

## VEGETATION OF SWAT VALLEY

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The vegetation of Swat Valley is interesting as there is mixture of plain and hilly plants. The lower portion of the Valley is broad and on low altitude and shows xerophytic types of plants while in the upper portion the vegetation resembles that of Kashmir and Kaghan Valley. In the lower Swat area the vegetation is typically Himalayan but in the upper areas of upper Swat there is a blending of the Mediterranean and Central Asian species because this region is under the influence of Mediterranean climate.

Swat Valley shows a number of vegetation types depending upon the aspect, altitude and slope. The various vegetation types are discussed.

There is no publication existing on the vegetation of Swat Valley barring of course Dr. Stewart's reference to some plants of this region in his *Flora of Rawalpindi District*.

This valley comprises the watershed area of Swat river. It includes Lower Swat, Upper Swat, Swat Kohistan and Kalam protected area. It is situated in the northern part of West Pakistan. Its geographical position is between  $35^{\circ} 54'$  to  $34^{\circ} 34'$  north latitudes and  $72^{\circ} 2'$  to  $72^{\circ} 47'$  east longitudes. On the northern side of it is the Chitral State and Gilgit, Indus Kohistan (of Swat) on the east, Buner (Swat) and Malakand Agency on the south and Dir State on the west (Fig. 1) The river originates in the mountains of Ushu and Utror valleys of Kalam, then enters Swat State near Kalam after which it is known as Swat river. It flows generally from north to south in the Swat State. The main valley in the lower Swat is fairly broad with rich cultivated fields but narrows beyond Madyan beyond which the upper Swat area starts. The maximum length and breadth of the tract is 100 miles and 27 miles, respectively.

The entire area is mountainous with the exception of fairly flat strips of land along both the banks of the Swat river below Madyan. The main hill ranges on both the sides of Swat river run parallel to its course with numerous cross spurs. The altitude ranges from 2426 ft. at Landaki to 19415 ft. at Falaksher in Ushu valley, the highest peak in the valley. The slope is generally gentle to moderately steep but becomes steep to precipitous in the upper reaches of the side valleys.

### Geology, Rock and Soil

No data is available on the geological formation of the tract. The rocks are highly metamorphosed and consist of shale, schists, sills of gneissose, granite and limestone in area below Kalam but in upper portions mica schists and quartzites are also present in addition to the above-mentioned rocks. The deep loose soil is formed by disintegrated

tion, which is very fertile. By the decomposition of fallen conifer needles very fertile humus is formed. Above the forest zone there is lot of snow erosion and the rocks are often exposed.

### Climate

The climate of the tract is sub-humid temperate in the lower half and dry temperate in the upper half. There is higher monsoon rainfall in the outer hills and it progressively decreases in the interior. The monsoons reach only up to Madyan. In the Swat Kohistan and Kalam, precipitation is generally in the form of snow whereas in Lower Swat snowfall is not so heavy. The permanent snowline is at about 14000 ft. Snowfall, altitude and climatic factors confer a powerful influence on the vegetation resulting in a great variety.

Average rain fall of Saidu Sharif varies from  $35''$  to  $40''$ .<sup>5</sup> June is the hottest month with mean minimum and maximum temperature of  $70.1^{\circ}\text{F}$ . and  $98.6^{\circ}\text{F}$ ., respectively, while January is the coldest month in which the mean maximum and minimum temperatures are  $56.8^{\circ}\text{F}$ . and  $34.0^{\circ}\text{F}$ ., respectively. There are no strong winds in the lower part of the valley while in the upper part winds are present.

### Vegetation Types

Swat Valley shows a number of vegetation types depending upon the aspect, altitude and slope. The vegetation of Swat is for the most part like that of Kashmir and Kaghan Valley, though there are plain species in lower Swat and there is quite a sprinkling of Central Asian plants in the higher valley. Some have probably come in from Chitral or Gilgit. As in the rest of the Himalayas the vegetation of Swat is progressively showing the effects of the pressure of population on the land. The lower hills and mountains have been badly denuded for firewood and by grazing animals. The original vegetation has already gone from the hills near populated places and hints of what it was like in ancient times can only be

seen in graveyards and around mosques where the trees are protected. Even in the midst of thick forests the land has been used for agricultural crops. The vegetation must have been much more luxuriant in Buddhist days, for villages and monasteries could not have existed on the barren hills which are now covered with ruins.

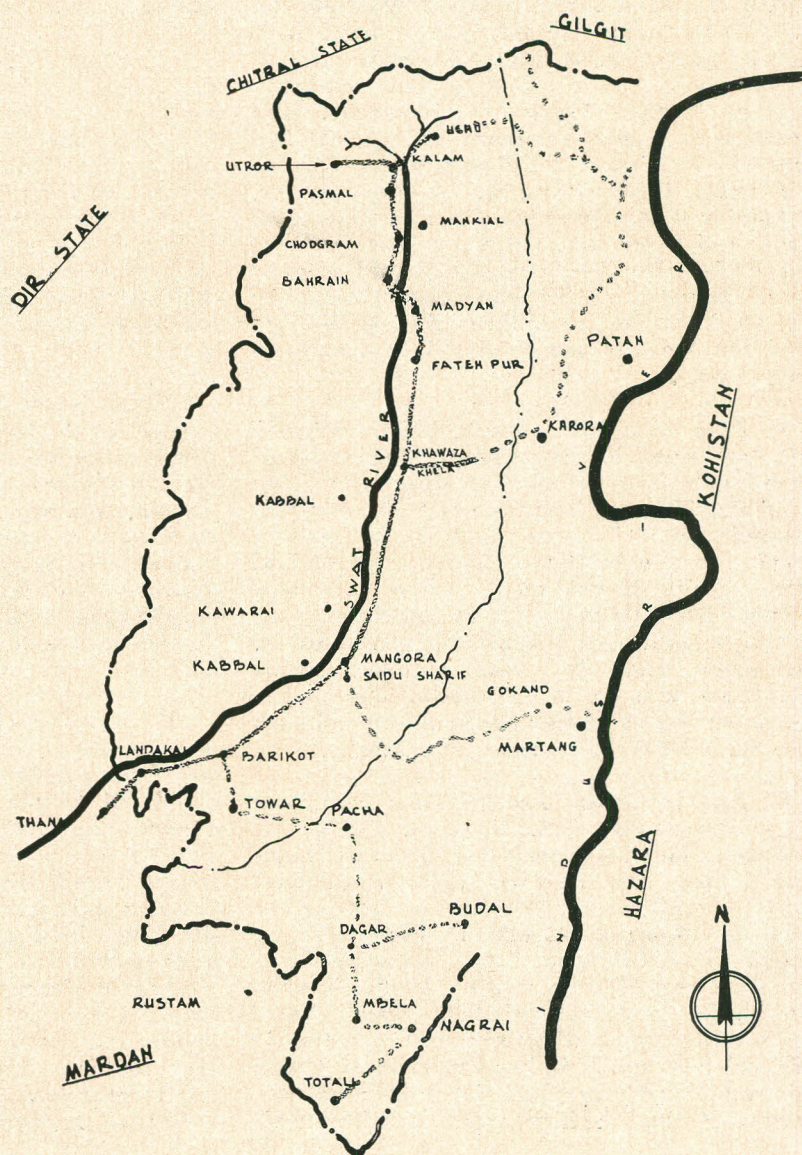
From Landaki to Mingora the hills are covered with only scrub vegetation of *Adhatoda vasica*, *Dodonia viscosa*, *Olea cuspidata*, *Zizyphus sp.* and *Acacia modesta*. Beyond Mingora the hill tops are covered with *Pinus roxburghii*. In the upper part of the valley are found the coniferous forests consisting of *Pinus wallichiana*, *Cedrus deodara*, *Abies*

*pindrow*, *Abies webbiana* and *Picea morinda* between the altitude of 5500 ft. to 10000 ft. but the best crop occurs between 6000 ft. to 9000 ft. Between sub-alpine elevations, i.e. 11000 ft. to 12000 ft., exist a belt of *Betula utilis* and *Quercus sem icarpifolia* scrub vegetation. Above 12000 ft. rich alpine meadows are found up to the altitude of 14000 ft., just below the permanent snow line.

The vegetation of the tract can be divided into the following types:

1. Scrub vegetation
2. *Pinus roxburghii* forests
3. *Pinus wallichiana* forests

Fig. 1.—The map of Swat State.



4. *Cedrus deodara* forests
5. Mixed forests
6. *Abies* sp. forests
7. *Betula utilis* and *Quercus semicarpifolia* scrub vegetation
8. Alpine vegetation
9. Agricultural crops

I. *Scrub Vegetation*.—Scrub vegetation occurs in the lower broad portion of the valley and also on the southern hot aspects in the interior. The shrubs are mostly in scattered patches. These have appeared due to destruction of forests by biotic factors. Many plain species are found here and it is in fact a continuation of the scrub areas of Malakand Agency. The hills are nude and are formed of rocks but in the upper portion of the lower valley the hills are covered with scattered trees of *Pinus roxburghii* which indicate that the upper part of this scrub was previously composed of thick forests of this species. This vegetation is mainly composed of *Olea cuspidate*, *Acacia modesta*, *Zizyphus* sp., *Dodonia viscosa*, *Adhatoda vasia*, *Berberis lycium*, *Quercus* sp. *Autostegia lambata*, *Zanthoxylum alatum*, *Punica granatum* and *Plectranthus rugosus*, which are scattered throughout the area. This scrub is also due to low altitude of the lower part of the valley. In the upper part of the lower Swat the lower portion of the hills is scrub vegetation but the tops are covered with *Pinus roxburghii* forests.

II. *Pinus Roxburghii Forests*.—*Pinus roxburghii* forests are found in comparatively smaller areas. These forests are found in Maraghzar near Saidu Sharif and Kabble. They are not dense. *Pinus roxburghii* occurs between 4000 ft. to 5500 ft., elevation and generally consists of stunted and deformed trees growing on a shallow rocky soil. At lower limits scrub species are associated with it. The broad leaved species are *Quercus incana*, *Pyrus pashia*, *Ficus* sps., *Celtis australis*, *Cedrella toona* and *Grewia* sp. along nallahs. The undergrowth consists of *Berberis lycium*, *Myrsine africana* *Rubus* sp., *Mallotus philippinensis* and *Rosa* sp.

III. *Pinus Wallichiana Forests*.—*Pinus wallichiana* is a pioneer species occurring on all aspects and its altitudinal limit is greater than any other Himalayan conifer tree. In Swat valley it occupies elevations 5500 ft. to 9000 ft. The pure *Pinus wallichiana* forests are found in Shangla area, Shanku Dara, Miandam area. Bishgram Dara, Shin dara and Manglaur area. In the interior of the valley it occupies southern warm aspect but on other aspects it grows mixed with *Cedrus*, *Abies* and *Picea* sps. It is found mixed with *Cedrus deodora* and *Pinus roxburghii* on lower altitudes and *Abies* and *Picea* on the higher elevations. Dispersed

in between these forests are also found some broad leaved species, i.e. *Quercus dilatata*, *Quercus ilex*, *Prunus padus*, *Aesculus indica*, *Acer* sp. *Jugulans regia*, *Pyrus jacquemontii* etc. In the dense forests the common undergrowth consists of bushes of *Viburnum* sp., *Indigofera gerardiana*, *Parrotia* sp. *Berberis lycium* and *Plectranthus rugosus*. The herbaceous vegetation is composed of *Viola serpens*, *Valeriana Wallichii*, *Gallium* sp., *Arisaema* sps., *Geranium* sps., *Fragaria vesca*, *Potentilla* sps., *Dryopteris filix-mas*, *Adiantum* sp. and other ferns.

These forests being near the habitations have been subjected to heavy fellings in the past. Included cultivation is a common feature. With the protection afforded by the Wali of Swat new areas are being colonized.

IV. *Cedrus Deodara Forests*.—Pure *Cedrus* forests are found in a comparatively small area. These forests are found scattered in the Daral Nallah (near Bahrain) Utror and Ushu ranges on favourable aspects. But major portion of *Cedrus* grows mixed with *Abies*, *Picea* and *Pinus* forests. These generally occur on precipitous slopes where there is erosion due to land slides. On gentle, moderately steep to steep slopes on favourable aspects where soil is deep and rich, growth is luxuriant, but on the hotter aspects at lower elevations the density is low.

These forests have been subjected to heavy fellings in the past and only in inaccessible parts of the valley are these forests present. Mixed with *Cedrus* are other broad leaved trees, i.e. *Quercus* sps., *Jugulans* sps. and *Aesculus* sp. These are generally confined to nallahs and depressions. The ground vegetation is scarce. *Parrotia* sp., *Indigofera* sp. *Viburnum* sp. *Plectranthus rugosus* and *Berberis lycium* are the usual shrubs found here. The herbaceous vegetation consists of grasses and *Fragaria vesca* only.

V. *Mixed Forests*.—Mixed forests of *Cedrus deodara*, *Picea morinda*, *Abies pindrow*, *Abies webbiana* and *Pinus wallichiana*, sometimes *P. gerardiana* also, are found on the northern and western cooler aspects between elevations of 6000 ft. to 9000 ft. The density of *Cedrus* and *Pinus wallichiana* increases towards lower elevations while on the upper elevation *Abies* sp. tend to grow pure. These forests are found in Kalam, Ushu and Utror, upper areas of Miandam, upper part of Daral Nallah. Major area of forests in Swat is composed of mixed forests. The broad leaved trees found mixed are *Quercus* sps., *Aesculus indica*, *Betula* sp., *Jugulans regia*, *Acer* sp., *Taxus baccata*, *Prunus padus* etc. The underground shrubs are *Viburnum* sp., *Parrotia jacquemontii*, *Indigofera gerardiana*, *Spiraea vacciniifolia*,

*Salix* sp., *Paeonia emodi*, *Lonicera orientalis*, *Berberis lycium*, *Rosa moschata*, *Pteridium aquilinum* etc. There is a lot of herbaceous vegetation which is composed of *Valeriana wallichii*, *Geranium* sps., *Gallium* sps., *Atropa belladonna*, *Viola serpens*, *Podophyllum emodi*, *Impatiens* sps., *Fragaria vesca*, *Potentilla* sps., *Adiantum* sp., *Dryopteris filix-mas* etc.

VI. *Abies* Forests.—These forests occupy elevations from 8000 to 11000 ft. above the limits of *Cedrus* and *Pinus wallichiana*. These are composed of *Abies pindrow* and *A. webbiana*. The mixed forests of *Pinus wallichiana*, *Cedrus deodera* and *Abies* sp. have pure *Abies* forests on the top of the hills. These forests are generally restricted to the northern cooler aspect and sometimes even on the western aspect. Forests are generally found on ridges and the intervening furrows are bare due to snow slides. Sometimes broad leaved species such as *Quercus semicarpifolia*, *Taxus baccata*, *Acer* sp. and *Aesculus indica* are found mixed with *Abies* in these furrows. The undergrowth consists of *Viburnum* and *Parrotia* species and *Skimmia laureola*, the latter being in abundance. Large patches of *Saxifraga ligulata* are also found on bare rocks.

VII. *Betula Utilis* and *Quercus Semicarpifolia* Scrub Forest.—These scrub forests are present above the *Abies* sp. zone. These form a narrow strip between the alpine meadows and the *Abies* zone and occur at the elevations of 11000 ft. to 12000 ft. The plants generally show stunted growth due to high wind velocity and heavy pressure of snow. These are found on cooler northern and western aspects. The shrubs found in this type of forests are *Juniperus recurva*, *Juniperus communis*, *Lonicera purpurascens*, *Rhododendron* sp. etc. The herbs are *Artemisia* sp. and grasses.

VIII. *Alpine Vegetation*.—Extensive tracts of alpine pastures stretch above the forest limits to the line of barren mountains above which there are peaks covered with perpetual snow, i.e., Falaksher and Kalasher of Ushu area. The alpine pastures are composed of beautiful perennial herbs which also include many medicinal plants. The important herbs are *Primula denticulata*, *Polygonum amplexicaule*, *Caltha paalustris*, *Geum elatum*, *Anemone* sp., *Swertia* sp., *Euphorbia* sp., *Aconitum heterophyllum*, *Aconitum chasmanthum*, *Polygonum affine*, *Papaver nudicaulus*, *Iris* sp., *Allium* sp., *Anemone obtusiloba*, *Potentilla* sp., *Meconopsis* sp., *Stellaria* sp., *Gentiana* sp., *Adonis* sp., *Ranunculus* sps., and *Anemone tetrasepala*.

The scrub alpine vegetation consists of *Rhododendron* sps., *Juniperus* sps. and *Saxifraga ligulata*. *Saxifraga ligulata* occurs in the form of patches on bare rocks. All these herbs germinate soon after snow melting and flower during the months of June to August.

IX. *Agricultural Crops*.—Large tracts of land are cultivated in the lower Swat where the valley is broader. The main crops in the lower Swat are rice and maize. During the months of June-July large areas are seen under rice. The cultivation of agricultural crops is done throughout the valley even on slopes. In the upper valley the vacated land is used for cultivation by cutting the forest trees. As the forests are not under the direct jurisdiction of the Wali the people utilize the land for cultivation even in thick forests. At some places the cultivation depends on rain water but in most of the cases the land is irrigated by spring or river waters.

### Conclusion

The vegetation of Swat Valley is interesting in that there is a mixture of plains as well as hill plants. As the lower portion of Swat valley is plain and the height is also not much above sea level we find plants which are seen in the plains of West Pakistan. There are also found xerophytic plants in which it also resembles the desert areas of West Pakistan. But as we go into the middle part of the valley the vegetation closely resembles the vegetation of Kashmir, Kaghan and Galis. The monsoon rains reach only up to Madyan, up to which the vegetation is typical of the Himalayan regions but beyond it there is a blending of the Mediterranean and Central Asian species. This is due to the change in periodicity of the rainfall because in the upper valley the rain is mainly during winter. The topography of the area, the temperate Himalayan and the mediterranean climate are the two basic factors which are responsible for such a diversified flora of this valley. The upper part of the valley is the meeting place of Dir, Chitral and Gilgit and it is regarded that some plants might have come from these regions.

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