Preservation of Devara Kadu in Kodagu District - A Resource Economic Study

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DEPARTMENT OF AGRICULTURAL ECONOMICS

UNIVERSITY OF AGRICULTURAL SCIENCES

GKVK, BANGALORE - 560 065, INDIA

2002

Modernalized sanctrum for the diety with shelter (Kemmani Ayappa, Kevady)

Sanctrum for Lord Ayappa in Eguthappa temple

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This study is one of the series of publication brought out by the TOE in NRE. The readers are welcome to offer their constructive comments and suggestions for improvement.

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FOREWORD

Kodagu, in Karnataka is the only district in India, to preserve at least one ecological haven in every village an achievement worthy of acclaim. Each village community maintains a devara kadu (temple forest / forest temple / god's forest / or deity's forest) as a self-imposed norm. Currently, there are devara kadus extending even up to 1000 acres. Devara Kadu has a sanctum housing a trishul or sthamba or a stone idol or a mere altar and an offering place (for vegetarian or animal offering), with or without roof over the sanctum depending upon the deity worshipped and with or without a small water pond to enable worship. Paddy, coffee and cardamom lands the vital farming systems surround the devara kadu. The deity is worshipped by Veerashaivas, Brahmins, Kodavas, Vadakars of Kodagu gowda, Airira, Peggade, Kembattis, scheduled castes and tribes. The first survey of Devara Kadus was conducted by the Madras Topographical and Village Boundary Survey Department during 1863 - 1870 and fixed the boundaries. Government of Mysore also conducted the survey. Devara kadus have both the Central and State Government survey numbers. The Karnataka Forest Department has already begun the resurvey of Devara kadus and about 30 per cent of the Devara Kadus have already been surveyed and boundaries marked. According to the Kodagu Revenue Settlement Report of 1910, there was provision for grazing and utilizing the tree branches and other parts of Devara kadus to meet the needs of the temple. For instance, in the 'Paranamani' horse festival ('Kudure Kali'), the bamboo from 'Badaga' Devara kadu was utilized to prepare 'horse' idol. Similarly 'Dhwaja Stambha' - 'Kodi Mara' was also made from the wood of Devara Kadu.

The history of devara kadus takes us back to the tradition of tree worship in the Indus valley civilization. The 'fig-deity' symbol in the Mohenjodaro excavations dated around 4000 BC[1] represents the 'Rudra Pashupathi' wearing the fig leaves. The Rudra Sukta of Yajur Veda, describes 'Rudra Pashupathi' as the lord of gardens, trees and medicinal plants. Further, the Rudra is depicted as 'Bishagwara' or 'Vanaspathi vaidya' - in 'Rg Veda'. In addition, there is a sukta (poem) in Rg Veda dedicated to 'Aranyani' the forest goddess, who is worshipped as mother of forest flora, fauna and forest ecology. In the pre-vedic time, the communities used to deify the trees and the faith and the rituals attached to the trees influenced the Neolithic age. Later these rituals and faith merged with early vedic tradition. The Madikeri inscription of around 5th century AD describes the maintenance of the tank and growth of Devara Kadu around Sri Vijaya Jinalaya - the jain basadi. The 'Nidutha' inscription of 1278 AD describes the temple tank, temple wet lands and flower garden in 'Siraha Mallikarjuna devara kadu'. The 1372 AD the Paluru inscription of Mahadeva temple and Bhagandeshwara temple of Bhagamandala provides for the development of 'Poovi sthana' or the flower (forest) gardens as a directive by the king. In 1796, the inscription of Madapur Mutt indicates the presence of devara kadu and tank for Mutt. Similarly in Harangi inscription of 17th century, the Bamboo forest of the Chikka Mutt Bidiru Kadu is highlighted. The 1810 inscription of Padi inscribed on the back of silver elephant indicates a 110 acre devara kadu for Igguthappa. The Irpu inscription of 1840-41, indicates the donations of 130 acres of devarakadu by farmers of Kiggattu Hath Nadu. The inscriptional evidences indicate that those who destroy or encroach the devara kadu would get the sin of killing children and being born as urchins for thousands of years. In the historic period, there was a belief

that the 'Yakshas and Yakshis' reside in sacred trees and they used to wear the leaves of sacred trees as head dress. Contemporarily we have in the Kunda betta jatra in Kodagu, those who have vow wear the sacred tree leaves while offering their prayers. This ritual is known as "Betthale kali" in folk tradition. In Tamil literature we find that the kings used to have groves as symbol of 'protecting the town' which were worshipped. The Kashmiri literature cite the existence of sacred groves for satisfying devotee needs. The 'Jathaka' stories of Buddhism even hint at human sacrifice to the *Ficus bengalensis* tree deity upon the condition of winning the war. The worship of 'Sabathai' - an incarnation of 'Parvathi' in Kodagu during 'Suggi Katte' festival has a parallel to the 'Sapta matrika' symbols in Indus valley civilization. The King Chandravarma of Kadamba dynasty in Karnataka is believed to be the ancestor of Kodava community. The name 'Kadamba' is traced to the sacred 'kadamba' tree (*Anthocephalus cadamba*). We see here, the manifestation of tree worship of the indus valley civilization in all communities of Kodagu tradition. Hence we find special significance and meaning in the devara kadus of Kodagu.

Familiar goddesses of Devara kadu, Sabathai, Maramma, Mandathavva, Bhadrakali, Bhagavathi, Durge, Chamundi, Chowdamma, Pannangala Thamme, Neelamma, Kuntiyamma, Nadamma and Cauveramma. The familiar gods are Mahadevaru, Igguthappa, Mahalingeshwara, Iayyappa, Chinnuthappa, Guliya, Kshetrappa, Kanneshwara and Gejjeshwara.

Devara kadus provide values which are not associated with actual use or even the option to use in future. As most devara kadus in Kodagu are in tropical evergreen forest belt, and are treated with spiritual motives which are non-utilitarian, the concept of 'existence value' is appropriate for the purpose of evaluating the conservation efforts of devara kadu undertaken by village communities. This study is the first attempt in this direction. The authors deserve to be complemented for their interest, efforts and commitment towards estimation of non-consumptive use value and existence value by designing a CVM survey to elicit the data from different stakeholders of Devara Kadu in Kodagu. They also highlight the efforts of Dr Kushalappa, Associate Professor of Forestry College, Ponnampet, who took the initiative of arranging the meeting of the Thakkas of most of the Devara Kadus as the first step towards appreciating the existence value and non-consumptive use value of devara kadu. The NATP, deserves rich complements for enabling the TOENRE to undertake this study where existence value, the bridge between environmentalists and economists, is estimated, to value the Devara Kadu institution.

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25th August 2003

[1]*Asko Parpola, "The Fig-deity Seal" from Mohenjo-daro: Its Iconography and Inscription, paper presented at the 10th International Conference of South Asian Archaeologists, Paris, July 3, 1989.*

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EXECUTIVE SUMMARY

Forests are significant natural resources for the development of agricultural economy in Kodagu district of Western Ghats of Karnataka. The sustainable use of forest area is being threatened due to commercial and demographic pressure. The stewardship role of the village community to preserve forests in their virgin condition is manifested through a forest institution called "Devara kadu". Devara kadu is charecterised by a temple of folk tradition surrounded by forest and a temple tank and are preserved for ecological and spiritual linkages. The village community enjoys aesthetics and performs rituals in the annual Devara kadu festivity offering social fencing. This institution brings and binds the village community and family together and in turn strengthens the Devara kadu signaling a code of conduct of preservation for ecological and spiritual needs. Over the past century the area under Devara kadu has reduced from 15000 acres to 5000 acres by 0.6 percent per year. If this continues, at the same pace it threatens the very foundation of the institution of Devara kadu affecting the forest ecology and economy of Kodagu.

The study has the objective of assessing the factors, which shape the preservation of Devara kadu. The existence value of Devara kadu a vital issue receiving wider attention in natural resource and ecological economics is estimated. Transaction cost involved in preservation of Devara kadu is also assessed. Utilising the description and evaluation of 40 Devara kadu of Kodagu, the study relies on the survey information from 80 sample respondents to estimate the existence value. The contingent valuation framework using tobit and logit econometric techniques has been adopted for estimation.

Ethnic and religious diversity of Kodagu is leading towards fused culture and traditions in Devara kadu. The mean willingness to pay towards preserving Devara kadu in their village was Rs. 702 per family, which can be considered as the use value as the respondent has physical access to the Devara kadu. The estimated mean willingness to pay for preservation of Devara kadu of another village was estimated as Rs.86 per family. This willingness to pay is the existence value since the respondent does not have physical access to the Devara kadu. The emergence of a new institution "Devara kadu Thakkamukyastara Vedike" comprising of the temple committee heads of all the villages in the district during 2001 is a testimony for reinforcing the preservation code of forests and trying to restore the encroached Devara kadu land back to the temple committee.

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I. INTRODUCTION

Sacred grove / temple forest or 'Devara kadu' in vernacular is a prime attraction since historic times in Kodagu, from the point of view of natural history. In a recent report Chandrakanth (2001) has reported that 'Devara kadu' with the oldest tradition of megalithic age (about 3000 years) is traced in Kolathod-Bygodu in Virajpet taluk, Kodagu. During that time, hunting – gathering of forest products were in vogue. Considering how significant the sacred grove / sacred site is to the community, societies attributed sacred values to patches of forests within their territories as they did to several other topographic or landscape features. Chandrakanth *et al* (1991) have indicated that worship of trees and plants has been a documented part of religious part of India since the hunting- gathering stage (circa 600 A.D).

The umbilical linkage binding human and nature was passed on from one generation to other. The elements of worship were light, water, air, earth and the cosmos. Ancient civilization with a deeper understanding and common sense approach devised different methods of conserving nature a forerunner of environmental conservation. In early evolutionary stages when life was simple, nature worship was at its pinnacle. In the process several personalities and flora, were identified and sanctified. Worship of trees persisted and became a way of life, leading to a traditional mode of floral and faunal conservation.

Devara kadu are patches of forest land preserved in their virgin condition on sacred sites to assuage deities for ecological balance and spiritual revelation. Devara kadu usually has invariably two entities: (i) the temple (iii) the temple forest (or forest around the temple). In many cases temple tanks also form the part of Devara kadu. Area of Devara kadu varies from a fraction of an acre with a few bunch of trees to hundreds of acres. Nothing is removed from Devara kadu as a tradition. Even dead wood is not removed due to the fear of inviting wrath of the deity. Thus, grazing and hunting are

also not attempted in Devara kadu.

Sacred groves are manifested in different parts of the world. They were common among the ancient Germans, where people were penalized for debarking. Tree worship was prevalent in ancient Greece and Italy. It is also found in Europe, North America, Eastern Africa, China and even in a few Arabian countries. The park cemeteries of North America, the fetish groves of Nigeria, church forests of Ethiopia, Guthi forests of Nepal, Monastic forests of China, Thailand, are a few examples. In India Devara kadu are commonly found in south India are named as Devara bana, Pavitra vana or Devara kadu in Karnataka, Kavu in Kerala and Kovil kadu in Tamil Nadu. In north India, they are known as Deorais or Devrahalisin in Maharastra, Sarnas in Bihar, Vanis, Orans, Kenkris or Shamlaldehs in Rajastan and Lawkyntangs in Megalaya.

Kodagu (Coorg) district in Karnataka, famous for the tropical evergreen forest, is the home for the sacred worship of trees and hence the name Devara kadu. These forests are a unique concept in nature conservation with peoples' participation and management. Kodagu located in the Western Ghats is derived from "Kodimalainad" meaning 'dense forest on steep hills'. The other view is that, Kodagu means the country of millions of hills as a mountainous configuration. The main range of Western Ghats extend to about 100 km from the Bramhagiri (average elevation 1360m) forming the southern boundary with the Wynad plateau of Kerala, upto Subramanya in the north west. Several long and elevated ridges run west to east from this portion of the Western Ghats. Incidentally, the other Bramhagiri peak near Bagamandala is the source of the river Cauvery, the most revered and venerated rivers in the country. This hilly district is divided into two zones, the uplands in the west, potentially a very high rainfall zone of evergreen forests and the low lands in the drier eastern fringe, the zone of moist deciduous forests.

Kodagu scenery is dominated by forest interspersed with valleys, which after the month of August appear greener with paddy crop. In the west and

north, the country raises to high peaks measuring from 3,800 feet to 5,724 feet. Wherever possible, the valleys are formed into flats and terraces for paddy cultivation and high lying lands are cultivated with coffee, orange, cardamom and pepper. Dotted all along, the valleys are the Devara kadu of varying sizes with different degrees of protection. According to the Karnataka Forest Department, Devara kadu in Kodagu district are sacred forests assigned to a particular deity or temple.

The privileges and rights such as extraction of firewood for temple worship, materials for erection of pendals and timber for temple construction vests with the temple committee. The villagers generally do not harvest anything from Devara Kadu. They offer social fencing to the Devara Kadu. The forest department has formulated a set of rules to preserve the Devara kadu.

Forest rules for Kodagu under section 31 of the Indian forest Act, VII of 1878

1. All Devara kadu shall be recognized as sacred, and shall be so maintained throughout the whole area, which is entered in the register as belonging to Devara kadu.
2. All felling, lopping, clearing, pruning, or burning of trees within the limits of Devara kadu is prohibited.
3. No timber wood, branches, grass or any other produce shall be removed from the Devara kadu on any pretext. Whatever, except on special permission which may be granted by the commissioner: provided that the villagers shall continue to enjoy such prescriptive rights as they may now possess with respect to gathering leaves and creepers, and to taking fallen branches which may be needed for use in the temple. Also the public officers may, with permission of the commissioner, remove such stone or gravel as may be required for a public purpose.
4. No cultivation of any kind shall be allowed in any Devara kadu.

Source: Joint Forest Management -Devara kadu Report (2001)

Forests in Kodagu district

Kodagu district is fifth in the state in respect of forest area with 20 per cent of the total forest area of the state. The geographical area of 4,102 sq km has forests of 1,259.52 sq. km forming 30 per cent of the area. This works out to 0.96 hectare of land area per person of which 0.29 hectare (30 percent) is forestland. The reserve forests account for 1,136.46 sq. km of protected forests. Kodagu has nine forest circles, further subdivided into four divisions for administrative convenience. Madikeri division has 858.16 sq. km of the district's forests and remaining is in Virajpet division and Hunsur wildlife division.

Due to increasing pressure of migrant population from neighboring Kerala, the forest area is rapidly reducing over time (*Table 1.1*). Shift in cultivation, over grazing, encroachments of forest land for cultivation of coffee, conversion of forests into agricultural land, collection of firewood and forest fire are contributing for reducing the forest area. Earlier the Devara kadu lands were well protected. However even such lands are being slowly encroached for commercial interests threatening their very existence.

Table 1.1 Forest land in Kodagu in 1960 and 1980

Sl.-No.	Particulars	Forest area in Sq. kms.	
		1960	1980
1	Geographical area	4102	4102
2	a) Area with good forest b) Denuded forest area	945 125	825 245
3.	a) Unreserved forests (Paisary land) having good forest cove b) Denuded forest area	120 44	40 134
4.	a) Betta or kan or soppina betta or bam lands having good forest b) Denuded forest area	470 30	70 490

Source: Coorg Gazetter (1992)

Status of Devara kadu in Kodagu district

Devara kadu exists in all villages of Kodagu district and each Devara Kadu is named after a specific deity. Kushalappa (2000) reported that there are about 1214 Devara kadu in Kodagu district, of which 557 (46 per cent) are of less than one acre size. 45 percent of the Devara kadu area is around 5 to 10 acres. About 4 per cent of the Devara kadu are more than 25 acres in size (*Table 1.2*).

Table 1.2 Area wise distribution of Devara Kadu in Kodagu district, 2000

Extent (Acres)	Virajpet taluk	Percent	Madikeri taluk	Percent	Somwarpet taluk	Percent	Total	Percent
0-1	210	41.34	109	38.38	238	56.40	557	45.88
1.01-2	89	17.52	45	15.85	70	16.59	204	16.80
2.01-3	46	9.06	19	6.69	29	6.87	94	7.74
3.01-4	38	7.48	16	5.63	18	4.27	72	5.93
4.01-5	25	4.92	14	4.93	13	3.08	52	4.28
5.01-10	50	9.84	34	11.97	28	6.64	112	9.23
10.01-15	7	1.38	15	5.28	7	1.66	29	2.39
15.01-20	16	3.15	9	3.17	7	1.66	32	2.64
20.01-25	9	1.77	5	1.76	1	0.24	15	1.24
>25	18	3.54	18	6.34	11	2.61	47	3.87
Total	**508**	**100.00**	**284**	**100.00**	**422**	**100.00**	**1214**	**100.00**

Source: Joint Forest Planning and Management- Devara kadu Report 2001

Devara kadu area has drastically reduced by 62 per cent during the period 1905 –1985. It is in order to analyze the institutional and economic factors for preservation and degeneration of Devara kadu. This calls for estimation of existence value of the Devara Kadu to appreciate the preservation value of the village community. Resource economists use the term "existence value" to refer to non-use values accrued due to non-accessibility to resource. This answers the key question, "Even though the

interaction is indirect and off-site (akin to the willingness to pay for preservation of Amazon, even though one may not visit at any time), what is the willingness to pay for the preservation of Devara kadu". The costs involved in preservation of the Devara Kadu called the transaction costs also need to be estimated.

Table 1.3 Status of Devara kadu in Kodagu District

Devara kadu	1873	1905	Variation	1985	Variation
Number	873	-	-	1214	39%
Area (acres)	10865	15506	+ 43%	5947	-62%
Status	Protected forests	-	-	Protected forests	-
Ownership	KFD*		_	KFD	_

* *Karnataka Forest Department*
Source: Kalam (1996)

This study focuses on the factors responsible for preservation as well as valuation of the institution of Devara kadu in Kodagu district with the following specific objectives (and underlying hypotheses).

Objective 1:*Analysis of historical, institutional, social and economical factors influencing preservation of Devara kadu.*

Hypotheses:

a) Preservation of historical traditions and institutions have led to preservation of Devara kadu

b) Pressure of population due to immigration and remunerative economic returns from plantations have contributed towards dilution of Devara kadu institution.

Objective 2: *Estimation of existence value of Devara kadu in Kodagu district*

Hypotheses:

a) Willingness to pay for preservation of Devara kadu is directly proportional to income, education.

b) Willingness to pay for preservation of Devara kadu is directly proportional to monetary contribution to family festivals

Objective 3: *Assessment of transaction costs involved in preserving Devara kadu*

Hypotheses:

a) Encroachment of Devara kadu enhances transaction costs

Special feature

This study presents the present status of conservation of Devara kadu in Kodagu district. In the process the existence value of Devara kadu is also estimated. The existence value indicates concern and attachment of the community to preserving Devara kadu. In this study, the various factors that have led to the preservation of Devara kadu and also the transaction costs involved in preservation are highlighted. Findings of the study will be useful in chalking out plans, programs and policies to preserve the Devara kadu.

II. METHODOLOGY

2.1 Description of the Study Region

Kodagu a picturesque district is in the south - west part of Karnataka State. Kodagu is a highland occupying the eastern and western slopes of the Western Ghats, covered with primeval forests or grassy glades and broken by few cultivated valleys. It lies between latitude 11^0 56^1 – 12^0 52^1 north and longitude 75^0 22^1 – 76^0 11^1 east bounded on north by Hassan district , on the west by Dakshinna Kannada , on the east by Mysore district and in the south by Cannonore district of Kerala state. The physical features of the district are varied. The southern, western and northwestern portions are intersected by a network of hills and forests and subjected to heavy rainfall. The northeastern and most of the eastern parts are different and resemble the adjoining Mysore district. The capital of the district, Madikeri is about 3,800 feet above mean sea level (Kodagu District Gazetteer, 1993). Bramhagiri peak near Bagamandala is the place where the holy river Cauvery, the most revered and venerated rivers in the country takes its birth. This hilly district are divided into (i) uplands in the west, a very high rainfall zone with evergreen forests and the (ii) lowland in the drier eastern fringe, the zone of moist deciduous forests.

In this district forests are interspersed by valleys, which in the rainy season are planted, with paddy crop. In west and north the district raises to high peaks measuring from 3,800 feet to 5,724 feet. Wherever possible, the valleys in Kodagu are formed into flats and terraces for rice cultivation and high lying lands are cultivated with plantation crops such as coffee, cardamom and pepper.

2.2 Sampling Scheme and Data Base

Kodagu district was purposively selected for this study as it consists of the maximum number of Devara kadu in which traditions are followed as before. There are about 1214 Devara kadu in Kodagu district covering about 5000 acres. The district is broadly divided into two forest divisions namely-

the Madikeri forest division a very high rainfall zone of evergreen forests and the Virajpet division in the drier eastern fringe, the zone of moist deciduous forests. From these two ranges four villages each were selected at random, thus, from each village 10 respondents were chosen at random.

2.3 Collection of Data

In order to identify the factors influencing the preservation of Devara kadu, primary data relating to the details of Devara kadu were obtained for a total of 15 Devara kadu. For another 25 Devara kadu secondary data were obtained from the forestry college Ponnampet (Kushalappa(1999)) collected from committee members involved in the management of forest Devara kadu. Information specifically related to the area of the Devara kadu, encroachment, deities associated, festivals celebrated, rituals followed, different communities involved and development activities undertaken in the Devara kadu.

The researcher using a pre-tested questionnaire during the months of May - June 2001, personally interviewed respondents. Information regarding knowledge and opinion on Devara kadu, current contribution made for the Devara kadu to which the respondent visits and also the Devara kadu which s/he does not visit was also obtained. Further their annual willingness to pay for preserving the Devara kadu in their village as well as the Devara kadu in another village that they normally do not visit was also obtained. Information relating to socio economic aspects like social role, education, family composition, land holding and crop economics were also elicited from the respondents. Information regarding the traditional values the respondent holds towards his ancestral home the "*Iynmane*" and "*Kaimada*" and his contribution to the same was also collected, along with his opinion regarding the land tenure system in Kodagu.

In order to list the different kinds of transaction costs involved in preservation of the Devara kadu the following information was collected. The collective action by the village community towards getting back the encroached land, time and money spent in this process, judicial costs, costs

of fencing, present status of securing the original size were obtained. Besides suggestions for preservation of Devara kadu in Kodagu were also elicited.

2.4 Method of Analysis

2.4.1 Estimation of existence value

Theoretical framework for the analysis of Existence value:

Existence value is commonly known as the value an individual has for the existence of a resource from which he does not derive any use. The idea of non-use value was first put forth by Krutilla (1967) when he criticised the traditional economic rationale for conservation on the ground that it did not address itself to the issue of preservation and provision for the future. Traditional economic rationale for optimal resource use would consider the stream of net benefits from alternative uses and choose that particular alternative which yielded the maximum net present value. Krutilla (1967) suggested that the preservation or destruction, of a "grand scenic wonder or unique and fragile ecosystem" directly effect an individuals real income on account of the value people have for them.

Krutillia (1967) recognised that existence values were not limited to naturally occurring resource. The concept could also be attributed to man made resources or items such as rare works of art. What he saw, as the foundation of existence value was uniqueness. What made existence value of natural resource different than those for other goods was that many environmental amenities can potentially effect society for innumerable generations. He defines existence value as "willingness to pay for retaining an option to use an area or facility that would be difficult or impossible to replace and for which no close substitutes are available. The demand may exist even though there is no current intention to use the area or facility in question and the option may never be exercised. Such a demand may exist among others who place a value on the mere existence of biological and /or geomorphic variety and its widespread distribution."

According to Monaka (2001) existence value has been variously defined in the literature and includes bequest value, cognitive, non paternalistic altruism, paternalistic altruism, option value, ethical, moral and social values. Since most of these preferences are not measurable in terms of Hicksian compensatory or equivalent welfare measure they are strictly non-economic, social and universal values and should be excluded from economic efficiency analysis. Therefore, she defines existence value as cognitive in nature, it is the value placed on simply knowing that resource exists, independent of cultural and future use values. Economic Existence value is a non-use or passive use value because the individual does not derive direct and indirect use. This is a better definition with relevance to this study, as we cannot be valuing the social and ethical values people have for Devara kadu. It is a religious way of preserving the forest for the present and future generations. In this study economic existence value of Devara kadu is estimated.

Method

Contingent valuation method (CVM) is commonly used to measure existence value. CVM is a way of using carefully worded surveys to determine what people would be willing to pay (or willing to accept in compensation) for a specified environmental change, by creating a hypothetical market like situation. There are four sources of biases in contingent valuation measure. They are (i) strategic, (ii) design, (iii) hypothetical and (iv) operational bias. Strategic bias is a free rider problem and emanates from the problem of getting individuals to reveal their true preferences. Design bias arises from various sources like starting point bias, vehicle bias (i.e. mode of payment) and information bias. Hypothetical bias arises, if bids in the hypothetical market are different to the actual market bids and operational bias arises on issue of whether hypothetical situation are consistent with the actual choices that are made.

Thus, a proper contingent valuation schedule is essential. In this study knowledge and opinion about preservation of Devara kadu was elicited. Before asking them their actual willingness to pay for preservation of Devara kadu their actual contribution for the festivals in the Devara kadu of their

village and also contribution for festivals in another village was obtained. This is done with the objective of making their actual contribution as basis for eliciting the respondent's true willingness to pay for conservation and preservation of the Devara kadu. According to the definition of existence value it is the value placed on simply knowing that the resource exists, independent of any present or future use.

A respondent contributing towards preservation of the Devara kadu in his village will have non-consumptive value as he is deriving an indirect benefit. However since existence value is based on the valuation due to non-accessibility to the natural resource, we elicit the respondent's willingness to pay for preservation of the Devara kadu in another village which s/he does not visit and thus does not derive any direct benefit from the same. Even when the interaction with the Devara kadu is indirect and offisite, a respondent's WTP represents the existence value.

Respondents were confronted with the Dichotomous choice (DC) Contingent Valuation questions. The questions pertaining to willingness to pay for preservation of Devara kadu in the respondent's village as well as in another village was DC format type. That is the respondent was confronted with an offered amount; then, in the next two follow up questions, was asked to specify his or her bid. Thus, it is argued that the specified bid amount is the respondents' true willingness to pay. This was mainly because the respondent's annual willingness to pay for preservation of Devara kadu was elicited thus trying to obtain his true willingness to pay.

The logistic model was used to find factors influencing the willingness to pay for preservation. These factors were separately estimated for willingness to pay for preservation of Devara kadu in their own village (WTP1) and WTP for preservation of Devara Kadu in another village (WTP2).

The logit model is used to capture the qualitative choice and uses the MLE method. If OLS estimator minimises the distance of the observations from the regression line, MLE maximizes the log likelihood (LL), which reflects how likely it is that, the observed values of the dependent variable

may be predicted from the observed values of the independents.

When the dependent variable is dichotomous in nature application of linear regression model leads to erroneous results. Under such circumstances binary choice models are used and assumed that individuals are faced with a choice between two alternatives and that the choice they make depends on the characteristics of the individuals. The purpose of these models is to determine the probability that an individual with a given set of attributes will choose one or the other alternative. The simplest form of the model involves the dependent variable assuming a binary response, which takes values of 1 and 0. The commonly used qualitative response models in economic analysis are the linear probability model, the logit model and the probit model.

The logit model used in the study is

$X = f(X_1+X_2+X_3+X_4+D_1)$

Where X = willingness to pay (1/0) towards preservation of Devara kadu

X1 = Income

X2 = Education

X3 = Monetary contributions towards family festivals

X4 = Bid amount

D1 = Clan (1/0)

The logit model based on the logistic probability is specified as:

$$Pi = f(Z_i) = f(\alpha + \Sigma \beta_i X_i) = 1/1+e^{-z}$$

$$\text{Where, } Z_i = \alpha + \beta_i X_i$$

After simplifying the above the formula for estimation of the logit model is expressed as

$$Z=\log (P_i/1-P_i) = \alpha + \beta_i X_i = L_i$$

P_i = Probability that the randomly chosen respondent has willingness to pay for preservation or for enhancing the Devara kadu in his village or in another village.

$1-P_i$ =Probability that the randomly chosen consumer is not having willingness to pay for preservation or for enhancing the Devara kadu in his village or in another village.

b_i = coefficient to be estimated

X_i = independent variables.

e = base of natural logarithms, which is approximately equal to 2.71828.

L_i is called the logit as it follows the logistic regression.

Pi/(1-Pi) is the odds ratio in favour of a randomly chosen consumer having willingness to pay. It is the ratio of the number of chances that the respondent is having willingness to pay for preservation or for enhancing the Devara kadu in his/her village or in another village to the chances that he/she is not WTP. Here, odds ratio less than one corresponds to decreases, for example the odds ratio of .486 indicate that for every one chance that he is WTP, there is 0.5 chance that he would not be willing to pay.

Tobit model

Having estimated the odds ratio, which reflects the probability that a respondent is willing to pay to the probability that the respondent is not willing to pay to preservation, it is in order to estimate the actual willingness to pay for preservation using the tobit model. The dependent variable in this model used to obtain the existence value is the 'actual amount' that each respondent would pay for preservation. In this study, since the range of this variable is limited due to the bid amount (no bids below 0 are allowed) the tobit estimation procedure was used. Data can be either truncated or censored. Data is "truncated" when both the X's and the Y's are missing. Data is "censored" if we have the X's but not the Y's. Censoring issues sometimes arise with discrete estimation. Because when the dummy variable takes a value 1, we may actually see what happens, and when the dummy variable takes a value 0, we don't. Ex: Predicting the taste for cars. If you buy a car, we can also observe how much you pay; but if you don't buy, we don't know anything specific about your taste for cars. One way to cope with censored dummy data is to use the Tobit model. A Tobit applies MLE to estimate the coefficients and enables us to obtain the global mean of the

dependent variable, which has zeroes in it. Estimating regular model on censored data leads to attenuation bias.

Tobit model from the limdep package was used to find the respondents actual willingness to pay towards preservation of Devara kadu in their village and also in the other village to which they do not visit. The respondents' willingness to pay towards the other village for preservation (WTP2) was considered as the existence value the respondent has towards the Devara kadu. This was considered as the willingness to pay is purely based on non-use value as the respondent does not derive any kind of benefits from the Devara kadu, which exists in another village. WTP1 was used as the base to check the accuracy of the willingness to pay and also the estimated existence value.

2.5 Transaction Costs

A simple tabular analysis was adopted to identify the different types of transaction costs involved in preservation of Devara kadu in Kodagu district. Primary information was collected from the planters with active participation in preservation of the Devara kadu and also the president and members of the temple committee who manage the Devara kadu.

III. RESULTS AND DISCUSSION

3.1 Factors Influencing Preservation of Devara Kadu

3.1.1 Historical analysis

The sanskrit hym describing the *Ficus religiosa* says that " I bow you representing the upanishaths, you the king of trees" in Satyavadi Adya, Puja vrikshagalu 5 (1983) as quoted by Chandrakanth and Jeff Romm (1991). According to Ashton,(1988) as quoted by Chandrakanth and Jeff Romm (1991) Hindhus have inherited perceptions of people who have lived since ancient times in a humid climate particularly favorable for forest life. People with such perceptions see themselves as one with the natural world , as both custodians and dependents . The people of India continue to harvest an astonishing diversity of products and thus have considered them to be traditionally sacred.

Tree worship in India dates to the vedic period. According to Chandrakanth and Nagaraj (1993) species that are viewed as religious throughout India often display a syncretic evolution of meaning over time. An example is the "fig deity seal" from the ruins of Mohenjadaro, the center of the Indus valley civilization that flourished about 3000.B.C. Asko Parpola (1989) presented the iconography and inscriptions of the "fig diety seal" at the 10th International Conference of South Asian Archaeologists, Paris. According to him sacred trees are also observed in non- Hindu religion. In Jainism, which is older than Buddhism, each of the 24 Thirthankaras was associated with a different species of trees. Texts of vedic religion, practiced on Indian soils as early as 2000 B.C. describe fig trees as housing the fertility spirits of "Ghandharva" (male) and "Apsara" (female). A fig tree (*Ficus religiosa)* or the pepal tree alive today in Bodhgaya , India is believed to have sheltered Buddha when he gained "Nirvana"(knowledge) in the sixth century B.C. The Budhist emperor Ashoka also planted this species wherever he spread the new religion (Chandrakanth and Jeff Romm (1991)).

It is an accepted belief that "yakshas" and "yakshis" reside in the sacred trees with the leaves of sacred trees as their headdress. This belief can be

seen in the Mahabaratha epic too. In the tribal areas of Kodagu, like the kunda betta jatra, people adorn the leaves of sacred trees while offering prayers. According to the epilogue of the Kodagu Forest Manual the worship of "Sabathai" an incarnation of Goddess Parvathi in Kodagu, the suggi katte festival has a parallel in the "sapta matrika" symbols of the Indus valley civilization. (Chandrakanth and Nagaraj (1993)).

The inscriptions (Madikeri 5th century, Nidtha 1278 AD, Palur 1372 AD, Harangi 17th Century, Madapur 1796, Padi 1810) say that damaging Devara kadu is a sin and it is like killing children and they are believed to be born as urchins for thousands of years , (Chandrakanth and Nagaraj (1993)).Some of the sacred groves may have had their origin in more secular causes in particular for the preservation of a valuable tree or a climber. Looking into the inscriptions collected and mentioned above we can consider that preservation of sacred groves has been possible due to the strong emotional and cultural beliefs that was imparted to the community. Comparing the felling of a tree to killing a child inculcates emotional barrier towards cutting a tree in a sacred grove.

The rulers of Kodagu used to grant forestland to a deity or a temple, which was designated as "Devara kadu". In 1367, the Nayaka rulers of Kodagu had donated 150 hectares of forest, as per the inscriptions available to Shri Mahalingeshwara temple located at palur betta at a distance of 25 kilometers from Madikeri. (Chandrakanth and Nagaraj (1993)).Origin of the grove was also due to the dedication of land to a temple or to a deity by the rulers or a particular family for a religious purpose or as a way of thanking the deity for the favours received. The belief that wishes will be fulfilled if they pray to the particular deity, increased the faith among people and the traditions continued.

3.1.2 Social factors influencing preservation of Devara kadu

Society has played an important role in preserving the grove as it exists in the present situation. The historical origin of the grove along with the spiritual influence and institutional management(temple committee) have made

the population to involve in the preservation of the grove.

Devara kadu have the deity, the temple tank (in a few cases) and the temple forest surrounding them. The Devara kadu are invariably named after the deities (*Table 3.1.1*). For instance, Igguthappa devarakadu houses the Igguthappa deity. Among the deities "Ayyappa", "Bhagavathy", "Chamundi," "Bhadrakali" and "Mahadevaru" seem to be common irrespective of the ethnic diversity in Kodagu.

Bhagavathy" deity is associated as protector of village, (Grama Devatha). Usually a sanskritized temple with a priest assigned to take care of routine rituals is built housing Bhagavathy. Some deities are represented as 'trishuls' or in 'stone form'. Kodagu people love hunting in the wild. Some times 'earthen images of dogs' are offered to appease the deity to seek a good hunt.

Ancestor worship is a well-respected custom among kodava communities. Some families worship their ancestors for their contribution through stone images kept on the altar of the Devara kadu[1]. It is believed that deities like "Chamundi" and "Bhadrakali" are ferocious and inflict serious illness or death to offenders. Animal sacrifice is in practice to appease such deities to calm them down. However, the practice of animal sacrifice is fading due to popular movements[2]. At present, deities being appeased with rice, coconut are on the rise. Only in cases of absolute belief and necessity, sometimes, chickens are sacrificed. Monetary contributions are also on the rise.

As may be seen from the Table (3.1) most of the cults around which the sacred groves exist are lord "Ayyappa" and "Bhagavathy". This is mainly

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1. An example for this can be see in Nariyandada village, Virajapet taluk, in respect of Boveranda family who are the Thakkas of the Bhagavathy Devara kadu. Here this family worships the ancestral priest ,who became a martyr during a village clash two centuries ago. This family worships this slain priest who was killed when he was forcibly bringing the deity from the neighboring village.

2 A movement heralded by Ms Maneka Gandhi has a mass appeal to stop animal sacrifice

Table 3.1.1: Deities in a sample of Devara kadu (secondary survey)

Sl. No	Village	No. of Sacred groves in the village	Name of the devara kadu	Area (acres)	No. of HH	Population in the village	Deities	Devara kadu festival time
1	Mayamudi	2	Manni Ayappa	61.79	350	1800	Ayappa	May
			Mahadevara kadu	8.00			Badrakali	Nov
2	Hathuru	3	Vana badrakali	16.37	626	2634	Badrakali	
			Ayappa d.k	2.52			Ayappa	no festival
			Mahadevara kadu	3.08			Mahadevaru	15-Jul
3	T Shettigeri	1	Korakotu Ayappa	30.00	180	2000	A,B	14-Apr
4	Kotooru	3	Ayappa d.k	7.00	69	325	Badrakali	Sep
				7.00			Ayappa	Nov
			Mahadevara kadu				Mahadevaru	May
5	Bagagarakeri	7	Amara Ayappa	1.79	340	3000	Ayappa	May
			Ayappa	1.36			Bagavathy	
			Bagavathy	0.35				
			Mahadevara bagavaty	3.97				
			Ayappa	15.62				
			Kakitu Ayappa	2.80				
			Punya Bagavathy	9.61				
6	Nallur	3	Betekara d.k	1.33	87	700	Ayappa	May
			Ayappa d.k	8.25			Mahadevaru	
			Mahadevara kadu	1.58				
7	Konageri	1	Ayappa d.k	15.48		800	Ayappa	15-Mar
8	Ervathokulu	3	kappu kadu	65.00	50	350	Badrakali	once in 3 years
			Chamundi kadu	3.00			Chamundi	June
			Ayappa dk	2.00			Ayappa	May or June
9	Balyamanoor	2	Ayappa d.k	1.58	65	350	Ayappa	May 26,27
			Govinda dk	1.30			Chamundi	
							Badrakalid	
							vishnumurthy	

Contd....

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Sl. No	Village	No. of Sacred groves in the village	Name of thedevara kadu	Area (acres)	No. of HH	Population in the village	Deities	Devara kadu festival time
10	Mythadi	1	Bagavathy dk	0.45	30	150	Bagavathy	May 23,24
							Ayappa	
							Chamundi	
							Badrakali	
11	Devanagiri	5	Chamundi bana	0.07	206	798	Chamundi	May
			Tathapa dk	2.35			Tathapa	
			Ayappa dk	20.25			Ayappa	
			Angarappa dk	0.11			Angarappa	
			Bagavathy dk	0.38			Bagavathy	
12	Ammathi	3	Badrakali dk	3.00	200	520	Badrakali n	May 15,16
			Badrekali d	3.00			Ayappa	
			Ayappa dk	3.00			Subramanya	
13	Kolakeri	1	Belekara Ayappa dk	9.50		700	Ayappa	March22-28
							Bagavathy	
14	Ballamavati	3	Bagavathy dk	0.90	159	914	Bagavathy	
			Poni Ayappa	56.00			Bagavathy	March
			Korchandela Ayappa	6.00			Ayappa	
15	Perur	1	Patta kani dk	26.96	90	1800	Sri guthappa	March
16	Kotagadelu	2	Eruli bana	1315.00	70	1500	Durga parameshwari	
			Kudike Ayappa	1.90	70	1500	kshethrapacham - undi	
17	Garwale	1	Nadamma devara kadu	78.87	184	1272	Eshwara, Subraya	
18	Kadakal	2	Kedakal dk	32.20	375	3500		
19	Tolluru shetalli	4	Suggi dk	0.56	350	3500	Subaamma, Beera	
			Hedevara kadu	4.14			Urodeya	April
			Beera devara bana	3.56			Basaveshwara	
			Basavvanna db	1.79				

Source . Forestry College, Ponnampet (2000

Table 3.1.2: Deities in a sample of Devara kadu (primary survey)

Sl. No	Village	No. of Sacred groves in the village	Name of thedevara kadu	Area (acres)	No. of HH	Population in the village	Deities	Devara kadu festival time
1	Narandada	1	Bagavathy dk	6.20	200	1200	Bagavathy	April21-2
							vishnumurthy	
2	Chetavara	2	Ayappa	0.74	250	1500	Ayappa	
			Pudiodiyamma	0.40			Pudiodiyama	
3	Marandoda	3	Bagavathy dk	9.00	200	1000	Bagavathy	
			Sarthav bana	19.00			Sarthav	
			baliya bane Ayappa db	1.44			Ayappa	
4	kokeri	2	Bagavathy dk	10.00	300	1500	Bagavathy,Ayap-pa	April
			sarthav bana	0.50			Sarthav	16-Dec
5	Karada	1	Bagavathy dk	9.82	275	1500	Bagavathy	may
6	Palangala	3	Keemani Ayappa	113.00	150	800	Ayappa	19-Mar
			Bagavathy dk	5.00			Bagavathy	17-Mar
			Pottola Vishnumurthy	2.50			vishnumurthy	28-Mar
7	Kavady	4	Badrakali bana	2.57	350	2000	badrakali	
			Ayappa	3.50			Ayappa	
			Bagavathy dk	3.86				
			Badrakali	2.00				
8	Billugunda	3	Mahadevarra kadu	0.50	400	2000		
				1.88				
				5.73				
9	Evakapadi	2	Pannangala	3.00	100	600	Thamme	16-Dec

because, there is a tradition of existence of Goddess "Bagavathy" for every village(ooru), "Ayappa" for every sub-village(keri), Naga for a group of houses (oni) and "Guru karana" for every home. Along with these deities, "Chamundi", "Badrakali", and "Mahadeva" deities are also associated with the grove, mainly depending on the clan diversity of the village.

The Devara kadu festivals are village fairs usually held during the month of May-June. With minor variations with regard to specific deities, Devara kadu festivals are common throughout Kodagu district. The rituals such as "Tere" "Thadambu dance" "Ethuporata", "Agni keri", "Bolakat", "Kattu" are common across Devara kadu festivals. All the communities in the village participate in the Devara kadu festivity.namely Kodavas, Amma Kodavas, Koyyava, Kumbara, Kudiya, Panika, Banna, Heggade, Kaapaala, Kembatti, Irri, Meda, Vakkaliga Gowda, Jamma Gowda, Kuruba, Yerava and Bramhin are the major communities traditionally associated with Devara kadu festival.

Even though the concepts of Devara kadu originated with nature worship, over the period of time in majority of the Devars kadu the deity is personified in the form of an idol/ symbol. In a few villages Bhagavathy and Ayyappa are worshipped in sanscritized temples.by and large worship in folk traditions is a common feature in most of the Devara kadu. Animals are sacrificed to appease the deity . Female animals It is observed that only male and not female animals are sacrificed to appease the deity since females contribute more through off springs for the betterment of the farming community. According to Chandran *et al* (2000) Communal hunting is organised at least once a year to appease the deities of the groves by involving the communities like the Hallakivokkaligas and Namadaries of Uttara kannada and the Kodava of Kodagu. Where the deities have been sanscritzed the hunting and animal sacrifice has been discontinued. In Kodagu it is particularly so with the deity "Ayappa" since it is referred to as "Botegara (hunting) Ayappa". Many rituals are followed in these groves to bring good rainfall, health of livestock and fending off disasters. Kalam (1996) mentions offering of miniature images of cattle and buffaloes to the grove in Ayappa Devara kadu to keep their livestock healthy.

Kodagu has attracted diverse communities from most parts of south India, especially, Kerala due to the better standards of living due to employment opportunities in plantations and also pleasant weather. This added to the ethnic and religious diversity of Kodagu and lead to the fused culture and traditions in Devara kadu too. At present, great importance is attached to the rituals and festivities in the Devara kadu. in those Devara kadu were sanscritized temples are planned, the village community is felling trees for the purpose of construction of temple. In addition, to provide space and other amenities for the increasing no. of devotees trees are being felled. If this continues this may result in denudation of Devara kadu at a fast pace.

Routine (daily) worship is not a common phenomenon in the Devara kadu. It is observed that deities who have sanskritized temples have daily worship in a few places. As most of the Devara kadu are in the folk tradition, all village communities conduct the festival jointly once a year. In some cases, there are also festivals once a month. Festivals, precisely the getting together of village communities with a sense of belongingness to the culture of Kodagu is strengthening the social fencing and the commitment for preservation and sustenance of Devara kadu tradition in Kodagu.

3.1.3 Institutional factors influencing preservation of Devara kadu

The local management of Devara kadu is with the village community even though the Devara kadu legally belongs to the State Forest Department. Periodically due to its forest wealth, Kodagu attracted diverse communities specifically from Kerala. Initially the interest was on timber and spice trade. Over time, those involved in trade gradually started settling. This added to the ethnic and religious diversity of Kodagu. Earlier to this diversity, the management responsibility of Devara kadu vested with specific families, with the head of the family assuming the role of "Thakka", as being duty bound to oversea routine upkeep, maintenance and festivals. As it became difficult for individual families to manage the affairs of the Devara kadu and

as the village community offered 'social fencing', the communities thought it as wise to involve the other communities in management. At present, most of the villages have 'Devara kadu committee" with diverse group of members. The committee meets periodically and plans activities that promote preservation of Devara kadu tradition, like developmental activities, organization of the festival, collection of funds and maintenance of Devara kadu. During the survey it emerged that the temple committees lack powers, which enable them towards better management of Devara kadu. For instance, they do not have any powers to preserve the Devara kadu from being encroached.

According to the State Forest Department Devara kadu are notified as protected forest areas way back in 1888. The provisions of reserve forests are also applicable to these forests. But the executive orders from the revenue department have created confusion regarding the control of these forests and greatly contributed to the destruction of the very valuable forests. The chronology of events that has taken place in managing the Devara kadu by the government department is given below.

Chronology of institutional factors influencing preservation and management of Devara kadu in Kodagu District, India

1863-1879	The Devara kadu were surveyed by the Madras topographical and village boundary survey department during 1863 - 1879 when boundaries were earmarked.
1888	The Chief Commissioner of Kodagu, Bangalore vide notification No. 41 dated 20th September 1888 declared Devara kadu as protected forests under section 28 of the Indian Forests Act. 1878. The rules for the management of Devara kadu were also notified.
1900	The Commissioner of Kodagu Madikeri, has published notification regarding enquiry of some Devara kadu in all the taluks in the district.
1905	The Chief Commissioner of Kodagu, vide notification no. 72 dated 24th October. 1905 has declared Devara kadu as protected forests again and made revised rules for their management.

1905-1956	The chief commissioner of Kodagu, has issued 21 notifications under the provisions of the Indian Forest Act granting an area of 3056 acres of Devara kadu area for other purposes.
1967	The revenue department has stated in its order no. RD 479 MZD 65 dated 28thJuly 1967 that the forest department should exploit the Devara kadu and pay the realization after deducting the working charges to the Endowment department of the Govwrnment.
1969	The Karnaataka Forests Act. 1963 and the Karnataka Forests Rules 1969. Prescribe that the provisions of the district forest are applicableto Devara kadu
1985	The Revenue department, Government of Karnataka vide order no RD 104 LGO 79 dated 26th October 1985 has stated that the Devara kadu lands in Kodagu district vest under the perview of the Revenue department and directed the transfer of all the Devara kadu lands to the forest department.
1987	The Forest department. vide order No FFD 26 FTS 8 dated March 1987 has stated that out of the revenue realized from Devara kadu forests 90% shall be given to the concerned temple.

Source: Joint Forest Planning and Management -Devara kadu Report (2001)

During the period 1905-1956 the Chief Commissioner of Coorg , has issued 21 notifications under the provision of the Indian Forest Act granting an area of 3056 acres of Devara kadu for other purposes. The purpose has not been clearly mentioned, but it was mainly for inhabiting the landless labourers and the migrated people. The order of the Revenue department of the Government during 1967 has stated that the forest department should exploit the Devara kadu and pay the realization, after deducting the working charges to the endowment department. This perticular stand by the Government made the local community to realise that their Devara kadu would be lost to other immigrants and started cultivating in Devara kadu area. During 1987 the Forest department further stated that out of the revenue realised from Devara kadu 90 per cent shall be given to the concerned

temple.This again is due to the mismatch between the secular/dejure defnition of forest and the religious/defacto defnition of forest. by secular defnition of forest as reserve forest considering equity, the government could have allocated paches of reserve forests for rehabilitation and migration purpose. however, the religious defnition of Devara kadu could have resulted in preservation of several Devara kadu.

Now the scientists, environmentalists, forest department officials, NGOs and judicial experts are appreciating the local community for their efforts of preserving Devara kadu as a treasure of biological diversity in the plantation dominant cropping system practiced in Kodagu.

3.1.4 Economical factors influencing preservation of Devara kadu

Kodagu is the largest coffee-growing districts of India contributing around Rs. 1200 crores towards export of coffee from Karnataka and towards the national income. The increase in domestic and export demand for the commercial crops like coffee, cardamom, pepper and recently ginger has resulted in increase in cultivation of uncultivated land. This was the strong motivating factor for increase in cultivated area in Kodagu attracting the private forestlands. This in turn had an influence on encroachment of Devara kadu lands. The increase in revenue derived from plantations has contributed to improved standard of living, but at a cost of converting forestland to plantations.

Area under Devara kadu can vary widely (Table 4.11). The size of Devara kadu varied from 0.11 acre to 1315 acres. The Neerulli Bana with 1315 acres is the largest Devara kadu in Kodagu district. The modal size of Devara kadu varied between five and ten acres Due to their pristine nature, Devara kadu would have wide genetic diversity qualifying for protection for ecological sustainability. Devara kadu are present at all locations from floor of river valley to slopes at the top with a mosaic of different forest types. Devara kadu have a vide variety of flora shaped by different types of forests from the hills to ravines.

According to Kalam (1996), the area under Devara kadu reduced from 15,000 acres during 1905 to 5,000 acres during 1985 due to different degrees of encroachment. However, it is crucial to compare the size of each Devara kadu in the recent times with the contemporary rise in the area under competing crops like coffee, pepper and cardamom. In fact, the 'land survey' records clearly demystify the extent of loss of Devara kadu due to encroachment. The land survey has not been conducted ever since 1905 and hence an authentic account of Devara kadu area encroached is not available from any study. During 1985, the Department of Survey settlement and Land Records undertook a survey of a few Devara kadu. This data need to be compared with the corresponding surveyed area of 1905, for arriving at objective conclusions regarding the extent of encroachment.

Table 3.1.3 Status of encroachment, survey and protection undertaken in Devara kadu

Details of data and source	Data from Devara kadu festival	Data from the present study
	N = 40 Devara kadu	N = 17 Devara kadu
Number of Devara kadu where Committees are formed	40 (100)	15 (88)
Number of Devara kadu which reported the fact that their area is encroached	18 (45)	4 (23)
Number of Devara kadu which actually reported extent of encroached area	10 (25)	4 (23)
Extent of Devara kadu Area encroached (acres)	116 (21)*	70 (26)**
Total area of Devara kadu (acres)	1879	267
Total area of Devara kadu which are encroached (acres)	557	80
Number of Devara kadu in which action is taken on encroachers	6 (33)	3 (75)
Number of Devara kadu surveyed by the Department of Survey settlements and Land Records	27 (68)	2 (11)
Protection activity (fencing, planting) undertaken	5 (12)	2 (11)

Note: Data from Devara kadu festival refers to the data filled by the heads of Devara kadu committees who participated in the Devara kadu festival held during Oct 2000. Figures in parentheses are per centages of the total number of Devara kadu under each study.

* 21 per cent (=116/557) is the reported percentage of Devara kadu area encroached out of the total area of Devara kadu which reported the area encroached.

** 26 per cent (=70/267) is the reported percentage of Devara kadu area encroached out of the total area of Devara kadu which are encroached.

The Forestry College, UAS, Ponnampet, conducted the Devara kadu festival during Oct 2000, where the temple committees met and discussed their experiences regarding preservation of Devara kadu. The heads of Devara kadu temple committees were asked to fill a questionnaire regarding their Devara kadu. From this, a sample of 40 Devara kadu questionnaires was chosen in order to understand the status of Devara kadu in Kodagu. Considering the information provided by the temple committees, about 25 per cent of the temple committee heads indicated that their Devara kadu have been encroached. The total area of such Devara kadu worked to 557 acres, of which 116 acres were reported as encroached by the temple committees. Thus encroached area formed 21 per cent of the total Devara kadu area.

In the present study, comprising a total of 17 Devara kadu, five Devara kadu temple heads reported that there is encroachment and the total encroached area was to the tune of 70.5 acres. This encroached area formed 26 per cent of the total Devara kadu area. Thus, from the both the sources of information, the extent of encroachment of Devara kadu area ranged from 21 to 26 per cent, which are comparable.

3.2 General Information of the Sample Respondents

The composition of a sample of 80 respondents selected for the study are given in table 3.2.1.

It is important to know whether the respondents attached any ecological significance for Devara kadu. Also, their attitude towards the same before obtaining their willingness to pay for preserving Devara kadu. According to

Table 3.2.1 Composition of sample

Feature	Number
1. Coffee planters	54(67.5)
2. Laborers	6 (7.5)
3. House wife	5 (6)
4. Teacher	5 (6)
5. Others	10 (12)

Rollins *et al* (2000) questions on related social issues in CVM questionnaire are asked to familiarise the respondent with some issues, which generally are not allotted a monetary value.

Majority of the sample respondents were coffee planters (68 per cent) followed by labourers (7.5 per cent), house wives (6 per cent), teachers (6 per cent) and others (12 per cent).

Land tenure of the respondents

About 74 per cent of the respondents had 'jamma'[3] land tenure, 14 per cent 'sagu'[4] tenure, followed by 12 per cent of the respondents who were landless. Jamma land tennure is one of the most important institutional management systems, which has lead to preserve the traditions and culture of Kodagu. It is a joint ownership of the land, among all the eligible members of a family with the senior most member of the family exercising the control. In this system of tennure, the land cannot be sold outside the family. This has necessitated the family to work together reflecting the family system of Kodagu.

Table 3.2.2. Socio-economic characters of the respondents

Variables	Range (Rs.)	Modal value (Rs.)
Annual gross income of respondents (Rs)	3000 to 800000	20000
Education (years of schooling)	12 to 18	12
Age of the respondent (years)	28 to 85	55
Number of members in the family	3 to 6	4

The annual gross income of the respondents varied from Rs 3,000 to Rs 8,00,000, with an average of Rs. 68,491 per respondent, while the modal income being Rs. 20,000. The size of coffee plantation ranged from one to

[3] Jamma refers to wet land assessed at one half of normal(sagu) rate of assesment . it was originaly a tenure in consideration of military services.

[4] Sagu refers to the ordinary ryotwari tenure of land held on full assessment at the ordinary rates.

100 acres in the sample. The slump in the price of coffee from Rs. 1500 per 50 kg during 1999 to Rs. 950 per 50kg bag during 2000, to Rs. 650 per 50-kg bag during 2001 has also contributed to the wide range in gross income.

The respondents' years of schooling ranged from one to 18 years. The modal number being 12 years. The respondent's age varied between 25 and 85 years, the modal age being 65 years. The average size of the family varied between 3 and 6 members, the modal size being 4, there by indicating the tendency towards nucleus families.

The Devara kadu is mainly meant for non-utilitarian purposes. Social participation in different activities of Devara kadu and social fencing indicate

Table 3.2.3 Contribution by respondents to Devara kadu

Particulars	No.	Per cent	Range (Rs.)	Mode (Rs.)
Monetary contribution to annual Devara kadu festival	34	42.5	100-5000	500
Monetary contribution to the development of sanctum in Devara kadu	36	45	100-15000	1000
Monetary contribution to annual ancestor worship*	70	87.5	100-3000	200
Monetary contribution to construction and/or renovation of ancestral home and ancestral monument**	13	16.25	2000-10000	5000

* **Karana kodupa** : traditional ritual followed by each kodava family where offerings in the form of food are made to the ancestors

** **Iynmane:** refers to the traditional ancestral home of a Kodava family and **kaimada** : refers to the place where the ashes of the first ancestor of the family is kept and a small shelter is made for the same.

the sense of belongingness and institutional attachment with the tradition of Devara kadu. Thus, participation in the annual Devara kadu festivity through donations and voluntary contributions can be considered as an indicator of involvement. In addition, people in management, time spent in social fencing and protection of Devara kadu is another indicator.

Accordingly, an estimated 42 per cent of the respondents contributed for the annual Devara kadu festival ranging from Rs. 100 to Rs. 5000 per family, modal value being Rs. 500. About 45 per cent of the respondents, contributed towards renovation of Devara kadu sanctum ranging from Rs. 100 to Rs. 15,000, the modal value being Rs. 1000.

The tradition of Kodagu people in Devara kadu preservation is closely linked to their family festivals. The major Family festivals reflecting the tradition of Kodagu culture are (i) ***karana kodupa (ii) puthari (iii),kailpod and (iv) Cauvery Sankramana (Theerthodhbhava).*** *In Karana Kodupa* ceremony the head of the family and most of his near and far relatives assemble in the Iynmane (ancestoral home) to offer 'Meedi' (food) to the ancestor/s of that particular family. In *'Puthari'* the harvest festival, the first harvest of paddy crop is brought home and offered to the 'Karana' (ancestor) appeasing for a good harvest. In the 'Kailpod' or Kailmurtha"(festival soon after the completion of the transplantation of paddy) the weapons used for hunting and self defense and agricultural implements are worshipped. In the *Cauvery (Tula) sankramana,* the river Cauvery which is considered as the goddess of Kodagu is worshipped, as Cauvery takes its birth in the Bramahagiri hills at Talacauvery, symbolizing good omen in the sacred site.

In Kodagu, family for the purpose of festivity encompasses all the descendants in the ambit of a specific family name making it possible to trace the family tree to its origin. Thus, the size of a family varies from about 50 to 200 members distributed in 20 to 50 nucleus families who assemble for at least one of the above major festivals especially 'Karana Kodupa'. In the sample, it was found that 87 per cent of the respondents contributed for these family festivals ranging from Rs. 100 to Rs. 3000 per year, modal value being Rs. 200 per nucleus family. In the sample, 87 per cent belonged to the ethnic Kodava community. The remaining 13 per cent of the sample respondents constituted others who did not follow the ethnic Kodava tradition.

'Iynmane' refers to the ancestral home where the first person of the 'family' responsible for the lineage lived. This house has an institutional and cultural connotation for Kodagu families. The family festival is conducted in the 'Iynmane' where all the members of the specific joint family assemble and participate in the festivity. Similarly 'Kaimada' is a building erected in the place where the ashes of the first person of the family was placed. Thus 'Iynmane' and 'Kaimada' are of special cultural and religious significance. Contribution towards renovation of these monuments reflects their sense of belonging and commitment to their culture and thereupon indirectly to the Devara kadu tradition also. About, 16 per cent of the respondents made a one time contribution towards renovation of Iynmane and Kaimada ranging from Rs. 2000 to Rs. 10,000, the modal value being Rs. 5000,

3.2.4 Responses to questions about knowledge and attitude towards Devara kadu

These questions serve as a preamble for contingent valuation study undertaken to estimate the existence value. Devara kadu in the study area are unique because they exist.

in most villages and have a long history. Devara kadu are the base of culturally rich festivals and spiritual rites. They are natural resource institutions which offer a platform for cultural and spiritual part of your life. The knowledge and attitude of respondents towards forests was first assessed by eliciting the answers for the below indicated question.

1. How well do you know the ecological significance?

It is interesting to note that none of the respondents indicated that they had no knowledge of the ecological significance of forests. This shows the general awareness of the Kodagu people regarding ecological functions of forests. About, 16 per cent of the respondents indicated that they had a 'lot' of knowledge regarding ecological significance of forests, while a majority of the respondents (55 per cent) indicated that they had 'some' knowledge regarding the ecological significance.

After eliciting the knowledge of ecological significance of forests specific responses were elicited for Devara kadu

Items	Number of respondents	Per cent
A lot	13	16.25
some	43	53.75
a little	23	28.75
not at all	0	0

II. Even though Devara kadu has been an important part of the life and culture of inhabitants of the recent studies show that the total Devara kadu area in Kodagu is on the decline. For example, the study by the Forestry College, Ponnampet, indicated that out of 1214 Devara kadu, 972 are below 5 acres and are facing severe threat of encroachment. About 50 per cent of the sample Devara kadu were either partly or fully encroached. According to another estimate, there has been a 60 per cent reduction in the Devara kadu area since 1900 in Kodagu. **Are you Concerned about the threat of reduction in Devara kadu area in Kodagu ?**

About 97.5 per cent of the respondents expressed varying degrees of concern towards the reduction in Devara kadu area. This shows that the threat of reduction in Devara kadu area is known to a majority of the

Items	Number	Per cent of respondents
Very concerned	22	27.5
Concerned	44	55.0
Slightly concerned	12	15
Not concerned	2	2.5

population and the fact that they have (different degrees of) concern in itself is an indicator of the sense of belongingness to the institution of Devara kadu.

III. In order to lead the respondents towards the factors that has lead to the threat of existence of Devara kadu in kodagu the following question has been posed. "Kodagu is one of the fast growing economies in the State due to its contributions through coffee. How do you feel about this growth?

All the respondents favoured the growth of Kodagu economy, through cultivation of Coffee. This shows that Coffee is a key crop shaping the Kodagu economy and the standard of living of people.

Item	Number	Per cent
Strongly favour	40	50
Mostly favour	40	50
Mostly oppose	0	0
Strongly oppose	0	0

IV. Growing demand for coffee has been instrumental in expanding area under coffee plantation. However, this coffee area expansion is partly responsible for the loss of area under DKs. Do you _____with this statement ?

More than 90 per cent of the respondents indicated that growing demand for land under coffee (ginger/cardamoms) crop has led to loss of area under Devara kadu.

Items	Coffee		Ginger/cardamom	
	Number	% of respondents	Number	% of respondents
Strongly agree	8	10	3	3.75
Agree	40	50	44	55
Somewhat agree	25	31.25	22	27.5
Strongly disagree	4	5	4	5
Don't know	3	3.75	7	8.75

V. Kodagu has several societal goals these days, including that of a claim for a separate statehood, infrastructure development, etc. How important to you personally is a goal of protecting Devara kadu from encroachment?

About 89 per cent of the respondents indicated that protection of Devara kadu from encroachment is important. About 31 per cent of the respondents felt that the goal of protecting the Devara kadu from encroachment is 'very

Item	No.	% of respondents
Very important	25	31.25
Important	36	45
Somewhat important	10	12.5
Not very important	9	11.25

important'. About 45 per cent of the respondents opined that proper means of taking action against the encroachers have not been evolved and thus they feel helpless.

VI. Do you support tougher government regulations to protect the Devara kadu from encroachment?

About 74 per cent of the respondents indicated that they would support tougher formal institutional regulations to protect Devara kadu from

Item	No.	% of respondents
Very important	25	31.25
Important	36	45
Somewhat important	10	12.5
Not very important	9	11.25

encroachment. About 64 per cent of the respondents indicated that they would support tougher government regulations to protect Devara kadu. However, 26 per cent of the respondents opposed tougher formal regulations as they felt that the local communities can take effective action to protect Devara kadu.

VII. Effectiveness of these laws in tackling the encroachment, smuggling and in preserving the status of Devara kadu.

About 70 per cent of those who were for government regulation in

Items	No.	% of respondents
Very effective	2	2.5
Effective	46	57.5
Slightly effective	14	17.5
Not effective	24	30

protecting Devara kadu. They also felt that the existing laws are effective in tackling the encroachment, However 30 per cent of them felt that these laws will not be effective in checking encroachment, smuggling and preservation of Devara kadu, since vast encroachments have taken place in spite of existing regulations.

3.2.4 Purpose of visit to Devara kadu

The range of responses regarding the purpose of visit to Devara kadu indicated that about 40 per cent of the respondents actually perform the different rituals and cultural activities in Devara kadu worship. About 96 per cent of the respondents attend to Devara kadu to seek blessings from the deity. A majority of the respondents participate in Devara kadu festivity to meet other members of their family. Out of the 17 Devara kadu in this study, in nine Devara kadu, there was the practice of 'konda' where villagers

have the ritual of running on the burning splinters. For this purpose one or two trees is/are cut. In order to facilitate this, about 43 per cent of the respondents helped in the process of cutting the tree/s and in preparation of

Table 3.2.4 Responses to questions on visits to Devara kadu

Purpose of visit	Number of respondents (n = 80)	Per cent
1) To seek blessings	77	96
2) To meet other members of family*	67	84
3) To cut trees for rituals in devara kadu	34	43
4) As a performer of rituals	32	40
5) To collect non timber forest products	16	20
6) To enjoy the scenic beauty	13	16
7) To participate in the festival	11	14
8) To obtain mental peace	10	13
9) To eat fruits	7	9

*Family in Kodagu traditions composes of 20-50 nucleus family under a particular family name spread over two or three villages

the ground for burning splinters in the Devara kadu festival. Among the sample respondents, 20 per cent of them, were those who settled in Kodagu since the last five years. All these respondents who settled in Kodagu recently indicated that they visited Devara kadu for scenic beauty and the associated mental happiness.

3.2.5. Reasons for willingness to pay for preservation of Devara kadu

Respondents were asked a series of follow up questions about why they would or why they would not demand willing to contribute the specified amount. Some respondents may view this valuation question more as a way to express a desire for preserving the grove than as a measure of how much they would actually pay. Other responses may reflect the satisfaction of contributing to a good cause rather than the value of the resource itself.

Therefore respondents were asked a series of follow up questions about why they would or why they would not be willing to contribute the specified amount.

Table 3.2.5 Reasons for willingness to pay for preservation of Devara kadu

Reasons	Number	Per centage
1. To preserve the forests in Kodagu	31	63.26
2. The entire village will benefit from preservation	29	59.18
3. For performing festival	28	57.14
4. To continue the traditions of Kodagu culture	21	42.18
5. To preserve the Devara kadu for future generation	15	30.61
6. To Secure Devara kadu to its original size from encroachment	5	10.2
7. Plantation and farm are benefited by the Devara kadu due to its location	3	6.12

About 63 per cent of the respondents were willing to pay for preservation of Devara kadu as they believed, this would also preserve the forests in

Table 3.2.6 Reasons for not willing to pay for preservation of Devara kadu

Reasons	Number	Per cent
1. There is no cost involved in preservation and hence not willing to pay	13	50
2. Cannot afford to pay	10	38.6
3. The temple committee will take care Of preservation	8	30.2
4. These are all hypothetical options and they never work	6	23.07
5. It is the responsibility of the Government to protect	5	19.23

Kodagu. Similarly abut 60 per cent of the respondents indicated that they are willing to pay for preservation as their entire village would benefit from preservation. About 57 per cent of respondents expressed their willingness to pay for preservation of Devara kadu for performing in the festival. About

42 per cent of the respondents were willing to pay for preservation of Devara kadu so as to sustain the traditions of Kodagu. About, 31 per cent were willing to pay, in order to preserve the Devara kadu for future generation.

Responses for not willing to pay are given in table (3.2.5) 50 per cent of the respondents felt that there was no such cost involved in preservation in their village. Further 30 per cent felt that the temple committee would take care of all such problem and thus avoid all such costs.

3.3 Factors influencing Willingness To Pay (WTP) towards preservation of Devara kadu

Table 3.3 Factors influencing willingness to pay (WTP) for preserving Devara kadu (logit model)

Variable	WTP1	WTP2
Constant	-1.496* (0.811)	-2.309** (0.950)
Income	0.34E-02 (0.0057)	-0.0041 (0.0057)
Education	0.155** (0.073)	.171** (0.076)
Contribution	0.398E-03* (0.232E-03)	0.384E-03* (0.076)
Bid amount	-.497E - 03* (0.265E-03)	0.387E-04 (0.258E-03)
Clan(1)	0.877 (0.782)	0.824 (0.828)
Odds ratio:1 0	1.9 0.79	1.82 0.8
LR test	13.04***	17.24***
P: 1	0.65 0.44	0.64 0.43
N	74	74

*** 1% level of significance
** 5% level of signific
* 10% level of significanceance

WTP1 = Willingness to pay towards preserving Devara kadu in their own village (annual contribution)
WTP2 = Willingness to pay towards preserving Devara kadu in other villages
Figures in the parenthesis represent standard error

A logistic regression model was used to estimate the factors influencing the respondent's willingness to pay for preservation of Devara kadu in their village. WTP1 refers to willingness to pay towards preservation of Devara kadu in their own village. The independent variables considered in the model are income, education, bid amounts, contribution to family festivals, and whether the respondent belongs to the ethnic clan practicing the Kodava culture or otherwise. The result in Table (4.3) indicates that education, contribution to family festivals and bid amount are the major factors influencing the respondents' willingness to pay for preservation of Devara kadu in their village. Education was significant at 5 per cent level of significance, whereas, contribution to family festivals and bid amount was significant at one per cent level of significance (Table 4.3). The model obtained was significant to one per-cent level of significance to LR test.

WTP2 refers to willingness to pay towards preservation of Devara kadu in another village for which the respondents do not have access. The independent variables considered in the model are income, education, bid amount, contribution to family festivals and whether the respondent belongs to the ethnic clan practicing the Kodava culture or not. The result indicates that education and contribution to family festivals are the two important factors influencing the respondent's willingness to pay. Education is significant at one per cent level of significance, whereas, contribution towards family festival is significant at ten per cent.

3.3.2 Odds ratios for willingness to pay

Using the results obtained by logistic regression the odds ratio was worked out. Odds ratio is defined as the number of chances that the randomly chosen respondent has willingness to pay for preservation of Devara kadu to the chances that he has not. The odds ratio was worked out and interpreted for willingness to pay i.e. willingness to pay towards preservation of Devara kadu in their own village (WTP1) and willingness to pay towards preservation of Devara kadu in another village to which the respondent does not have access (WTP2).

Odds ratio for WTP1 indicated that the chances for paying towards preservation increased by 1.9 chances when the respondent belongs to the ethnic kodava community. Odds ratio of 1.9 implies that there is 1.9 chances in favour of willing ness to pay towards preservation to one chance of not willing to pay. If the odds ratio is less than one indicates that the chances of paying decreases to the chances of not paying. Similarly when the respondent does not belong to the ethnic kodava community his willingness to pay decreases to 0.79 to one chance of not paying.

Odds ratio for WTP2 indicated that the chances for paying towards preservation increased by 1.82 chances when the respondent belongs to the ethnic kodava community and was 0.8 when he did not belong to the community.

3.4 Existence Value of Devara Kadu in Kodagu District

According to Stevans *et al* (1991) wildlife are thought to produce two types of economic value: 1) "use value" derived from hunting ,fishing and viewing; and 2) existence value accruing to both users and to those not actually using the resource but who have an interest in it. Attention has been recently focused on the existence category and preliminary evidence suggests that this might be the most important component of the total value.

Weisbrod (1964) and Krutilla (1967) as quoted by Stevans *et al* (1991) introduced the notion that economic value may accrue to the individuals not actually using the resource. Weisbroad suggested that in an uncertain world "non users" might pay an option price to retain the possibility of future use while Krutilla argued that people often value natural resource even though they have no desire to ever actually use it. Motives suggested for these existence values are based on the premise that some may value the knowledge that the resource is available for the enjoyment of others and some may believe that natural resource have intrinsic value independent of any direct benefit or harm to the people.

At present CVM method is extensively used to arrive at the existence value of natural resource there is concern about its validity. Therefore,

adequate care has been taken to see that the respondents reveal their true preference for the preservation and enhancing Devara kadu in Kodagu district. Cummings *et al* (1986) argue that CVM accuracy is increased when the

Table 3.4 Estimation of willingness to pay for preservation of Devara kadu in Kodagu district - 2001 (Tobit model)

Variable	WTP1	WTP2	Mean of X
Constant	204.135 1256.27)	-383.11 (331.31)	
Income	6.693* 3.91	.754 (331.31)	66.13
Education	117.081** (59.40)	28.55* (16.06)	10.97
Age	-35.198 (18.26)	-3.127 (4.63)	53.37
Contribution	.273 (.10)	.118E-01 (.245E-01)	1064
Bid amount	-.501E-01*** (.195)	.913E-01* (.480E-01)	2096
Clan (1)	467.058 (658.05)	69.55 (175.66)	
Log likelihood function	-416.8638	-344.1938	
Estimated mean willingness to pay (1/0)	702(Rs) 235(Rs)	87(Rs) 15(Rs)	
N	74	74	

*** 1% level of significance
** 5% level of significance
* 10% level of significance

WTP1 = Willingness to pay towards preserving Devara kadu in their own village (annual contribution).
WTP2 = Willingness to pay towa5rds preserving Devara kadu in other villages.
Figures in the parenthesis represent standard error

participants are familiar with the commodity being valued, when they have had experience with making choice about the commodity, and when there is little uncertainty. This aspect has been given due consideration in the present study. Accordingly respondents were chosen who are familiar with the commodity but do not derive any direct use value from the resource. A

difficult proposition arises with regard to the willingness to pay to preserve Devara kadu since the decision making invokes ethical or moral principles. Harris *et al* (1998) reminds us that natural resources are often viewed as either price less or beyond market - like transactions. This is because of the fact that spiritual or other factors, including perceptions (that moral rights rather than exchangeable property rights) predominate in the valuation of natural resource.

According to Chandrakanth and Nagaraj (1992) existence value is a bridge between environmentalists and economists, which attempts the valuation of Devara kadu by valuing the institutions. Existence value in the present study was estimated using Contingent Valuation method. Willingness to pay towards their own village will be considered as use value as indirect benefits are derived in the form of environmental benefits and increase in farm production. Willingness to pay towards preserving Devara kadu in other village was considered as existence value of the respondent towards his Devara kadu. Existence value of Devara kadu refers to the willingness to pay for preservation of a sacred grove even when there is no physical access to such a sacred grove. Thus existence value is the willingness to pay even when direct on site interactions between the user and the Devara kadu do not occur. Hence interaction is non-consumptive, indirect and off site type. Existence value question was framed in terms of willingness to pay for preservation of some other sacred grove, which the respondent does not normally visit. This is an unobtrusive proxy for existence value of a sacred grove, since the question of non-access to a sacred grove is utopian.

The results presented in table 3.4 bring out the estimated willingness to pay for preservation of Devara kadu in their village as well as their neighboring village. The mean willingness to pay towards their own Devara kadu was much higher at Rs 702 per family as compared to the Devara kadu in another village at Rs 85 per family. This is a flow concept wherein the contribution is made annually. In the study as referred earlier the willingness to pay towards other Devara kadu is interpreted as existence value. Accordingly the estimated existence value for preserving the Devara kadu worked to Rs 86 per family.

The estimated value falls within the range of the basis considered for checking the validity of willingness to pay. The raw mean obtained from the sample was about Rs 1135 for WTP1 and Rs 224 for WTP2.

3.5 Transaction Costs Involved in Preserving Devara Kadu

Transaction cost is defined as the cost of making and enforcing decision. Of it includes the cost of obtaining information, and arriving at a decision and enforcing the decisions made. Even though Devara kadu is a concept, which has been evolved from the ancient age with the major objective of conserving forests, fear of almighty has been induced among the population as a means of restriction to conserve the resource. As the social, ethical and moral restrictions are fading in the present economic situations, a few costs are involved in preserving Devara kadu. As these costs are not directly involved in preserving Devara kadu we call these costs as transaction costs.

The transaction costs in this study refers to the cost incurred by the society on three accounts:

a) The extent of Devara kadu area diverted to other purpose (stock negative externality).

b) Costs incurred by individuals and society in preservation of Devara kadu (costs of social fencing) and

c) Costs involved in restoring the encroached area to the Devara kadu.

The first type of transaction cost involved in preservation of Devara kadu relates to situation were if the Devara kadu land encroached can never be restored due to permanent parting away of land for human settlement. This has already happened in villages like Abbyathmangalam and Nellihudikeri. In such situation the total economic value of the land is colossal. The estimation of these costs will include the opportunity cost of the land fore gone due to preservation.

The second type of Transaction costs connotes the restoration of the encroached land despite the social fencing and other routine measures involved in preservation of Devara kadu. The third type of transaction cost occurs when the Devara kadu is encroached for raising of plantation crops where such lands can be restored at a cost. This involves active role by the temple committee in convincing the encroachers in arriving at an amicable settlement. This mainly consists of the legal costs involved in restoring the

Table 3.5 Analysis of Transaction costs

Village	Grove	Area Encroached	Action Taken	Type of Action	Period of Action	Year of Action	Cost of Action (Rs.)
Karada	Bagavathy dk	1.5	yes	judicial case	six months and still going on	2001	15000
Chelavara	Pudiyodiyamma dk	40	yes, but not success-ful	judicial case	one month	1969	300
Marandoda	Bagavathy dk	.25	no	social warning		1999	
Kokeri	Sarthav bana	3	no	religious fear		1999	

land. In addition it also includes the value of the efforts put forth by various individual in boycotting the encroachers at all the social and temple rituals.

Along with these costs, the value of efforts put forth by the forestry college Ponnampet in formation of village level and district level committees, bringing the members together and arriving at a consensus regarding extent of encroachment also forms part of the transaction costs. In this study, the sample respondents distinctly identified four Devara kadu, which were encroached.

Apparently estimation of transaction costs is challenging, as it cannot be averaged due to the above factors. Therefore, a safe way of understanding

the different types of transaction costs involved in preservation of Devara kadu can be by the way of case studies of the encroached Devara kadu and the valuation of various actions initiated by interested personnel.

Case study 1- Bagavathy Devara kadu, Karada

Bagavathy Devara kadu is situated in Karada village in Madikeri taluk, having an area of 9.62 acres of forest according to the revenue (jamabandhi) records. The local communities and the temple committee play an important role in all temple festivals and preservation of Devara kadu. The committee has been formed by co-opting one person from each family of the village. A Brahmin priest has been appointed for conducting pooja in the temple. He is provided with free accommodation in the temple premises and also paid a monthly salary. The village committee conducts a meeting once in a month and on that day a special pooja too.

The annual festival in the Devara kadu is of great significance to the villagers, which is celebrated for five days from 11th to 15th of April. All the villagers participate actively in the festival. Each family contributes about Rs 150 towards the festival and additional contribution is made according to their willingness.

The rituals like "Thadumb dance', pooja every morning, "Bolakat" and Dudikott, are followed. On the last day of the festival animal sacrifice in the Devara kadu is carried out. It is estimated that all these rituals would cost about Rs 16000, which is met by the temple committee. The villagers have made contribution to the extent of Rs 25000 for the development of the temple.

In spite of all the sense of belongingness, participation and rituals followed there is slight encroachment of Devara kadu area. In this case the encroacher built a compound for his house encroaching the Devara kadu area. The villagers were against this and they warned him. Since the encroacher did not heed to the villagers warning, they broke the wall. Consequently, the encroacher himself filed a case against the temple

committee. Now, the temple committee is fighting against the encroacher in the court. This has cost the temple committee Rs 15000 until now and the hearing is still going on. The temple committee is confident of winning the case.

Case study 2- Chelavara

Chelavara is a village, which is devoid of Devara kadu today due to encroachment. In this village there are two temples, Ponnole Eshwara and Pudiyodiyamma both of which had groves 50 years ago to the extent of 40 acres and 27 acres respectively.

Ponnole Eshwara is a temple for the whole of the nad (group of villages) comprising of 12 grama. The "Amma Kodava" community of the village for the purpose of Devara kadu donated the 40 acres of grove associated to this temple. Generations later, the off springs took position of the land as they considered that the property belonged to their ancestors. The thakka during that period (1969) filed a case against the encroachers in order to restore the Devara kadu property. But he lacked support from the local community, as most of them belonged to the "Amma Kodava" community. Finally he had to drop the case. The judicial case had cost him about Rs 300 for lawyer's fees and towards transportation costs during 1969.

Similarly, the Pudiyodiyamma temple had about 28 acres of Devara kadu associated to it. During the 60's the responsibility of the grove was handed over to the temple priest as he resided close to the grove as well as the temple. The priest after a few years registered the land in his name. Later he sold the land and left the village. Only after the priest left, the villagers realised the loss of the common property. Now as the two temples do not have any land the villagers contribute paddy, rice and money to the temple to carry on the festivals in the temple.

IV. SUMMARY AND CONCLUSION

Forests are one of the most significant natural resources for the well being of human and animal life. This valuable resource is being exploited over the sustainable level for pure economical purpose. The forethought by our ancestors to preserve forests in their virgin condition has brought "Devara kadu" to its present existence. Devara kadu are patches of forest lands preserved in their virgin condition on religious grounds which can satisfy the aesthetic, scientific, cultural and recreational needs of mankind. They are sanctified enclosures and irrespective of their size have a reigning deity who protects the grove. Kodagu (Coorg) district in Karnataka, famous for the tropical evergreen forest, is also the home for the sacred worship of trees, called Devara kadu (Devara kadu), with an unique concept in nature conservation involving peoples participation and management. But the alarming fact is the decreasing area under the Devara kadu from 15000 acres to 5000 acres over the past ten decades.

The present study was taken up with the main objective of assessing the factors, which has led to the preservation of Devara kadu. An attempt has also been made to estimate the existence value and also to assess the transaction cost involved in preservation of Devara kadu.

The study was conducted in Kodagu district in the Western Ghats region of Karnataka. The sample consisted of 80 respondents randomly drawn from eight villages. The district is broadly divided into two forest ranges, namely, Madikeri forest range a very high rainfall zone of ever green forests and Virajpet range in the drier eastern fringe, the zone of moist deciduous forests. From these two ranges four villages each were selected at random, thus from each village 20 respondents were chosen at random.

Simple tabular analysis was employed to assess the various factors such as historical, social, institutional, and economic factors influencing preservation of Devara kadu. Similarly the general characteristics of the sample respondents and their opinions were also analysed.

The special objective of the study was to estimate the existence value of the Devara kadu in Kodagu district. Existence value is commonly known as the value an individual has for the existence of a resource from which he does not derive any use. The only method to date commonly used to measure existence value is the contingent valuation method (CVM). It is a way of using carefully worded surveys to determine what people would be willing to pay (or willing to accept in compensation) for a specified environmental change, by creating a hypothetical situation.

Considering the inscriptions collected and mentioned in the results chapter we can consider that preservation of Devara kadu has been possible due to the strong emotional and cultural beliefs that was imparted to the community. Like comparing the felling of a tree to the killing of a child inculcates emotional barrier towards cutting a tree in Devara kadu.

The ethnic and religious diversity of Kodagu has lead to the fused culture and traditions in Devara kadu. At present, more importance is given to rituals and festivals in the Devara kadu temple than in preserving the forests surrounding it.

The intervention by the Government over the years (from 1905) has encouraged the management committees of Devara kadu to exploit the Devara kadu land as well as its forest resource for economical purpose and use it for the development of the temple rather than preserving the forest. The increase in returns from plantations, due to increase in coffee prices in the early 90s seemed to have encroached the Devara kadu. The allotment of land in Devara kadu areas for various purposes and people coming from other region also prompted the local people to encroach the area.

From the information obtained from the forestry college UAS, Ponnampet about 40 various Devara kadu were considered out of which about 25 per cent of the temple committees indicated that their Devara kadu have been encroached. The total area of such Devara kadu worked to 557 acres, of which 116 acres were reported as encroached by the temple committees. Thus encroached area formed 21 per cent of the total Devara kadu area In the present study, comprising a total of 18 Devara kadu, five

Devara kadu temple heads reported that there is encroachment and the total encroached area was to the tune of 70.5 acres which formed 26 per cent of the total Devara kadu area. Thus, from the both the sources of information, the extent of encroachment of Devara kadu area ranged from 21 to 26 per cent, which are comparable.

An estimated 42 per cent of the respondents contributed for the annual Devara kadu festival ranging from Rs. 100 to Rs. 5000 per family, modal value being Rs. 500. About 45 per cent of the respondents, contributed towards renovation of Devara kadu sanctum ranging from Rs. 100 to Rs. 15,000, the modal value being Rs. 1000.

Most respondents (87per cent) contributions to family festivals ranging from Rs. 100 to Rs. 3000 per year, modal value being Rs. 200 per nucleus family. This indicates that still large proportions of the people value their traditions of which Devara kadu also forms a part.

All the respondents indicated that they had knowledge of the ecological significance of Devara kadu. About 97.5 per cent of the respondents expressed varying degrees of concern towards the reduction in Devara kadu area. All the respondents favoured the growth of Kodagu economy through cultivation of Coffee. More than 90 per cent of the respondents indicated that growing demand for land under coffee ginger and cardamoms crop has led to loss of area under Devara kadu. About 89 per cent of the respondents indicated that protection of Devara kadu from encroachment is important. About 74 per cent of the respondents suggested stringent institutional regulations to protect Devara kadu from encroachment.

Majority of the respondents (96 per cent) visited the Devara kadu to seek blessings. They also visited the Devara kadu to participate in the festival where they could meet friends and relatives. Some acted as performers and others assisted in conducting rituals and cultural programs.

Logistic model used to analyse the influence of various factors influencing willing ness to pay for preservation of Devara kadu. Education, contribution to family festivals and bid amount emerged as the major factors influencing the respondents willingness to pay for preservation of Devara kadu in their

village (WTP1). Education and contribution to family festivals are the two important factors influencing the respondent's willingness to pay towards preservation of Devara kadu in another village (WTP2). A hypothesis was made that people who have a sense of belongingness towards their family will also have a sense of belongingness towards their Devara kadu. This hypothesis was accepted as the respondent's contributions towards their family festival was also a significant factor influencing the respondent's willingness to pay towards preservation of Devara kadu.

Odds ratio for WTP1 indicated that the chances for paying towards preservation increased by 1.9 chances when the respondent belonged to the ethnic (mainly Kodava) community. When the respondent does not belong to the ethnic community his willingness to pay decreased to .79 to one chance of not paying. Odds ratio for WTP2 indicated that the chances for paying towards preservation increased by 1.82 chances when the respondent belonged to the ethnic community and was decreased to .8 when he did not belong to the ethnic group.

As expected the mean willingness to pay towards their own village was much higher at Rs 702 per family, which is considered as the use value, as the respondent has access to the resource. The estimated mean willingness to pay towards preservation of Devara kadu in another village was estimated as Rs 86 per family. In the study the willingness to pay towards other Devara kadu is interpreted as the existence value since the respondent does not have direct access to the resource. Accordingly the estimated existence value for preserving the Devara kadu worked to Rs 86 per family.

Apparently estimation of transaction costs is challenging, as it cannot be averaged due to the complexity of factors. Therefore, a safe way of understanding the different types of transaction costs involved in preservation of Devara kadu was by the way of case studies of the encroached Devara kadu and through valuation of various actions initiated by interested parties. Obviously, Transaction costs was found to be more only in those Devara kadu where there was encroachment.

Conclusion from the study

Most of the Devara kadu are in existence but not in their original form. There has been a reduction in the area of Devara kadu due to encroachment and conversion of forest area into plantations and sanctum development. The strong historical background with emotional and cultural beliefs have led to the preservation of Devara kadu at least in their present form. On the contrast the diverse social culture due to immigration, week institutional management, economical needs and legal framework have led to the dilution of the Devara kadu institution. More concern has to be directed towards preserving the Devara kadu (forests) for our future generation from the point of maintaining biodiversity rather than for religious purposes.

Education and contributions to the family festivals are the most significant factors influencing the respondents willingness to pay towards preservation of Devara kadu. There is good awareness towards preserving the Devara kadu. However a mechanism has to be developed to involve all communities in the locality for preserving Devara kadu. The willingness to pay by the respondents indicates that the people in Kodagu are ready to contribute for preserving Devara kadu. However it is necessary to ensure that their contribution are properly used by developing a set of guidelines. In this direction, the proposal to form a committee at the village level and a federation of Thakkmukyastha at the district level is worth considering.

Policy Implications

- The committees formed at the village and the district levels are be vested with powers to restore and preserve Devara kadu involving the participation of local people.

  The Devara kadu land converted to plantations should be reverted to forest land since the land under forest is on the decline especially at the village level.

  More emphasis has to be laid towards preserving Devara kadu as forests reflecting the local bio diversity for the benefit of future generation.

  Highlight the success stories and the need for preserving Devara kadu through mass media.

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Emphasis on the development of the sanctrum of Devarakadu

Ayappa devarakadu Pallangala

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