

Types of Vegetation in the Mount Kenya Nature Reserve

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How to cite this paper: Warburg, I. (2026) Types of Vegetation in the Mount Kenya Nature Reserve. *Open Journal of Ecology*, 16, 56-67.
<https://doi.org/10.4236/oje.2026.162004>

Received: November 26, 2025

Accepted: February 9, 2026

Published: February 12, 2026

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Abstract

The vegetation in Mount Kenya is quite diverse. The lower vegetation belt of Mount Kenya, is composed mainly of mountain rainforests. Above that forest, lines the vegetation belt of the *Podocarpus* forest, above which, is also located in the Bamboo area. The *Hagenia* Forest, grows also between the Bamboo area, and also the forest line. Above the forest line, which is located at elevations of around 3400 m ASL, grows in Mount Kenya an *Erica* shrub-land. The vegetation above that *Erica* shrub-land, is of an Afro-Alpine moorland, which lines mainly, in elevations of between 3500 m - 4200 m ASL. From elevation of 4200 m ASL upwards, are also located the higher areas in Mount Kenya, where their vegetation is relatively dilute. The peaks of Mount Kenya reach heights of around 5000 m ASL.

Keywords

Bamboo, *Erica*, *Hagenia*, Kenya, Mountains, *Podocarpus*

1. Introduction

Mount Kenya, is located on the equator, east of the Kenyan part of the Rift Valley, and also about 140km NNE of Nairobi, the capital of Kenya. The central coordinates of Mount Kenya are: 0°9'03"S; 37°18'27"E. Mount Kenya is geologically, an ancient volcano. It includes 3 high peaks: Point Batian, at Elevation Point (E. P.) 5199 m ASL; Point Nelion, at E. P. 5188 m ASL; Point Lenana, at 4985 m ASL [1]-[3].

In the lower elevations of Mount Kenya, grow several types of vegetation societies, ordered in elevation belts. Those vegetation belts start from mountain rain forests in the foothills of Mount Kenya, move to several types of mountain forests in higher elevations, until they reach the forest line, which is the upper limit where

trees grow in mountains. In Mount Kenya, the forest line is located in elevations, of around 3400 m ASL. Above the forest line in Mount Kenya, grows a shrub-land of *Erica*, like in many high mountains in the world. Between elevations of 3500 m - 4200 m ASL, grows in Mount Kenya an Afro-Alpine moorland. That area receives, a high amount of rainfall, and therefore the soil in that area is muddy. Consequently, the vegetation in that area is defined as moorland. From elevations, of about 4200 m ASL upwards, the vegetation becomes more dilute, until it reaches in elevations, of about 4600 m ASL, the Nival area, which almost, does not include vegetation in it [1] [3].

In August 1983, I participated, in a tour, of about a month, to Kenya, which was organized by the Society for Protection of Nature in Israel, together also with Neot-Hakikar travel company from Israel. That tour, was also defined, as a guiding course to Kenya, which was intended, mainly to tour guides of those touring organizations. We were guided on that tour by Dr. Abraham Arbel, who is a Field Biologist, and also a Zoologist specialized in Vertebrates. In that tour, we also spent 3 days hiking to Mount Kenya, where we started to walk from the entrance gate of the Mount Kenya National Park, at elevation of about 2400 m ASL in the west side of Mount Kenya, upwards on that mountain. The 1st day of that hike was from that entrance to Mount Kenya National Park up to the Meteorological Station Camp, in an elevation, of about 3050 m ASL. The 2^d day of that hike was from the Meteorological Station Camp up to Mackinders Camp, in an elevation, of about 4200 m ASL. On the 3^d day of that hike to Mount Kenya we started to walk at 2 AM from Mackinders Camp upwards, till we reached the peak of Point Lenana, at about 8 o'clock in the morning. After a while in that summit we then, in a half-day's walking, descended all the way down that mountain till we reached, again, the entrance gate of the Mount Kenya National Park.

Recently, because of some climate change consequences, many species, of animals or plants became rare or also endangered. Therefore, it is also important to preserve the information, about different species of organisms. The aim of the summary, that I bring hereby, is to preserve the information about the vegetation in Mount Kenya especially for the coming generations.

2. Methods

During the tour to Mount Kenya in August 1983, I photographed several natural sites, and also several plants. I also wrote during that tour, some notes about Mount Kenya Nature Reserve, which included several identifications of plants which I photographed at that tour. Those notes were written also in order to match between each of those photos with each of those identifications. The identifications of plants on that tour, were done by Dr. Abraham Arbel, together with some of the participants on that tour. We did not collect plants on that tour to compare them with herbarium records. In 2025, some of those photos were scanned. In 2025, I also checked some of the identifications of the plants presented here, with botanical internet resources, to ensure those identifications. I also used for the

description of nature in Mount Kenya, the booklet, that the Society for Protection of Nature in Israel prepared in 1983-1984, about Kenya [4].

3. Results & Discussion

3.1. The Mountains Rain Forest

The vegetation in the lower slopes of Mount Kenya, is of a mountains rain forest. That forest is prominent in the tallness of some of the trees that grow in it. Those trees include the African Wild Olive (*Olea europaea* subsp. *cuspidata*), and also *Ocotea*, which is also called: Camphor. That tree, can reach a tallness of about 40 m, while the diameter of its trunk that can reach 3 m [3]. The vegetation belt of that mountains rain forest, is not noticed, when we climb to Mount Kenya from its western side, through the Naro-Moru hiking trail. The Naro-Moru hiking trail, starts at the Naro-Moru village, which is located west of Mount Kenya. Afterwards that trail enters Mount Kenya, at the main gate of the Mount Kenya Nature Reserve, in a height of about 2400 m ASL (Figure 1) [4] (p. 55).



Figure 1. A view to Mount Kenya from the entrance to the Mount Kenya Nature Reserve.

3.2. The Podocarpus Forest

Above the mountains rain forest, grows in Mount Kenya, a coniferous forest, which is dominated by *Podocarpus* trees (Figure 2). It seems that those *Podocarpus* trees are of: *Podocarpus milanjanus*. The vegetation belt of the *Podocarpus* forest in Mount Kenya, ranges mainly between heights of 2000 m - 2500 m ASL. Some of those *Podocarpus* trees, serve also as habitats to lichens of the genus: *Usnea* (Figure 3). The *Usnea* lichens which grow in Mount Kenya, are usually of: *Usnea longissima*, which is also called: Bearded Lichen. The following other trees that grow in that forest, are: *Cyathea*, *Juniperus*, and also a wild Banana tree: *Ensekvorticolum* [4] (pp. 55-56).

When I toured to Mount Kenya, in August 1983, I also, took a photo of *Eupatorium* shrub of the *Asteraceae* (Figure 4). According to some internet sources, *Eupatorium* plant, is not known from Mount Kenya. Therefore, the documentation, that I bring here in Figure 4, can be recognized, as a noteworthy field observation from August 1983, which warrants further investigation through new surveys or herbarium research in the future. It is also possible, that *Eupatorium* shrubs grew in Mount Kenya in the year of 1983, but later maybe because of cli-

mate change consequences, became rare plants in that region.



Figure 2. *Podocarpus* trees near the Naro-Moru trail in elevation of about 2400 m ASL.



Figure 3. Lichens of the genus: *Usnea*, grow on *Podocarpus* trees.



Figure 4. *Eupatorium* shrub in the *Podocarpus* forest.

In the sub-forest of that vegetation belt, can also be found several kinds of Bryophytes (**Figure 5**), ferns, and also *Lycopodiaceae* plants (**Figure 6**, **Figure 7**). According to some internet sources, in Mount Kenya grow also 194 identified species of Bryophytes. The *Lycopodiaceae* plants, which appear in **Figure 6**, **Figure 7**, look like: *Lycopodium clavatum*, which is a common *Lycopodial* plant that grows in the moist mountain forests of Mount Kenya.



Figure 5. Bryophytes, in the sub-forest of the *Podocarpus* plant society.



Figure 6. Close look at *Lycopodiaceae* plants, in the sub-forest of the *Podocarpus* plant society.



Figure 7. *Lycopodiaceae* plants, in the sub-forest of the *Podocarpus* plant society.



Figure 8. A Butterfly flower—*Impatiens hoehnelii*, in the *Podocarpus* forest.

A Butterfly flower (*Impatiens hoehnelii*) (Figure 8), of the Balsams plant group (*Balsaminaceae*). That plant is considered as an East African plant, found mainly in the mountain forests of Mount Kenya.



Figure 9. *Kniphofia thomsonii*, in the sub-forest of the *Podocarpus* plant society.

The plant which appears in Figure 9, looks like: *Kniphofia thomsonii* of the Asphodelaceae (Figure 9). That plant is called also: Thomson's Red-hot Poker, or; Alpine Poker. The distribution of that plant includes several regions in East Africa (<https://www.wikipedia.org/>; <https://www.inaturalist.org/>).

3.3. The Bamboo Area

The Bamboo area, is also common in Mount Kenya, in heights of between 2200 m - 2600 m ASL. The Bamboo plants in that region, grow in a plant formation which also looks like a forest, although those Bamboo plants are perennial grasses. The Bamboo plants in Mount Kenya, are of the genus: *Arundinaria*, possibly of: *Arundinaria alpina*, which usually grow, to a tallness of about 10 m - 20 m [3]. Some of those Bamboo plants can even reach tallness of up to 40 m [4], p. 56-57. Since the Bamboo forest in Mount Kenya is quite dense, that seems to prevent other species of plants to grow in that vegetation belt [4] (pp. 56-57) (Figure 10).



Figure 10. In the bamboo forest.

3.4. The Hagenia Forest

Above the Bamboo vegetation belt, grows in Mount Kenya, a forest of *Hagenia* (Rosewood) trees, of the Rosaceae. The vegetation belt of the *Hagenia* forest in Mount Kenya, ranges between 2600 m - 3000 m ASL. Some of those *Hagenia* trees are of an age of hundreds of years [3]. The *Hagenia* trees in Mount Kenya are mainly of: *Hagenia abyssinica* (African redwood) (inaturalist.org).

At some locations in that *Hagenia* forest, there also grows: *Hypericum keniensis* or *Hypericum revolutum* [4] (p. 57). *Hypericum* in Mediterranean regions usually appear as sub-shrubs. However, the finding that *Hypericum* plants in the *Hagenia* forest in Mount Kenya, grow to such big dimensions, is also another evidence, to the phenomenon of gigantism of plants in African high mountains [4] (p. 57).

In the sub-forest of that *Hagenia* plant society, grow several more plants, which include also the following perennial plants. Red *Gladiolus*, which is also identified as: *Gladiolus watsonioides*, of the Iridaceae (Figure 11). A subshrub of the genus: *Helichrysum* of the Asteraceae (Figure 12). That *Helichrysum*, does not look like: *Helichrysum brownei*, which grow in Mount Kenya in its Afro-Alpine vegetation belt.



Figure 11. Red *Gladiolus*—*Gladiolus watsonioides*, in the *Hagenia* forest.



Figure 12. *Helichrysum*, in the *Hagenia* forest.

3.5. The Erica Shrub-Land

The forest line is also defined, as the upper limit of the areas, where trees grow in high mountains. Close to the forest line of Mount Kenya, is also located the Meteorological Station Camp, in height of about 3050 m ASL. That hiking camp is

used by travelers to spend the night between the 1st day of their hike, to the 2^d day of their hike, when they climb from the entrance to the Mount Kenya National Park, to any of the summits of that mountain. The forest line in Mount Kenya is also located in elevations of between 3000 m - 3500 m ASL (**Figure 13**).



Figure 13. In the forest limit of Mount Kenya, at elevation, of about 3400 m ASL.



Figure 14. Flowers, of an *Erica* shrub in Mount Kenya.

The vegetation, right above the forest line of Mount Kenya, is also of *Erica* shrubs. *Erica* shrubs are common in high mountains, also in other regions of the world, and they are known, as occupying the upper side of forest lines in several regions of the world. In Mount Kenya, *Erica* shrubs grow mainly in elevations of 3200 m - 3500 m ASL. The *Erica* plant, that I photographed in Mount Kenya in August 1983, was from a lower elevation within the Mount Kenya Nature Reserve (**Figure 14**).

3.6. Afro-Alpine Moorland

The Afro-Alpine zone in Mount Kenya starts, in an elevation, of about 3500 m ASL. From that elevation, towards the area below the summits of Mount Kenya, the landscape, is also, of a continuous moderate slope which leads us from that elevation up to Mackinders Camp, at an elevation of about 4200 m ASL. That area, receives high amount of rain water. Therefore, the soil in that slope is muddy. The vegetation, in that area, is defined as moorland (**Figure 15**).

In the lower part of that Afro-Alpine moorland, grow also the following 2 species of Lobelias. The Teleki Lobelia (*Lobelia telekii*), which its flowers look like

feathers of an Ostrich. Mount Kenya Lobelia, which is also called: The Giant Lobelia (*Lobelia gregoriana*), which its flowers are purple. That species of Lobelia was formerly called: *Lobelia deckenii* subsp. *keniensis* (Figure 16). The flowers of *L. gregoriana*, are pollinated by hummingbirds called: Johnston Hummingbirds, which can reach heights of about 4000 m ASL [3].



Figure 15. Landscape of moorland, at a height of about 3600 m ASL.



Figure 16. Plants of *Lobelia*, in a height of about 3600 m ASL.

The Lobelias in Mount Kenya, demonstrate also the phenomenon of gigantism of some plants, at high elevations, in African mountains. Lobelias in that vegetation belt in Mount Kenya, can reach tallness of up to 4 m [3]. Researches raised a hypothesis, that when those Lobelia plants are farther from the ground, they receive less amount of coldness at night, because most of that coldness comes from the ground. Additionally, some researchers found in some tissues of leaves' rosettes of *Lobelia telekii* plants, in Mount Kenya, an anti-freeze chemical, which also protects the buds of those plants [5]. The buds of those plants need protection from freezing temperatures. It was also found, that in: *Lobelia gregoriana*, those buds are coated by envelopes of hundreds of leaves, which close at night, and also open during daytime. Those leaves isolate those buds, and therefore protect them against the coldness of the night [6].

In a height of about 3600 m ASL, I documented in August 1983, a subshrub of the *Asteraceae* (Figure 17).

In Mount Kenya, the elevations of between 3500 m - 3800 m ASL, are also char-

acterized by: high rainfall, thick humus layer, high tussock grass moorland, low species richness. The elevations of between 3800 m - 4400 m ASL, in Mount Kenya, are also characterized by more scattered vegetation, which also includes Giant Senecio plants.



Figure 17. A bush of the *Asteraceae*, at a height of about 3600 m ASL.

The Giant Senecio of Mount Kenya, is also called: Giant Groundsel (*Dendrosenecio keniodendron*). Since those Senecio plants are typical to the higher elevations of Mount Kenya, I think we can call those plants: Mount Kenya Senecios. In the lower part of the high alpine zone, of Mount Kenya, can be also found *Lobelia* plants together with Mount Kenya Senecio plants in the same area (**Figure 18**). That area looks like, a transition area between the area of the *Lobelia* plant society from its lower side, and also the Mount Kenya Senecio plant society, from its upper side.



Figure 18. A field of Lobelias, together with also Senecios.

Some of those Senecios reach, to a tallness of about 8 m, although the Mount Kenya Senecio is a perennial grass [3] (**Figure 19**). The Mount Kenya Senecios develop flowers once in 20 - 30 years, a phenomenon which is also not understood yet. When those plants flower, they develop an inflorescence column, which can

also reach an additional tallness of 2 m [3]. The Mount Kenya Senecios also demonstrate the phenomenon of gigantism of some plants in African high mountains. That phenomenon of gigantism of some plants is considered to be also, an adaptation to the coldness in some African high mountains. In the region of Mount Kenya, the temperature becomes cooler by 1 °C when increasing the height by 150 m. The diurnal temperature differences in Mount Kenya, are also relatively large [1] [3]. The Mount Kenya Senecios, have also, an additional adaptation to coldness, by an antifreeze substance in their leaves, possibly similar to the same mechanism, that was found in *Lobelia telekii* plants in Mount Kenya [5] [6].



Figure 19. Mount Kenya Senecios, above Teleki Valley.

After the 2d day of our tour to Mount Kenya, we reach Mackinders Camp, in elevation, of about 4200 m ASL. The vegetation in Mackinders Camp is a typical Afro-Alpine grassland, which includes also many Mount Kenya Senecio plants (**Figure 20**).



Figure 20. Mackinders Camp, at a height of about 4200 m ASL.

3.7. The Nival Area

From elevations, of about 4200 m ASL upwards, the vegetation becomes more dilute, until it reaches in elevations, of about 4600 m ASL, the so-called: Nival area, which is also called: The Alpine area. The Alpine area, is an area which almost, does not include vegetation in it. The Alpine area in Mount Kenya ranges from about 4600 m ASL, up to the summits of that mountain [1] [3].

The 3'd day of the hike to Mount Kenya, is from Mackinders Camp, to the area of the peaks of Mount Kenya, in elevations, of around 5000 m ASL. A description of the route from Mackinders Camp to that summit area I would like also to bring, in a separate article.

4. Conclusion

The vegetation of Mount Kenya is unique in the whole world, because it is, also combined by several types of Afro-tropical forests, together with Alpine vegetation. The vegetation of Mount Kenya includes 7 vegetation belts, 4 of which are forests, while 3, are also plant societies above the forest line. Some of the plants in the higher parts of Mount Kenya, such as: Lobelias or Senecios, show unique adaptations to their surroundings.

Acknowledgements

I would like to thank hereby also the Society for Protection of Nature in Israel, which, together with Neot Hakikar Tourism Company, organized the tour to Kenya in August 1983, which also I participated in it.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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