SILENT VALLEY – THE NEED FOR WILDLIFE CONSERVATION

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For an average human being wildlife conservation means setting up some national parks to protect areas of natural beauty; to establish sanctuaries for the preservation of one or more endangered species of animals, to create botanical gardens for maintaining a vast collection of plants for research and educational purposes etc. But there is a good number of intelligent and well-informed persons, who know that every living organism on this earth is a mini chemical factory of its own kind with tremendous potential and also each species in the wild is a rich living genetic resource which provides a vital component for the whole life support system of the universe. This resource is a must for the well-being of not only the present generation but also the many more to come in the future. Further, it is now amply understood by everyone that man depends for his food largely on the produce of foodgrain crops like cereals and pulses, potatoes and tuber crops, fruits and vegetables and certain oil yielding species. In addition, from the plant world we obtain wood, many kinds of fibres, essential oils, drugs, stimulants and many other natural products which enable us to live a civilised life and to support a very large number of industries of various kinds. It is a remarkable fact that such high-yielding food plants like wheat, rice, maize, sorghum, millets, pulses, tapioca, oilseeds and a wide variety of fruits and vegetables have been developed by man during a period of less than ten thousand years, from their wild and weedy relatives which hardly gave any yields, but the progenitors of our widely cultivated and high-yielding varieties are indeed the wild varieties. This fact demonstrates the vital importance of wild species of plants as basic resources for future requirements.

Plant breeders, by applying the advances made in a number of disciplines of science, like genetics, cytology, physiology, etc., have been able to breed high-yield varieties which form the backbone of modern agriculture. It is well known that no amount of fertiliser, irrigation water, and pesticide application will result in greater production unless the variety itself possesses the genetic constitution which can respond to improved agriculture technology. As the saying goes, 'good crops must start from good seeds' and good seeds mean not only pure, disease-free seeds, but also seeds of genetically superior varieties. While as a result of modern advances in agricultural science and technology a high level of production has been achieved in certain areas, there are many regions where, because of varying soil and climatic conditions, this has not yet been possible. Special varieties will need to be evolved to suit, for

instance, very arid regions. Even in areas where high production has been achieved, there is need not only to stabilise the present productivity but also to increase it further to support rapidly increasing human population. For such purposes, we need a very wide range of plant genetic material to build upon; and from time to time, scientists find it necessary to go and search for some attributes which are required, from among the species and varieties growing in the wild.

Every now and then a new pest or a new disease arises, causing great havoc to, and a substantial lowering of, the food reserves of mankind. Only a few years ago, in the United States, the hybrid corn indicated a very high level of productivity of maize. Suddenly fungal disease assumed epidemic proportions and caused a tremendous drop in production, because virtually none of the hybrids on large scale commercial use was resistant to the disease. Maize breeders frantically searched for resources of resistance in the wild varieties to combat the new enemy of the maize crop. Another example is of a new rice pest, in the form of the brown plant hopper, which assumed menacing proportions; and all the high-yielding dwarf varieties under cultivation were found to be susceptible to it. In fact the rice crops suffered severe losses in countries like Indonesia; and it was feared that there might be a major build-up of the pest in the rest of the rice-growing regions. A world-wild search for sources of resistance against the brown plant hopper indicated that a few old rice varieties from the State of Kerala were the only ones possessing resistance. These Pattambi rice varieties have now been widely used during the recent five year period in hybridisation programmes for further improvement of the rice crop, both at the International Rice Research Institute in the Philippines and in our own country. These varieties of Kerala may have done more for the continued productivity of the rice crop than any other variety in the crop improvement history during the last decade.

It has become clear that as more and more high-yielding varieties of crop and other economic plants are released for general cultivation, the problem of heavy losses through diseases and pests which thrive under conditions of intensive agriculture will become increasingly important. Thus, the plant breeders will have to turn, in such situations, to the genetic resources found in the primitive type varieties and their wild relatives. And, thus, it is important to preserve those areas of the world, which are rich in plant genetic resources, as biosphere reserves. The importance and sanctity of wildlife conservation for posterity may be illustrated through a well-documented example of the much talked-of 'silent valley.'

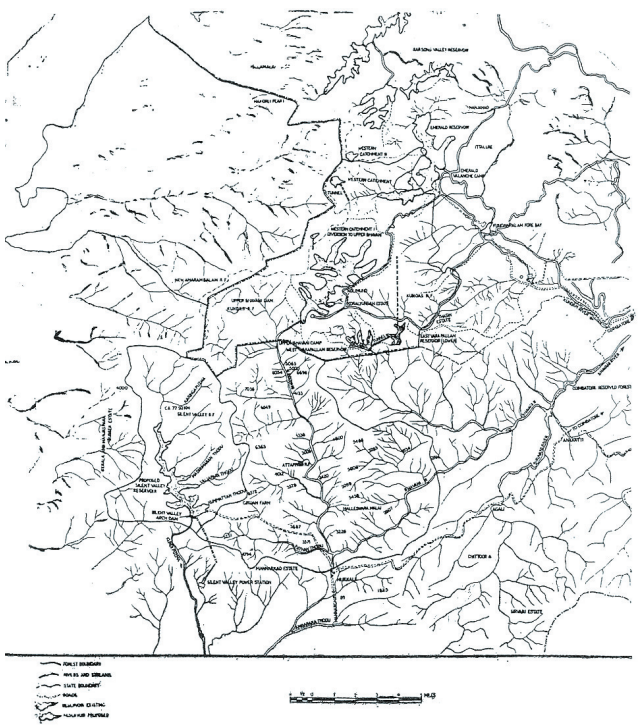
Silent Valley

The Silent Valley forests, also know as Syrendhrivanam, are on a plateau perched at the south-western corner (Latitude 11°5' N and Longitude 76°26' E) of the Nilgiris in the Western Ghats region of Peninsular India. While the local name relates to the era of the Mahabharata, it is believed that the name 'Silent Valley' owed its origin to the relative absence of the *Cicada* insects which cause a distinctive sound in a forest environment.

Lying at an elevation of about 1,100 metres, the Silent Valley plateau is flanked, to the south and the west, by steep escarpments, descending a thousand metres to the plains of Kerala and, to the north and the east, by sheer walls rising

another thousand metres to the upper plateau of the Nilgiris. It falls within the revenue district of Palghat, Kerala, about 45 kilometres north of Mannarghat, the nearest township. On the north, part of the boundary is formed by the vested forests of Nilambur Division and part by the Nilgiris. On the south is the vested forest of the Palghat Division. On the east, the Attapadi reserve forests are continuous with the Silent Valley reserve. On the west, the boundary is shared by the forests of the Nilambur Division. The total extent of the Silent Valley reserve is 8,952 hectares.

The river Kunthipuzha runs all along the centre of the Silent Valley in a north-south direction. Originating at an elevation of almost 2,400 metres on the outer run of the Nilgiris, the river descends rapidly to 1,150 metres on the northern edge of the plateau and then pursues a gentle southwardly course for about 15 kilometres before cascading down to the Mannarghat plains through a gorge at an elevation of 1,000 metres of the southern edge of the plateau. Having an average annual rainfall of 4,600mm over a catchment of 77 km^2, the river Kunthipuzha is expected to yield an annual run-off of 293 mcm, with the steep escarpment of the southern edge of the Silent Valley descending to the Mannarghat Plains at the elevation of about 100 metres. This river offers a straight head of 857 metres, the highest in the Kerala State, for generation of hydro-electric power. The Silent Valley, therefore, offers an attractive site for location of a Hydro-electric Power Project (see Map).



The site (lat. 11°5'33"N and long. 76°27'15" E) selected for the construction of a dam to impound the water as required for hydel power generation is on the southern edge of the Silent Valley plateau where the river transverses through a very narrow gorge. The project, in its first stage, will involve:

(a) Construction of a RCC arch dam (131 metres high and 430 metres long) across the river Kunthipuzha.

(b) Formation of a reservoir submerging an area of 830 hectares and impounding 317 million cubic metres of water.

(c) A water conductor system comprising 4267.2-metre long power tunnel, 259.08-metre long pressure pipeline and 2355-metre long penstock branching into two near the power house end.

(d) A power station on the bank of Kallan Patti, a small stream joining Kunthipuzha at the toe of the hills about eight kilometres from Mannarghat.

The first stage of the project envisages the construction of two power units of 60 MW each, the water conductor system and the power house structure having been designed for the ultimate stage to accommodate all four units. Stated to be completed within six years, the Silent Valley hydro-electric scheme is expected to contribute 522 Mu of electrical energy per annum. Furthermore, the water released from the power house is expected to irrigate about 10,000 hectares of land lower down in Palghat and Malappuram districts.

Case for Conserving the Silent Valley

The concern which has been voiced in India and abroad regarding the consequences that are likely to befall the Silent Valley if the Kerala Government's Hydel Project is pushed through, rests on the following three main foundations:

1. The Valley occupies an area of about 77.5 sq km and its vegetation is typical of the southern tropical wet evergreen forests characterised by high plant species density, rich biomass production, a wide range of biological niches and pathway of energy circulation and adaptability. The former Director-General of the International Union for the Conservation of Nature and Natural Resources describes it as a unique sample of ancient tropical flora and an essential key to understanding the origin and evolution of Indian-Malaysian-Australian Floras. Shri S.K. Seth, former Inspector General of Forests and one of the foremost authorities on forests in India has stated: "It is the finest intact evergreen forest area for scientific research and training purposes. We have enough knowledge of it to recommend, with all the emphasis possible, that this entire valley should be declared a Biosphere Reserve as early as possible".

The Silent Valley with the adjoining forests represents the largest presently available area of this type of forest and the one which has been least disturbed by human interference: and therefore of priceless value for training of botanists; foresters and others for basic studies on the evolutionary processes.

2. The Silent Valley sustains a remarkably rich wildlife (fauna and flora). Its fauna includes four endangered species of mammals, viz., Lion-tailed Macaque, Tiger, Nilgiri Thar and Bonnet Monkey. The absence of human population and easy access has helped in protection and isolation of these animals as well as other biotypes. Recent

surveys carried out through various expenditions from Zoological Survey as well as by some other national organisations and zoologists from other countries have revealed the existence of several, up till now unknown, wild varieties such as a curious hill stream fish, large eels, lizards, a flying snake and a number of limbless amphibians. The Archaeological Department survey on human settlements has come out with a statement that the Valley has never been inhabited even by tribals. Incidentally, it may be pointed out that the Lion-tailed Macaque is one of the only two black monkeys existing in our country. The Silent Valley is the abode for one of the two viable populations of these monkeys existing in the world.

3. The Silent Valley constitutes a remarkably rich pool of genetic resources. A majority of the modern crop varieties and other economic plants have been developed from their wild and weedy progenitors during the past 10,000 years. Crop evolution is a continuous process. High-yielding, disease-free, and nutritionally superior varieties have to be constantly produced to suit a wide range of agro-climatic conditions. Heavy losses through diseases and pests are becoming increasingly important under intensive agricultural practices for evolving high-yielding varieties. Although the present-day varieties are vigorously screened for resistance before their release for cultivation, from time to time a new pest or a virulent disease suddenly develops, causing extensive devastation leading to shortages in food and other materials. Severe losses in rice in Indonesia, as a result of brown plant hopper, has already been mentioned. A frantic search was made and providentially the old *pattambi* rice varieties growing in Kerala were found to be the only ones possessing genes resistant to this pest. These genes have been incorporated in the present day improvement programmes and this operation has been started to alleviate the fears and gain the confidence of the farmers. Many other such examples can be cited.

It has become clear that, as more and more high-yielding varieties of crops and other economic plants are released for general cultivation, the problem of heavy losses through diseases and pests which thrive on the conditions of intensive agricultural practice will become increasingly important. Thus, the plant breeders will have to turn in such situation to the genetic resources found in the primitive types of varieties and their wild relatives. Studies in this direction have shown that certain regions of the world are more richly endowed with plant species than others. The Silent Valley is one of such very rich areas. It would be tragic if the plant genetic resources which have been created through centuries of evolution are allowed to be destroyed.

It is for these reasons the nature reserve and all those who aspire for healthy living strongly recommend that the proposed hydro-electric project in the Silent Valley should not be proceeded with and the Valley along with the adjoining areas be immediately declared as a national park and consequently a biosphere reserve. With more information now at hand, the author is convinced that the 'safeguard' suggested by the Western Task Force of which he himself happened to be a Member-Secretary, would not be able to save the precious ecosystem if the project is implemented.

The Other Viewpoint

However, there has been strong pressure within Kerala for going ahead with the project. An attempt has been made by some persons to denigrate the importance and value of the Silent Valley ecosystem by making statements such as, the Silent Valley is no longer a virgin forest, the species found in the Valley may be found elsewhere, and that the area which will be submerged if the Dam is built comprises only a small part of the total area in terms of percentage, and therefore, would not really damage the Silent Valley ecosystem as a whole. It is obvious that such questions, particularly those relating to the plant and animal wealth actually existing in the Valley, cannot be satisfactorily answered on the basis of individual opinions or casual visits to the Silent Valley but on the basis of factual data collected from the area by plant and animal specialists. Some of the findings of these surveys are briefly recorded here to counter the casual observations.

Plant Life (Flora)

Although only the periphery of the impenetrable forests and the shore vegetation has been botanised, scientists of the Botanical Survey of India have collected over 1,200 species of vascular plants. Amongst the species obtained from the submergible area and considered new to science are a few orchids *(Enlophla propax):* some ferns, *(Tectoria* sp. and a member of the Thalpteridacese), an extremely specialised and endangered aquatic flowering plant, and a climbing bamboo *(Ochlandra).* Many other plants have been noted for the first time in South India and have not been listed by Gamble in his authoritative *Flora of Madras Presidency* or preserved in the Madras Herbarium.

Plants abundant in the Silent Valley which have either disappeared or are scarcely represented outside have been catalogued. The Silent Valley also abounds in plants considered rare, endangered or threatened elsewhere (species of ferns, three ferns—Cycads, Gnatum, Sarchandra).

Mosses are better represented here than in the Nilgiris or the Western Himalayas on account of high humidity, low light intensity, and ideal elevation from the sea level. Over 50 genera and 100 species of mosses and over 25 genera and 100 species of lichens have been gathered and are being identified. Over 41 species of Hyphomycetes— a group of interesting fungi-comprising 36 genera have been isolated from the submergible area. Several of these were unknown to science. The role of micro-organisms in the cycling of biological elements in the biosphere and biological nitrogen fixation is well known.

Some of the world's most spectacular life saving drugs have come from soil micro-organisms. The floor of a tropical rain forest is one of the richest areas for micro-organisms and it would be a pity if this is allowed to be destroyed even before scientific studies have been undertaken which could yield results of outstanding value for agriculture and medicine.

The National Bureau of Plant Genetic Resources has recorded that the submergible area of the Silent Valley possesses a remarkably rich diversity of genetic wealth of several economic plants and their closely related wild species. These include turmeric, ginger, cardamom, cinnamon, nutmeg, black pepper, jackfruit, okra, *Dioscorea, Cestus, Bryanopias* and many important aromatic and

dye-yielding plants. Natural populations in spices like cardamom and pepper showed a great diversity and the plants were free from attacks of diseases and pests, indicating that these gene types could be used for developing resistant cultivated varieties. The six species of wild black pepper exhibit enormous variation in their vegetative and fruit characters and appear to be free from cardamom disease such as cellar rot and quick built. They are, therefore, significant for future improvement of this very important species. Similarly wild relatives of *Arhar, Moong* and Urad showing resistance to several diseases and pests are distributed in the submergible area. These need preservation and could be utilised in developing special varieties of pulss.

Animal Life (Fauna)

The records show 23 mammalian species including the three endangered ones, i.e., the tiger, the lion-tailed macaque and the Nilgiri *langur*. The Zoological Survey of India has recently collected more than 8,000 specimens which have established the existence of many rare and even new species in groups, such as fishes, the amphibia and the reptiles. Even a few new genera have been found to illustrate it further, three species of hill stream fish and a new subgenus of scorpion have been discovered.

The richness of the amphibian fauna from the area exceeded all expectation of the survey teams. As many as 17 different species belonging to newer genera were reported during these explorations. An interesting discovery was the limbless amphibian (or Colecilian) collected in good numbers. Among 2,500 examples of insect collection, more than 250 species are recognised so far. The collection is under further scrutiny.

Among snakes, species like brown whip snake, cat snake and flying snakes, which, so far, were known to Assam and Sri Lanka were recorded. The Pit Viper was found both in the Valley and the New Amarampalam forests. Several other species of insects found more abundantly in the submergible area than elsewhere are also reported.

The zoological explorations mentioned above have given an excellent opportunity to assess the faunal variations and the disappearance or depletion likely to set in as a result of major disturbances by human agencies, in this hitherto undisturbed ecosystem.

Conclusion

In the light of the richness of flora and fauna in the area, one of the points raised by some persons and referred to earlier, that the Silent Valley is not a virgin forest, does not really need even cursory discussion. In the strict sense there are no virgin forests left in India and hardly any in the world because of the increased mobility and increased human requirements and consequent human disturbance. However, the Silent Valley remains the only major forest area of its type in the country largely because of its relative inaccessibility. The studies carried out in the area indicate that though there was an attempt made for coffee plantation in an outer area of the Valley and also some selected felling of trees, especially for providing railway sleepers, yet the Valley with its genetic treasures is still intact.

Recently there has been some damage by the operations of the Kerala State Electricity Board in

preparation for the starting of the Hydel Project, which is still confined to a limited area at one end. As a matter of fact, from his association with the Silent Valley project since 1976 as Member-Secretary of the Western Ghat Task Force and then Co-ordinatior with the expert survey team of April/May 1980, the author emphasises once again that the Silent Valley is the only rain forest available with us, which for all practical purposes is a virgin forest, that is to say, is relatively an undisturbed one.

The argument that there are similar forests of comparable size and richness in other parts of the Western Ghats is not correct. Although at one time there were undoubtedly such forests, they have been reduced to relatively smaller pockets. The Silent Valley is particularly important because, apart from its amazing richness of wildlife, it constitutes, together with the adjoining forests, the largest contiguous belt of relatively undisturbed West-Coast tropical evergreen forest left in the country. It is floristically and faunistically different from similar forests found in some parts of our north-eastern states.

A great deal has been sought to be made of the fact that in terms of percentage only a small portion of the Valley would be involved, overlooking the fact that the heartland of the Silent Valley ecosystems would be submerged. A noted forest expert has stated that "the entire Valley at all levels from its floor to its highest point is an invaluable whole as the floral composition varies at every level in a continual series (ecotones), no part of which can we afford to sacrifise."

The submergence of the ecologically most crucial area of the Silent Valley together with the activities of a large number of workers on the project with their families for several years would no doubt give a shattering blow to the delicately balanced ecosystem from which it cannot be expected to recover and it would be lost forever.

The assertion by some individuals that the Silent Valley does not contain any plant or animals of special importance or which cannot be found elsewhere has been shown to be not determined by factual data. Even the preliminary work done by the BSI, ZSI, and the National Bureau of Plant Genetic Resources has demonstrated the existence of a variable treasure house of plants, animals and micro-organisms including many new forms not only of great interest to science but also vital for future needs of agriculture and other fields.

To sum up, the Silent Valley represents the only remaining undisturbed tropical rainforest of its type in India, built up over thousands of years. It affords the finest intact evergreen forest area for scientific research and training. Its richness and living resources show that it is one of the genetically rich areas with great significance for the future generations in dealing with problems of agriculture, medicine, etc. It belongs to the category which a former Director-General of FAO described as "an invaluable and irreplaceable world heritage."

The climatological repercussions of disturbing the rainforests are also well known. The effectiveness of forests in modulating localised weather patterns is clear and there is no dispute about it. Localised effects of forests on precipitation are documented by Puri (1960, Chapter 21). Lagris and Blasco (1969, pp. 57-59) present evidence that reduction in rainfall in the

Palni hills in the Western Ghats has accompanied the destruction of the wet evergreen forests. It is to everybody's knowledge that large parts of Kerala and Karnataka are dependent for their irrigation water supplies mainly on the monsoon precipitation falling in the Western Ghats. Destruction of the Ghat Shollas or the alterations in their character inevitably endangers water supplies to the region for which these forests serve as catchment areas. Krishnamoorthy (1960) predicted for example, that hydro-electric projects folding many forested valleys in Kerala would threaten rainfall. Fourteen years later Balram (1974) noted that the dam, regulated irrigation projects, based on pre-deforestation rainfall and the predictions are now feltering due to reduction of precipitation in the Ghat areas. Meteorological data from Andaman and Nicobar Islands (the islands are colonised by wet evergreen rainforests) reveal that in the seventees, that is, after the de-forestation programme for rehabilitation, etc., undertaken on the island the rainfall amount is receding gradually, e.g. in 1974 the maximum rainfall was 121.80'' in 1977 the maximum recorded was 91.80'' whereas in 1978 it was only 6.18''up to March.

Further, destruction of even the vegetation cover of the submergible area along with disturbances created by human activities is bound to affect the ecological cycle of precipitation — percolation — transpiration — evaporation. The total surface area of transpiration provided by the total leaf surface of all the plants of the forests which are to be destroyed would be several thousands sq km as against the total water surface area of the full reservoir level, i.e., 8.30 sq km. Thus, the input of water vapour into the atmosphere will be drastically diminished. This is bound to affect the precipitation not only locally but also in the adjoining regions. Deforestation has also been reported to bring about disasters like landslides and cloudbursts, resulting in extensive damage and loss of life.