HORTON PLAINS – SOME ASPECTS OF ITS VEGETATION AND ECOLOGY

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Situated in the angle between the western and central ridges of the main mountain massif of Sri Lanka is a plateau of undulating land well known as the Horton Plains. Its average elevation is 2150 m. above sea level. From its Western and North–Eastern ends arise two mountains; the more spectacular 2392 m. tall Kirigalpotta and the less prominant 2206 m. tall Totapolakanda. The southern boundary of this land is a steep escarpment overlooking Balangoda.

Based upon its location 6° 45' north of the equator and its average annual temperature of about 17°C, Horton Plains is subject to a tropical montane climate. The mean monthly temperatures show little variation here, but daily means fluctuate quite widely, particularly during late January, February and early March, when day temperatures reach 25°C and night temperatures close to or below 0°C. Consequently, night frost is a common feature at this time of the year when its climate may be aptly described as 'every day a summer and every night a winter' as suggested by T.C. Whitmore in his book 'Tropical Rain Forests of the Far East'. Other climatic factors include a mean annual rainfall over 2000 cm, very high humidity, frequent cloud cover which limits the amount of sunlight reaching plants and high winds during late August to early October. The interaction of all these climatic features, over many thousands of years has given rise to the vegetation of Horton Plains as seen today. What intrigues one most about this vegetation is that it is neither completely forest nor completely grassland, but a mosaic of both, each occupying about 50% of the land area. What is even more puzzling is that forests are limited to upper slopes and hill crests while grasslands occupy lower slopes and valleys; both vegetation types appear not to invade each other and a sharp boundary exists between them. This forest–grassland vegetation, though common to the area, is best manifest in the Horton Plains.

The vegetation, climate and some of the larger animals like the bear monkeys and birds are among the obvious features that cannot be missed in Horton Plains. What is not obvious or tangible is the threefold integration of vegetation, environment and animals; in other words the ecosystem of Horton Plains, how it functions and its importance to Sri Lanka. Let us examine some of these features briefly.

In height, the forest in Horton Plains varies between 10–15 m and 1–1.5 m on the summits of Kirigalpotta and Totapolakanda where one looks down on the 'forest'. In appearance most do not have straight stems or buttresses (stilt roots may sometimes be present); they are low branched, twisted and branched, so much so that Mr. W.R.H. Perera, the former Conservator of Forests in the island, reports that they resemble 'giant bonsai of Japanese tree culture'. On the

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whole the leaves of these taller trees are small and show drought resistant features such as hairs or a thick waxy layer on their surfaces. Where the forest is wind swept, the canopy is more or less continuous without any characteristic emergent trees. Beneath the tree layer, shrubs and herbaceous forms abound and in them the leaves are relatively large. Other plants that predominate are the epiphytes growing on the tree trunks and branches, and epiphyllous forms growing on leaf surfaces. Among these plants are orchids, balsams, ferns, mosses, liverworts and lichens. Some of them even grow on rocks, decaying wood or directly on the forest floor. The major factor that determines their growth is the high moisture content.

Plants in this forest belong to either families almost entirely restricted to the tropics and sub–tropics (e.g. Clusiaceae, the mountain *Keena* family; Myrtaceae, the Guava or Eucalyptus family; Melastomataceae, the *Osbeckia* or *Bowitiya* family etc.) and those common to temperate countries (e.g. Ericaceae, the Rhododendron family; Vacciniaceae, Vaccinium and *Gaultheria* family; Magnoliaceae, the *Michelia* or Wanasapu family etc.) The absence of plants belonging to the Fagaceae or Oak family and those of the Conifers which are present in mountain forests of the region, is particularly interesting.

Beneath the trees, the treelet and shrub layer is dominated by a single species of plant, viz., *Strobilanthes* or Nelu. This species blooms only once in its life time, after which the plants die. No one knows for sure how long the life span of a single plant is; 4–8 years is the common belief. Most of these plants being of the same age bloom together, imparting to the forest undergrowth a striking mauve colour. The dying *Strobilanthes* though unsightly, permits light to filter through between the decomposing stems, stimulating the growth of herbaceous balsams and *Coleus* on the forest floor. These are short lived species and complete their life cycle before *Strobilanthes* seeds germinate and subsequently establish. When the *Strobilanthes* begins to grow, the ground layer of the forest takes on a carpet like appearence. Apart from *Strobilanthes,* members of the Rubiaceae, the coffee family, are abundant in the undergrowth. Among the non–flowering plants, primitive members of the ferns such as *Psilotum* and *Lycopodium* (related species of kuda–hedeya and maha–hedeya) and their advanced members such as the filmy ferns, and numerous mosses such as *Frullania, Bazzania* and *Sphagnum* are present either as epiphytes or terrestrial forms. In clear flowing unpolluted streams that arise from the forest, the only species of fresh water red algae in Sri Lanka, namely *Batrachospermum* may be seen.

The soil underlying the forest vegetation is equally dynamic and has its own flora and fauna. Bacteria and fungi abound in the soil flora and the existence of the latter is only evident when some of them produce their fruiting bodies or the familiar mushrooms which are of various forms, sizes and colours.

In the grassland, the dominant component is the 1–1.5 m tall tussock grass *Chryzopogon zeylanicum.* Scattered among this grass are a few shrubs and stunted trees; four among them are the familiar red flowered *Rhododendron zeylanicum,* the small white flowered *Gaulatheria* sp., whose crushed leaves emanate a wintegino–like aroma and the yellow or white flowered *Anaphalis* spp., whose stems and leaves are covered with cottony white hairs. In the shade and protection of the grass, numerous herbaceous plants with delicate but beautiful flowers may be seen. Where streams flow through or moisture is high in the shallow valleys of the grassland the dwarf bamboo, *Chimonobambusa densifolia,* may be seen growing luxuriantly.

Thus, in the forest and grassland of Horton Plains, different types of plants, ranging in size and shape, exhibiting various degrees of complexity grow in micro–habitats well suited to each of them. This diversity of plants, apart from other features, tells the story of evolution itself.

Complexity and diversity of animals and plants impart a dynamic equilibrium to fragile ecosystems such as the Horton Plains. Such systems are

therefore relatively stable provided they are not subject to man's influence or major natural catastrophes like earthquakes etc. The forest in Horton Plains is not merely a stand of trees; but trees provide micro–habitats for the rest in this system. One might surmise that shrubs and herbs do not contribute to the well being of the trees; no, they benefit each other. Shrubs and herbs maintain a suitable ground cover, protect the soil, retain high humidity and provide a suitable soil temperature to facilitate the growth of tree seedlings as well as their mature individuals.

Among the applied uses of Horton Plains, four may be considered important and presented here. They are its contribution to the country's (1) education, (2) hydrology, (3) gene pool conservation and (4) future agriculture.

(1) Education: Like all natural vegetation types, Horton Plains is a valuable resource for teaching. With the diversity of plant and animal life in it, students of Botany, Zoology and Ecology in particular could be made to understand various aspects of these subjects. In the class room, students must depend entirely on the teachers' descriptive ability and enthusiasm as well as their own imagination. Whereas in the field, the student sees nature for himself and the reality, thus giving the student ample opportunities to develop an inquiring and perceiving mind. Ecosystems like Horton Plains are yet underutilised for purposes of education but their potential for it is enormous.

(2) Hydrology : Horton Plains serves as a part of the catchment area or watershed for the Mahaweli river. From the Western and Northern sides of the plains tributaries of the Agra Oya and Nanu Oya respectively, and on its East those of both the Uma Oya and Badulu Oya all originate eventually finding their way to the Mahaweli river. In addition, uppermost tributaries of the Udawalawe river, including the Belihulu Oya originate on the Southern side of the plains near Baker's falls and World's End. The natural montane forests of Horton Plains are well adapted to capture, retain and release precipitation falling on them, unlike the Tea estates that surround it. The multi–layers of trees, climbers and epiphytes growing on tree trunks, branches and surfaces have the ability to intercept the rain. Once these surfaces are fully saturated water is slowly released to the soil where it is first absorbed by the leaf litter and humus. After this, any excess water will infiltrate the soil. Only when all these surfaces are fully saturated will surface run off begin. Thus, every part of this complex ecosystem acts as a reservoir of water. More complex the vegetation, greater its potential as a water shed. The epiphytic lichen, moss, liverwort and fern flora in these forests play an important role in the capture of water. According to Prof. D. Mueller–Dombois, an ecologist at the University of Hawaii, these plants have the ability to comb out water from the mist that hangs and settles on these forests at night, particularly during the dry seasons. This, to some extent ensures dry weather flow in the streams that originate from Horton Plains. No grassland or monoculture Tea, *Pinus* or cash crop has a rich lichen, moss, liverwort and fern flora as the natural forest. Consequently, these simple vegetation types do not equal natural forests as efficient catchment areas and watersheds.

(3) Gene Pool Collection : The vegetation of Horton Plains is a collection of plants with many future potential uses in the fields of horticulture, agriculture and medicine. It is to ecosystems like Horton Plains that one would return to, to find suitable plant material for crop diversification

Even today several plant collectors from overseas Botanic Gardens have collected plants from habitats such as Horton Plains and grown them in their own Botanic gardens for horticultural purposes. Among these plants are species of *Strobilanthes, Exacum* and *Gordonia,* all of whose flowers are exceptionally beautiful and attractive. Similarly, other species are of medicinal value (*Rubia* and *Lycopodium*) and yet others of food value.

(4) Future Agriculture : Apart from the value of potential agricultural plants in the vegeta-

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tion of Horton Plains, the forest as a whole gives one an indication as to what man might achieve in artificial or man made multicropping systems of these mountains. Examining details of how the natural forest is structured and how it functions will certainly shed light useful to agriculture at similar elevations and climate. The efficiency with which these natural forests function are time tested. Can we not study them and see whether this knowledge could be applied to future agricultural systems? Horton Plains with forest and grassland side by side certainly serves as a valuable model for future agriculture.

Last it must be mentioned that the Horton Plains ecosystem is changing. As far back as 1978 Mr. W. R. H. Perera, who was referred to earlier in this article, reported that the trees of Horton Plains are dying. In various parts of the world 'Die Back' of forests have been documented and the causal factors for this phenomenon are being researched upon. In the case of Horton Plains one does not know what factors triggered this 'Die Back'. Are they man induced or natural? If natural, were the present grasslands, whose origin is believed to be due to natural causes, a result of similar conditions that prevailed several thousand years back? Would the present forests be replaced by grasslands? If the factors are man made is it a warning that man has gone too far in destroying the natural environment? Whatever it be, the fact remains that the vegetation of Horton Plains is changing. Just as much as the rolling landscape, silence and vastness of the plateau and beauty of the forest–grassland ecosystem draws man to itself, the current changes disturb and worry the ecologist who asks 'What is the future of this forest–grassland ecosystem of Horton Plains?'. Will generations to come see it as we see it today or would it be quite different?