Its increase where livestock used to congregate is related to the prohibition of grazing. While livestock overgraze and over-enrich the soil, they may enhance floral diversity by limiting the growth of taller more vigorous plants. Its eradication and regular monitoring is expected to be a major expense (Srivastava, 1999). The litter piles up by the tonne from the thousands of tourists that visit the shrines: 300,000 plastic bottles a year and 5-600 kg of human and mule dung per day. The local people have now combined to clear this. A past threat to the forests surrounding the pilgrim route was the destruction of trees for firewood but this is now forbidden. There is no pollution and little danger from avalanches except on the approach road from Govindghat. There is, nevertheless, a constant threat from local poachers, especially to the snow leopard, and to ungulates when they come down to the valleys in winter; also from local indifference to wildlife conservation. This is aggravated by lack of adequate funding for the training needed for high altitude monitoring.

COMPARISON WITH SIMILAR SITES

The Valley is similar to Nanda Devi National Park, but has many more and more northerly plant species and is much more accessible. Entering the other Park requires time and mountaineering skills; it remains a wilderness rightly protected as a Strict Nature Reserve. At present there is only one World Heritage site in the mountains between Assam and northern Pakistan - the far larger mountainous Sagarmatha National Park in Nepal, but there are such large differences in scale and terrain as to make close comparison unrealistic. There may be comparable valley sites in the nearer Himalayas which remain largely unknown due to the difficulty of access and the strategic sensitivity of the region.

There are 17 protected areas in the west Himalaya, covering 11.6% of the biotic province. There are certainly some alpine valleys such as Ralam, Pindari, Sunderdhunga, Khatling and Harkidoo, which may originally have been comparable in number of plant species but all have been degraded by overgrazing and medicinal plant collection. Three adjacent valleys of Khiron, Khakbusandi and Bedini-Ali have much less diversity. Nearby protected areas in Uttarakhand which include valleys are Gangotri and Govind National Parks, Kendarnath, Ascot and Govind Pashu Vihar Wildlife Sanctuaries and, in Himachal Pradesh, Sangla Wildlife Sanctuary. But none has a comparable floristic richness, and in so compact an area. The valley's 600 species of plants comprise 25% of the vascular plants found in the Chamoli district though it is only 1.3% of its area. The valley is also celebrated in literature, both Indian and English, for its beauty, its flowers and the associated religious sites.

STAFF

Nanda Devi:

In 2004 a staff of 89 was deployed: one Director/Conservator of Forests, one Deputy Conservator of Forests, one Sub divisional Forest Officer, two Range Officers, two Deputy Range Officers, five Asst. Wildlife Wardens, six foresters, 22 Wildlife Guards, 17 Forest Guards and 21 part-time watchers. Out of these, 22 field staff have been deployed at the Park from the Biosphere Reserve establishment.

Valley of Flowers:

One Divisional Forest Officer, one Range Officer, 2 Foresters, 4 wildlife guards, 2 buffer forest guards. Training includes elusive animal census techniques and in the properties of medicinal plants.

BUDGET

Nanda Devi:

Approximately Rs20 lakhs (Rs20,000,000/US\$44,500) in 2003-4. US\$75,000 from the budget for Nanda Devi Biosphere Reserve is given to the Park.

The Valley of Flowers:

This comes from the national Ministry of Environment and Forests. An annual average expenditure of Rs17.5 lakhs (Rs1,750,000 / US\$39,000) was recommended over a ten year period from 2000-2009 (Srivastava, 1999). Rs2,000,000 (US\$45,000 from the Nanda Devi Biosphere Reserve budget is allocated to the Park.

LOCAL ADDRESSES

Director, Nanda Devi Biosphere Reserve, Ghingran Road, Gopeswar, Chamoli, Uttarakhand, India.

Deputy Conservator of Forests, Nanda Devi National Park, Joshimath, Chamoli Uttarakhand. India.

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Valley of Flowers: April 2005, Updated 7- 2005, May 2011.