FEASIBILITY OF FOREST CERTIFICATION IN MARAYOOR SANDAL DIVISION, KERALA

By

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(2014-17-106)

THESIS

Submitted in partial fulfillment of the requirement for the degree of

MASTER OF SCIENCE IN FORESTRY

Faculty of Forestry

Kerala Agricultural University

DEPARTMENT OF WOOD SCIENCE

COLLEGE OF FORESTRY

VELLANIKKARA, THRISSUR - 680 656

KERALA, INDIA

2016

DECLARATION

I hereby declare that this thesis entitled "**Feasibility of Forest Certification in Marayoor Sandal Division, Kerala**" is a bonafide record of research done by me during the course of research and the thesis has not previously formed the basis for the award to me of any degree, diploma, fellowship or other similar title, of any other University or Society.

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ACKNOWLEDGEMENT

It is with utmost and great devotion, I place on record my deep sense of gratitude and indebtedness to my project advisor ***Dr. E. V. Anoop****, Professor and Head, Dept. of Wood Science, College of Forestry, whose valuable guidance, timely help and moral support, friendly co-operation and warm concern throughout the study period made my thesis work an easy task.*

I owe my sincere thanks to ***Dr. K. Vidyasagaran****, Dean, College of Forestry for his immense help in a way of extending the facilities available in the college for conducting the present study and valuable suggestions he has provided throughout the course of my research. I express my heartfelt gratitude to* ***Kerala Agricultural University*** *for extending financial and technical support for pursuance of my study and research.*

I am deeply indebted to my advisory committee members ***Dr. P. O. Nameer****, Professor and Head, Dept. of Wildlife Sciences, College of Forestry,* ***Dr. S. Gopakumar****, Professor, Dept. of Forest Management and Utilization, College of Forestry and* ***Dr. V. Anitha,*** *Senior Scientist, Dept. of Forest Economics, Kerala Forest Research Institute, Peechi, for their constant encouragement and constructive suggestions throughout the study period, and also for their critical evaluation of the manuscript.*

I am whole heartedly obliged to ***Dr. T. K. Kunhamu,*** *Professor and Head, Dept. of Silviculture and Agroforestry,* ***Dr. A.V. Santhoshkumar****, Professor and Head, Department of Tree Physiology and Breeding,* ***Dr. Indhira Devi,*** *Professor, Dept. of Agricultural Economics,* ***Dr. Sunanda C*** *Assistant Professor, Dept. of Statistics, and other faculty members, for kindly providing me valuable advice and various facilities for the conduct of the study.*

I take this opportunity to render my sincere gratitude to ***Mr. Sabi Varghese,*** *Divisional Forest officer, Marayoor Sandal Division, and* ***Mr. Sameer.M. K*** *Range Forest Officer, Marayoor Sandal Division for providing field staff during the field works. Special thanks to* ***Mrs. Mini,Mrs. Jyothi, and Mrs. Seena Cheriyan*** *for their help during the field work and thesis preparation.*

Words cannot really express the true friendship that I realized from ***Mr. Mohammed Anees P. V,Mr. Alex. K. George, Mr. Thomachan, Mr. Subu. R. Unnithan, Mr. Sreejith M. M, Mr. Sreejith Babu, Mr. Bill Nelson Paul, Mr. Karthy, Mr. Abin, Mr. Faby, Mr. Akhil, Mr. Deepak Kumar, Ms. Sherin George, Ms, Rini, Ms. Swathy, Ms. Anju S Vijayan, Ms. Lakshmi J Rajan, Ms. Anju Mathew, Ms. Reshma M Raj, Ms. Devika, Ms. Devipriya, Ms.***

Kavya, Ms. Neenu and my dear juniors **Mr. Jobin Kuriakose, Mr. Hashim K. P, Mr. Arun K. R, Mr. Sachin Krishna, Mr. Anees Ahmed, Mr. Ajith Lal, Mr. Harikrishnan, Mr. Jishnu, Mr. Krishnan Unni, Ms. Gayathri M, Ms. Bineesha K, Ms. Nimitha, Ms. Anamika, Ms. Shahnas, Ms. Arathy, Ms. Anju T, Ms. Nadha, Ms. Hitha, Ms. Anjana, Ms. Anjitha, Ms. Tintu, Ms. Aishu, Ms. Sana, Ms. Thoppan, Ms. Krishna, Ms. Sethu, Ms. Henna, Ms. Anna and Ms. Sneha** *for their valuable mental and physical support during the course of the study. Also the co-operation and help extended by* **Mr. Kiran Thomas, Mr. Raneesh C, Ms. Judy Thomas, Ms. Neeraja and Ms. Jayasree** *are remembered with gratitude.*

At this juncture, I express my deep love to my parents and brother without whose moral support, blessings and affection this would not have been a success.

Above all I bow my head before **GOD ALMIGHTY** *whose blessings and care enabled me to undertake this venture successfully.*

Toji Antony

Dedicated to my dear

Parents and Chettayi

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Introduction

1. INTRODUCTION

Forest certification has been addressed as one of the most significant advances in forestry scenario in recent times. During the past one decade, forest certification emerged from just an idea to a routine practice in the North America and the Europe and is being adopted in all continents. The origin of forest certification was stimulated by two major events. Primarily, environmental Non-Governmental Organizations were increasingly disenchanted with the failure of government and intergovernmental efforts to improve forest management. Furthermore, the forest producers and sellers realised that their future would be more secure if they were able to prove that their products were derived from a sustainably managed source. Hence, forest certification arose as a measure of independent verification, which is related to the labelling of environmentally conscious markets. Certification subsequently evolved to handle temperate forests as well, and today over 80 per cent of the certified forests are in the Northern hemisphere.

'Forest certification is a mechanism for forest monitoring, tracing and labelling timber, wood and pulp products and non-timber forest products where the quality of management from environmental, social and economic perspectives is judged against a series of agreed standards' (Shanley, 2008). Most of the certification schemes in forestry are third party verification, under which an independent assessment of forest management is carried out by an accredited third party. Generally, there are two major forest certifications, Forest Management Unit (FMU) certification and Chain of Custody (CoC) certification. FMU certification is the most common type of certification, and it applies to forest land. Actual land management practices are evaluated with the standards of sustainability. Forest owners can either certify their land as an individual property (individual certification) or as a part of a group of properties (group certification). The CoC certify wood by tracking every step of the supply chain - from forests to finished products.

Forest certification is not a single process. It is constituted by several functions; tasks that aims at producing assessments on the basis of objectives (which are also named as the mechanical functions) and those that tend to the development of standards, criteria and interpretation of it (which is the political form). The International Organisation for Standardisation (ISO) has set standards in the various steps of certification, standardisations, and accreditation. Most of the certification schemes adopt the standards from ISO because they are recognised by the World Trade Organisation (WTO) and do not create unnecessary barriers to trade (Bass, *et al.*, 2001).

There are several certification schemes in operation of which Forest Stewardship Council (FSC) certification is one of the most globally prevalent and credible certification schemes. Other Certification Systems include Programme for the Endorsement of Forest Certification (PEFC), Sustainable Forestry Initiative (SFI), Australian Forestry Standard (AFS), Sistema Brazileiro de Certificação Florestal (CERFLOR), Certificación Forestal (Certfor), and Malaysian Timber Certification Council (MTCC) (Anoop, *et al.*, 2014). The rise in the number of schemes being developed is an evidence of perceived usefulness and value of certification- but also the need to adapt schemes to suit particular producers and markets. Many schemes are already having a strong influence in global markets. In the Europe, 22 million hectares has been FSC certified, with targets of achieving 200 million hectares by 2005. Also, an area of 35 million hectares has been certified under PEFC scheme in the Europe in a short period.

Certification initiatives began as early as in the 18th century. Scientific forestry in India began in 1842 with the initiatives taken by Sir H. V. Conolly, collector of Malabar, during the time of the British. In 1864, Dietrich Brandis, a German forester, was appointed as the first Inspector General of Forest in India. This was followed by the 1865 Forest Act and its subsequent revisions. The concept of working plans and management unit divisions and circles emerged for scientific

management of state-owned forest on a sustainable basis during this time. Earlier in 1797, the German Forester George Harting came up with the concept of "sustained yield management" by which he meant that to ensure continuous wood supply over generations, harvest should not exceed growth increment. This idea formed the backbone of modern forest management in the Europe and the North America and many other parts of the globe. Sustained yield principles have always been the keystone in the Working Plan prescriptions in India and was essential for the harvesting of timber. It essentially meant that the cumulative tree increment should only be harvested leaving the capital intact. The forestry sector in India is among the first few in the world to be managed on the lines of modern scientific management. Establishment of modern and scientific forest management system and process, which started from the middle of the 18th century, coincided with the Industrial Revolution in the west. However, the basic change in perception that forest as a resource cannot be exploited without disturbances was brought about by the National Forest Policy of 1952. This led to change in focus to production forestry and also had an eye on achieving objectives regarding the maintenance of ecological balance and meeting the needs of various other stakeholders in the best way possible (Gupta, *et al.*, 2013).

The Criteria and Indicators (C&I) approach was developed with the idea of a set of specific forestry conditions evolved through various international processes among participating countries. In the initial phase, it was supposed to develop a framework for Sustainable Forest Management (SFM) for the Indian context and also to establish a benchmark for sustainability according to prevailing global policy framework. In 1999, a workshop on "Development of National Level Criteria and Indicators for Sustainable Management of Dry Forests in Asia" (also called the Bhopal-India Process) was held at the Indian Institute of Forest Management, Bhopal, with the support from the United Nations Environment Programme and Food and Agriculture Organization of the United Nations in collaboration with the International Tropical Timber Organisation, and the US Department of Agricultur's (USDA) Forest Service. The outcome of the process

widely referred to as the "Dry Forest in Asia Process" in which 10 Asian countries together developed a regionally applicable set of national-level criteria and indicators pertinent for dry forests in the region. The regional initiatives were later endorsed by the national task force on sustainable forest management", under the Ministry of Environment and Forest and Climate Change (MoEF&CC), Government of India, and this has led to a National draft set C&I. Thus, the Indian initiative of C&I approach for SFM has been led by the IIFM, in collaboration with the IITO and the MoEF&CC. Over a period of time, 8 criteria and 51 indicators specific to Indian forestry conditions were evolved after a detailed discussion process, where a wide range of stakeholders were involved. The Bhopal India process helped to evolve C&I for national level through a lot of consultation and field testing. But Indian forestry has still to go a long way in achieving sustainability (Gupta, *et al.*, 2013).

Recently, in November 2010, the FSC and World Wide Fund for nature (WWF) in Delhi set up a trust called the Forest Certification Council of India (FCCI) to encourage FSC certification programmes in India. Though all government owned forests are managed under working plan prescriptions of sustained yield principle which is the actual basis of the certification, still the strict Criteria and Indicators (C&I) laid down by the FSC might prevent it. Kerala Forest Department also follows definite Working Plan prescription for the management of forest lands which confirms to the sustained yield principle.

Certification of our forests has various advantages but the steps to be followed for the implementation is quite challenging. As per the Standards Development Group (SDG) for India by the FSC, homesteads and rubber plantations have vast potential for certification. Rubber plantations supply rubber wood which satisfy roughly 41 per cent of the current timber demand in Kerala. Once a rubber plantation is certified under FMU, even the rubber latex from the plantation can be FSC certified.

The Marayoor Sandal Division, with its headquarters at Marayoor in Idukki district of Kerala, is the only compact tract of sandal *(Santalum album)* forests with mature sandal trees remaining in the country. In order to combat large-scale unauthorised felling and smuggling of sandalwood trees from the sandal forests, the government decided to upgrade the Marayoor Range of Munnar Division into a new Division named Marayoor Sandal Division in 2005 vide GO (MS) No: 67/2005/Forest dated 08/06/2005. About 150 daily wage watchers were engaged for the protection of sandal all day long; a large majority of whom are members of the different Vana Samrakshana Samithis (VSS) functioning in that area and provide employment for the tribal groups residing in Marayoor, mainly the Muthuvans and the Hill Pulayas. The Marayoor Government sandalwood depot is the only one of its kind in the state, where only dead, wind-fallen, and confiscated trees are auctioned.

The present study seeks to assess the perception of stakeholders associated with Marayoor sandal division viz-a-viz forest certification. The main objective is to find out the potential of implementing forest certification in Marayoor Sandal Division of Kerala by an assessment of the perception and socioeconomic status of the stakeholders. It is also intended to assess the management aspects of the Division particularly to see whether they comply with the Sustainable Forest Management Principles and Criteria of Forest Stewardship Council (FSC).

Review of Literature

2. REVIEW OF LITERATURE

Certification is regarded as an important process in sustainable forest management (SFM). It is widely practiced in developed countries especially in the Europe and the North America (Bass *et al.*, 2001). In forest certification, assessment of certification are done by an accredited independent third party under a set of principles of SFM (Gupta *et al.*, 2013).

2.1 EVOLUTION OF FOREST CERTIFICATION

2.1.1 Origin of Sustainable Forest Management

Sustainability is a biological notion in forest management. The word 'sustainable forest' was prominent in the Europe during 18th and 19th centuries. At that time the deforestation activities were common in Europe region, and they were more concerned about the sustainable production of wood because it was a driving force of their economy. Later the idea of sustainability became popular and gradually made headway to North American region also. Earlier forest managers incorporated silvicultural practices for sustainable production of wood, wildlife and other products and services for human wellbeing. But this concept no longer exists (Gupta *et al.*, 2013). The sustained yield management was practised in the late Medieval Europe (Heseke, 1938). The lack of communication facilities and underdeveloped transportation facilities hurdled the regional trade (Waggener, 1977), thus, the popularisation of scientific practices and management were not as much prevalent as in the medieval period.

'Sustainable development' is defined in Brundtland Report as "development that meets the needs of the present without compromising the ability of future generation to meet their own needs". This report helped in the emergence of new programmes under the United Nation Conference on Environment and Development (UNCED) and in the Earth Summit in 1992 in Rio de Janeiro. The

major denouement of the Earth summit in Rio was, it defined sustainable forestry as a set of forest principles. This principle served as the base for all other programmes related to environment, climate change and desertification.

During 1993 in Montreal, many of the developed countries established a set of criteria and indicators (C&I) for the management and conservation of temperate and boreal forests. This is referred to as "The Montreal process" C&I, this includes seven criteria and 67 indicators for the sustainable management of forests (Wasburn and Block, 2001). These C&I provided a foundation for assessing the forest condition and drifts.

In certification, sustainability is an inherent aim. This is the emphatic goal of a certification by improving the quality of management to reach this goal (Upton and Bass, 1995). Unsustainable forest management activities lead to soil erosion, biodiversity loss and adversely affects the economy of the country. The World Bank estimated that about $10 billion is lost due to illegal logging (Gupta *et al.*, 2013). After the implementation of C&I, most of the forest management activities follow some scientific tools and they control felonious activities and unscientific practices in the forest.

2.1.2 Emergence of Forest Certification

In the Europe, members of cooperative societies of cabinet makers practised labelling of furniture in 1637 (Pradere, 1989). The modern certification started from the 1960s and 1970s because people were more concerned about the social and environmental importance, also the environmental cognizance increased rapidly compared with earlier periods (Granholm *et al.*, 1996). The emergence of certification indirectly boosted the awareness in the society. In the 1980s, 'certification' emerged as a tool for controlling deforestation. It improved the environmental and social status. This manoeuvre mainly happened in developed nations especially in the Europe and the North American continents. In these

regions, certification played a pivotal role in controlling deforestation (Vogt *et al.*, 2000).

In tropics during 1990s labelling of timbers started because certification emerged as a market-based tool. Also, it exists as a barrier for deforestation (Perera and Vlosky, 2006). The UNCED first started identifying forest issues, and they focused on how forest maintained properly in worldwide. They raised forest issues as an international problem and developed first set of principle, criteria and indicators (PCI) for forest management and evaluation. These PCI helped for the SFM, which is the important factor for getting forest certification (Gupta *et al.*, 2013).

In the 1990s, more independent organisations started working in the forest-related field globally. They were more attentive to forest degradation issues and climate change. In the tropics, the Rainforest Alliance hurled Smart Wood Programme, they assessed the premises scientifically and gave certification status for forests that are managed sustainably. Later, Forest Stewardship Council (FSC) set Principles and criteria (P&C) for forest certification. Most of the NGOs accepted this P&C because they were scientifically more reliable. But in industrial sector P&C was less popular (Bettinger *et al.*, 2009). Gradually this concept attained great importance in worldwide.

2.2 WORLD SCENARIO

2.2.1 Emergence of Certification in America and Europe

During the 1990s, the emergence of forest certification in the developed nations was prominent. They focused on sustainable management of forest and sustainable production of timber and other natural resources for the well-being of the people. Since 1941 onwards, the American Tree Farm System (ATFS) was created to lure people attention to the management activities and investments in the

private plantations. The ATFS certification was based on a set of forest management principles and the management activities in the forest area was supervised in every five years (Bettinger *et al.*, 2009). Later, the American Forest and Paper Association (AF&PA) started a certification system in the 1990s and introduced a third party auditing system.

The Canadian Standards Association (CSA) established a set of standards in 1996 for evaluating the SFM and they updated the standards in 2002. Another forest monitoring system was the Sustainable Forestry Initiative (SFI), which was an industry self-regulation programme. The CSA and the SFI were equivalent systems for monitoring sustainable management (Perera and Vlosky, 2006).

In the Europe, a well-developed certifying agency was created by forest owners which were called Programme for the Endorsement of Certification scheme in 2003. But later this name changed to 'Programme for the Endorsement of Forest Certification' (PEFC) scheme. This PEFC plays a pivotal role in the Europe in forest certification. They have their own principles and criteria for sustainable forest management and evaluation of forest and plantations (Gupta *et al.*, 2013).

Similarly, the International Organization for Standardization (ISO) 14001 have standards for environmental management. But these standards are not specific for forestry operations while this set of standards are used as a foundation for the preparation of forest management standards (Hansen *et al.*, 2006).

2.2.2 Status of Certification

Certification gained acceptance and became popular worldwide because in most of the developed countries it is considered as a legal requirement. Initially, certification was limited to the paper industries. Subsequently this trend become weak. Although certification gained acceptance in several sectors, the expansion of forest certification in developing nations is in an infantile stage. In 2003, over 125

MHa of forest land was certified by different third party certification organisations. It is only about less than 3 per cent of world's forest area (Rametsteiner and Simula, 2001). The major parts of certified forests are in the Europe and the North America.

There was also a considerable variation in the certification status of timber and timber industries. During 2005, the certification status was not available but in the UK they had a report commissioned by the UK Timber Trade Federation, which disclosed that 56 per cent of timber imported to the UK were certified. Also, the imported materials like, 98 per cent of medium-density fibreboard, 58 per cent of sawn softwood and 11 per cent of sawn hardwood were certified. This statistical data gave growth of CoC certification (Gupta *et al.*, 2013).

Principles and Criteria of the FSC and the PEFC organisations are widely accepted by most of the developed nations. Thus in 2006, over 271 MHa of forest area certified by these third party organisations. From the total certified area, about 93.83 per cent was certified by these organisations, where 68.69 per cent and 25.14 per cent of forest area certified by PEFC and FSC respectively. The major part of the certified forests are temperate and boreal forests. In developing nations, only 13 per cent of forests were certified while in the tropical forest this percentage of certified forest area reduced to 4.7 per cent. During this period, industrial forest certification was increased largely (Durst *et al.*, 2006).

In 2009, the Food and Agriculture Organisation (FAO) estimated that, about eight per cent of global forest area was certified under a different systems and one-quarter of industrial Round wood came from the certified forests (FAO, 2009). There was only less than two per cent certified forest in the tropical region. Most of the certified area 82 per cent was under private sector (IITO, 2008).

The intervention of certification organisations such as the FSC and the PEFC made forest certification popular. By 2010, about 355 MHa forests were certified by FSC and PEFC together. This represents approximately 28 MHa or

eight per cent increase in the certified area compared to 2009 status. In mid-2010, about 13 countries adopted the FSC standards for their forest management. Also, the forest management certificates issued by FSC exceeded 1000 for the first time. While, tropical regions mainly the Africa and South East Asia are still in the initial stage of certification, developed nations like Sweden, and Russia are far ahead with certification (Oliver, 2010). In general, there is an upward trend in the forest certification status, because forest certification has a pivotal role in the management of natural resources globally.

2.3 CERTIFICATION SCHEMES

Globally different certification schemes are existing, they have different objectives. Thus, identification of the appropriate certifying body is important. The certification schemes are broadly classified into two: 1) Performance-based, and 2) Process-based (Layton *et al.*, 2002; Perera and Vlosky, 2006)

Performance-based certification schemes define specific performance levels for various aspects of forest management. This framework mainly used by FSC. Similarly, process-based schemes define a systematic approach to developing, implementing, monitoring, and evaluating environmental policies, but they do not stipulate performance standards and use the framework used by the Sustainable Forestry Initiative (SFI) (Layton *et al.*, 2002; Perera and Vlosky, 2006). These two methods were differing in the approach of conservation and management of the forest.

Different organisations have their own certification standards. The World Trade Organisation (WTO) define forest certification standards as drop into the category of process and production method standards, which specify how forest or natural resources are managed and raw materials are harvested. These standards covered the sustainable forest management standards (Atyi and Simula, 2002).

2.3.1 Forest Certification Schemes

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Forest certification schemes are categorised into internationally recognised schemes and nationally recognised schemes. The major internationally recognised schemes are FSC, PEFC, SFI, and International Organisation for Standardisation (ISO) 1400. These schemes have wide acceptance in the international market and more expensive than National Certification schemes. The major national certification schemes are Canadian standards association (CSA), American tree farm system(ATFS), Australian forestry standards (AFS), Brazilian national forest certification program (Cerflor), Chilean Forest Certification system (CERTFOR), Indonesian Ecolabelling Institute (LEI), Malaysian Timber Certification Council (MTCC), Keurhout Foundation, and China Forest certification scheme (CFCC) (Gupta *et al.*, 2013). The acceptability of national schemes in the international market is less but comparatively less expensive than international certification schemes. The national certifications Principles and Criteria are region specific, so these certifications are not used in global level. Details of some international and national schemes discussed below.

2.3.1.1. International Schemes

I. Forest Stewardship Council

The FSC is an international non-governmental organisation that was established in 1993. The Europe was the birthplace of FSC, now active in more than 57 countries. The FSC organisation evaluates, accredits, and monitors independent forest product certifiers and reinforce the certification programme through training, educations, and development of national initiatives.

The major objectives of FSC are environmental, social and ecological feasibility. FSC has specific P&C for ensuring these objectives, also this organisation does not prohibit any silvicultural practice. The P&C can be applied

to all temperate, tropical and boreal forest because these standards are general. Also specific standards for the assessment of plantation forestry. The certifiers use site-specific P&C for the evaluation of the forest area. These site-specific standards prepared by consulting various stakeholders related to that specific forest area or location (Fernholz *et al.*, 2010)

Since 2004, the certification status of FSC has rapidly grown from 125 MHa to 304 MHa and has more than 987 FMU certificates today. Similarly, in CoC certification, the organisation has grown from 4000 in 2004 to more than 16235 certificates today (Gupta *et al.*, 2013). Now FSC certified forest is distributed over 80 countries.

II. Programme for Endorsement of Forest Certification

In the Europe, non-industrial forest owners, government and small scale companies antagonistic towards FSC, because of their P&C were more rigid and not suitable for the site. So it led to some imbalance in the internal and international markets. Thus, government and some NGOs took steps for the development of new certifying agency called Programme for Endorsement of Forest Certification (PEFC). The FSC activities were the major impetus for the development of PEFC (Bass *et al.*, 2001).

Now the PEFC has support from 12 million woodland owners in the Europe. They manage 100 million hectares of woodlands and fell 280 million m^3 of timber annually and eleven countries has developed national PEFC governing bodies (Gupta *et al.*, 2013). This organisation also ensures the products come from the sustainably managed forest. The PEFC has developed specific C&I for sustainable forest management and for assessment of forest. The Pan-European process initiated to set specific C&I and identified 27 quantitative and descriptive indicators for SFM and certification process. These C&I was globally accepted but some of

the indicators not suited for some localities. Thus, member countries can elaborate the indicators based on their region.

The certification process involves major five steps, viz; 1) application for certification by the forest owner, 2) assessment process, 3) reporting, 4) decision on certification, and 5) re-auditing. The PEFC has rapid growth in the last six years. In 2004, the sanctioned programmes about 130 million acres of certified forestland (Fernholz *et al.*, 2010). Today, about 28 endorsed national programs and over 34 PEFC members. Now, they certified over 544 million acres of forestland and 6200 CoC certificates have been issued. One of the peculiar change happened in PEFC was declared a policy to permit stakeholders to become members.

In the Europe, a regional certification process was developed for non-industrial forestland. Finland used this certification approach intensively because 60 per cent of forest are private owned. A well network system available in the Europe for certification and management of forestland (Oliver, 2010).

III. Sustainable Forestry Initiative (SFI)

The members of American Forest and Paper Association initiated development of some criteria for SFM in 1994 and developed a scheme called Sustainable Forestry Initiative (SFI). The objectives of SFI are encouraged and promote efficient use of forest resources. The SFI follows five principles, 13 objectives, and 34 performance measures within those objectives and 103 indicators (Bettinger *et al.*, 2009). The influence of SFI grown each year, in 2004, about 90 million acres certified forestland to 181 third party certified forestland in 2013. Also in 2009 over 807 CoC certificate issued by SFI. But this SFI programme still in the juvenile stage, while some green building councils adopt SFI standards for the assessment and rating.

2.3.1.2. National Schemes

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During the 1990s, most of the developed nations initiated forest certification process. Usually, national certification schemes are of three types, viz; 1) Schemes associated with either FSC or PEFC, 2) Schemes that develop independently but aim for compatibility with FSC and/or PEFC, and 3) Schemes without any link to umbrella schemes (FSC and PEFC).

I. Canadian Standards Association (CSA)

Since 1996, Canada developed regional specific standards for SFM (Bettinger *et al.*, 2009). The CSA was the first country-specific programme in the North America. This programme set up standards for smallholders to increase the certification opportunities for smallholder groups or individuals in Canada.

II. Malaysian Timber Certification Council (MTCC)

In 2001, the MTCC phased a new approach to the management and conservation of tropical forest. This independent third party developed specific standards for SFM.

III. Cerflor

In 1996, the Brazilian Silvicultural Society (SBS) considered The Brazilian Programme for Forest Certification (Cerflor system) was one of the main tool for SFM. This system was created in collaboration with a research institutes, NGOs, training institute and Government departments. The C&I is somewhat relaxable compared with FSC (Kaechele *et al.*, 2011)

2.4. INDIAN SCENARIO

2.4.1 Sustainable Forest Management in India

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SFM in India began in the middle of the 18th and 19th century under the initiatives of the Malabar Collector Conolly in 1842. The first Inspector General Dietrich Brandis initiated the preparation of Forest Act, 1865. Then for the scientific management idea of working plan, management unit, divisions and circles arose during this time (Rao *et al.*, 1961). However, in 1797 Harting raised the concept of sustained-yield management, which is the backbone of modern scientific forestry. The Indian forestry sector was one among the world to be managed on scientific basis. During the pre-independence period, forest was considered as an import source for raw material collection for the industrial revolution. They have extensively collected wood and NTFPs. That is, forestry was considered only in the line of production after the implementation of 1952 Forest Policy the perception changed to conservation side although meeting the needs of the stakeholders (Gupta *et al.*, 2013).

After the 1990s the concept of forest certification emerged worldwide. Globally, the degradation of tropical forest was one of the main focus issues, which led to the emergence of certification. Earlier most of the environmental conferences set up specific P&C or C&I for the conservation and management of natural resources. Thus, India set up specific C&I for the management of forestland. In 1999, a workshop was held at Indian Institute of Forest Management (IIFM) at Bhopal on "Development of National Level Criteria and Indicators for the Sustainable Management of Dry Forests in Asia" is also called Bhopal-India Process. The result of the workshop widely referred to as "Dry Forest in Asia Process". In which the participated 10 Asian countries developed regionally accepted C&I for the management of tropical forests. They set up eight criteria and 51 indicators specific for the management of Indian forest as well as other tropical forests.

2.4.2 Emergence of Forest Certification in India

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Today, India has a dominant place in the global trade market of timber and non-timber forest products (NTFP), especially in the tropics. Now a days a lot of schemes and programmes have emerged for natural resources conservation and management. But, like carbon trading, India is still in its infancy stage in case of forest certification. The dependence on wood and NTFPs are more in the country, but the demand could not be meet by the Forest Department and local market. So, for providing continues wood, it is required to have areas under forest certification. In order to meet the demand for certified products in the markets, the industries have to look certified plantations and/or forestlands to supply the raw materials.

The forest certification demand increasing each year, that affect the export and wood based market industries in India. So, Ministry of Environment and Forest and Climate Change (MoEF&CC) established a National Forest Certification System. Up to now, FSC certified over 455492.3 Ha area and 256 CoC. This shows the growth of forest certification in India because of increased demand for certified products in the global markets.

This demand of certified product adversely affects the small and medium industries and growers. So that, FMU certification is needed for small and medium scale industries and growers. Thus, the Ministry of Textiles set up an Export Promotion Council of Handicrafts (EPCH) and they set up standards for export wooden handicrafts. Also, in November 2010 the FSC in collaboration with the World Wide Fund for Nature - India (WWF) in New Delhi set up a Forest Certification Council (FCCI), which push to FSC forest certification. Generally, the growth of CoC certification is appreciable in India, but FMU certification growth is in diminishing stage because most of the forestland is under government owned. All the forest divisions follow working plans which are prepared on the basis of sustainable yield principle. The main feature required for certification is sustainability, so most of the forest areas have this character but due to some

unawareness and bureaucratic apathy towards certification, it is yet to establish and stabilize.

2.4.3. NTFP Certification in India

NTFPs are an integral part of the forest-dwelling tribal communities to meet livelihood as well survival use (Lele *et al.*, 2010). Today, NTFPs are a good source of revenue to the government (Tewari and Campbell, 1995; Mitchell *et al.*, 2003). However, the poor marketing strategy and trade alteration led to 70 per cent of loss in the return (Choudhury, 2007). In the health care sector and the livelihood needs of rural poor people, the medicinal plants have pivot role, the World Health Organisation (WHO) statistics says about 80 per cent world population depended on traditional medicines. Thus, the increasing demand of NTFPs in the market led to exploitation of natural resource which created pitfalls in the social, ecological and environmental sector. So that, experts created suitable 'Certification Standards' for the management and assessment of NTFPs (Wilsey and Hiderband, 2011). These standards considered as a good tool for the sustainable management and production of NTFPs (Bhattacharya *et al.*, 2009). Now a days, the interest of NTFP certification is increasing, India initiated to attempt to get certification to Wild Honey from the Nilgiri Biosphere Reserve with the label of "eco-mark" also called 'PGS Wild', this certification was based on the principles of the Participatory Guarantee System (Nath, 2010). The awareness of certification is very less in our country so that the acceptance of certified products also very less. Thus established an independent framework for the certification of NTFPs with respect to the opinion collected from the different stakeholders from four states in India (Bhattacharya *et al.*, 2008, 2009). Finally, new standards emerged for certification but still some institutional framework, political aspects, and marketing strategies hindering the growth of certification in India. The following section briefly discusses the potential of certification in Kerala.

2.5 KERALA SCENARIO

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In Kerala, different variety of timber species ranging from very light (<550 kg/m^3) to very heavy (>750 kg/m^3) are available in the market. This wide range of timber species meet the demand of different industries and saw mills. But still, there are some pitfalls in the demand for timber because only 1.6 per cent of timber supplied by plantations. So the timber imported from different countries is about 16.5 per cent and the rubber plantations and the home gardens contribute the major portion of the timber supply which is about 46.3 per cent and 35.3 per cent respectively. The actual value of timber imported to Kerala was 2,16,000 m^3 during 2010-11 (Krishnankutty and Chundamannil, 2012). However, we do not have any mechanism for the monitoring, assessment and price fixation. Certification thus becomes a significant tool in this regard.

2.5.1 Forestland and Trees Outside Forest- Certification Potential

The forest area managed based on the Working Plan prescriptions, which is built on the principle of sustained yield. The building block of certification is SFM so that every forests area has the capacity for acquiring certification because the P&C or C&I created via sustained yield principles. In India, FSC plays a major role in the certification in which Standards Development Group (SDG) created site-specific C&I. The homesteads and plantations have the potential for getting certification because of their very nature and are sustainably managed (Kumar, 1994). The rubber plantations have the vast potential; it contributes more than 40 per cent timber supply to the market (Krishnankutty, 2005). Once we certify a forest area or plantation, then automatically all products derived from that area get certification. In the case of rubber plantation, the latex derived from the plantation is also certified. This increases the market price and enhancing the export activates. Thus, Kerala has immense certification potential in forestland as well as plantations and homesteads.

2.5.2 NTFP Certification: Kerala Perspective

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The forest dwellers communities of Kerala heavily depend on forest because of rich biodiversity. The tribal communities depends on NTFPs as a main source of livelihood. Thus, over 56 per cent of their income comes from NTFPs (Thomas, 1996). In Kerala, one hundred and twenty items of the NTFPs were collected from the forest areas, where medicinal plants are the main item of collection (Krishnakumar *et al.*, 2012). In India, 80 per cent of ayurvedic industries is situated in Kerala. These industries are the largest consumers of NTFPs (Ramesh *et al.*, 2007; Menon, 2003). Day by day the demand for NTFPs increasing so there is a wide gap in the demand and supply of NTFPs usually medicinal plants. Besides, there is concerned about the payment received by the collector and the selling price of the product or NTFPs. For the minimization of these all issues some evaluation standards needed in this sector. Later experts reveal that certification is the best tool for controlling massive extraction of NTFPs and assessing the quality. Also, it meets conservation aspects and livelihood option of the forest dwellers (Krishnakumar *et al.*, 2012). So, in Indian situation we need to develop some standards for the assessment of the NTFPs, thus firstly study the feasibility of NTFP certifications through the consultation with major stakeholders (Agrawal, 1996). Then study the cost of certification (Bhattacharya *et al.*, 2009) and understanding the socio-economic aspects of the stakeholders (Agrawal, 1996). Then we can say that NTFP certification is a benefit or not. In most of the developed countries, the effect is positive.

2.6. IMPORTANCE OF SANDAL TREE

2.6.1 Sandal Tree

Sandal (*Santalum album* L.), is one of the valuable trees in peninsular India and it belongs to the family Santalaceae (Sreenivasan *et al.*, 1992). The sandal tree is also called 'Dollar earning parasite'. It is harvested for heartwood and oil, so the

heartwood is called as East Indian Sandalwood and its oil is called 'Queen of Essential oil' (Jain *et al*., 1998). It is a small evergreen tree having 12 to 15-meter height. It grows well in early stage under partial shade condition but in the middle and late stages it shows intolerance to heavy overhead shade. Sandal trees are seen in soils like literate loam, sand, red soil, clay, and black cotton soil. It grows well in red ferruginous loam with varying fertility. Its best growth is on rich and fairly moist fertile soils. Trees growing on stony or gravelly soils are known to have more highly scented wood. It flourishes well where there is moderate rainfall of 600 to 1600 mm in a cool climate with long periods of dry weather, but adapts well to different climatic conditions excepting waterlogged or very cold places (Durairaj and Kamaraj, 2013).

Sandal tree is a protected resource in India but still, it being extensively exploited because of its high market value (Meera *et al*., 2000; Rao *et al*., 2002). The sandal genetic resources in the country are threatened by a variety of biotic and abiotic factors including logging of the trees, poaching, large-scale changes in land-use and poor natural regeneration (Sreenivasan *et al*., 1992). Since most of the extraction is from natural population, the pressure on the existing population has been tremendous (Radomiljac *et al*., 1997; Rao *et al*., 2001; Suma and Balasundaran, 2003). The loss of genetic resources is due to the high exploitation of sandal trees. So it affects the improvement trails of sandal for its heartwood quality as well as oil quality (Chandrashekaraiah and Dabgar, 1997). Active management and conservation measures are essential for sandal trees for minimizing the threats (Durairaj and Kamaraj, 2013). So a separate management plan is needed for sandal division.

Sandalwood Market

India act as the main exporter of sandalwood and oil (Ananthapadmanabha, 2000). Indian sandalwood and oil are considered to be a top quality, so it's

extensively used in perfumes, cosmetics, beauty aids and Ayurvedic medicines (Sreenivasan *et al*., 1992).

The Marayoor Sandal Division has the only government sandal depot in Kerala. Based on the government norms the sandalwood billets, sapwood, sawdust, chips, and roots are disposed of. Only the dead and wind-fallen trees are collected from the site and from other parts of the state are collected for auction. The major marketable sandalwood sorted under different classes before being passed for sale, is listed in Table 1 (KFD, 2011).

The Marayoor sandal forest is the only remaining natural tract of sandal in India. During the period 2001 to 2008, the sandal population declined rapidly because of rampant smuggling, in which thousands of trees have been felled and smuggled away from the forest. Also the number of sandal trees in Karnataka and Tamil Nadu region almost zilch. The unprecedented increase in the price of sandal along with scarcity factors boosted its demand (KFD, 2011). Under these circumstance, forest certification has pivotal role in the conservation, management and valuation of sandal reserve.

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Table 1. Classification of Sandalwood

Sl. No	Sandal Class	Descriptions
I	First Class Billets (or Vilayat budh)	Consists of thoroughly sound billets, weighing not less than 9 kgs, and not exceeding 112 pieces to the tone.
II	Second Class billets (or China budh)	Consists of slightly inferior billets, weighing not less than 4.50 Kgs. and not exceeding 224 pieces to the tone.
III	Third Class (or Panjam)	Consists of billets having small knots, cracks and hollows, weighing not less than 2.2 Kgs and not exceeding 448 pieces to the tone.
IV	Ghotla (or billets of short length)	Consists of short sound or no limit as to weight or number.
V	Ghat badia	Consists of billets with knots, cracks and a small hole at either end, weighing not less than 4.5 Kgs and not exceeding 240 pieces to the tone.
VI	Begardad	Consists of solid pieces without limit as regards dimensions, weight or number.
VII	Roots (First class)	Consists of pieces weighing not less than 6.75 Kgs and not exceeding 150 pieces to the tone.
VIII	Roots (Second Class)	Consists of pieces weighing not less than 2.25 Kgs and not exceeding 448 pieces to the tone.
IX	Root (Third Class) Ghat	Consists of small and side roots below 2.25 Kgs in weight.
X	Jajpokal (First class) or Badla	Consists of pieces weighing not less than 3.10 Kgs and not exceeding 320 pieces to the tone.
XI	Cheria (or large Chilta chips Sali)	Consists of pieces and chips of heartwood weighing not less than 2.25 gms.
XII	Ain chilta	Consists of pieces and small chips of heartwood.
XIII	Sawdust or powder	Obtained in sawing the sandalwood.

Materials and Methods

3. MATERIALS AND METHODS

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3.1 STUDY AREA

3.1.1 Location

Marayoor sandal Division, situated in Devikulam Taluk of Idukki District, is located 77^0 5' to 77^0 15' East longitude and 10^0 10' to 10^0 20' North latitude (Map 3.1). The headquarters of Marayoor Division is at Marayoor, 41 Km East of Munnar town. The present area of the Marayoor Division is 6260.094 hectares. Marayoor sandal Division is the only compact tract of sandal forest with mature sandalwood trees remaining in the country (KFD, 2011).

3.1.2 Boundaries

Marayoor sandal Division is within the Devikulam taluk, covering Marayoor, Kanthalloor, Vattavada and Kizhanthoor villages. Chinnar Wildlife Sanctuary is located in the North, Kurinjimala sanctuary in the East, Munnar range and Devikulam in the South and Eravikulam National Park in the West of the Division (KFD, 2011).

3.1.3 Topography

The sandal Division comes in the eastern part of the Western Ghats. This area comprises the Munnar Forest Division, which falls in the western slope and is the widest stretch of Western Ghats in Kerala. This area is divided into three sub regions namely, Anjanad in the East, Kannan Devan Hills at the center, and the valleys of Pooyankutty and Idamala in the West. Marayoor sandal Division falls in Anjanad tract and this tract is composed of lofty peaks and ridges on all sides except

the North and North-East side, which comprises of two valleys, Anjanad valley and Vattavada valley (KFD, 2011).

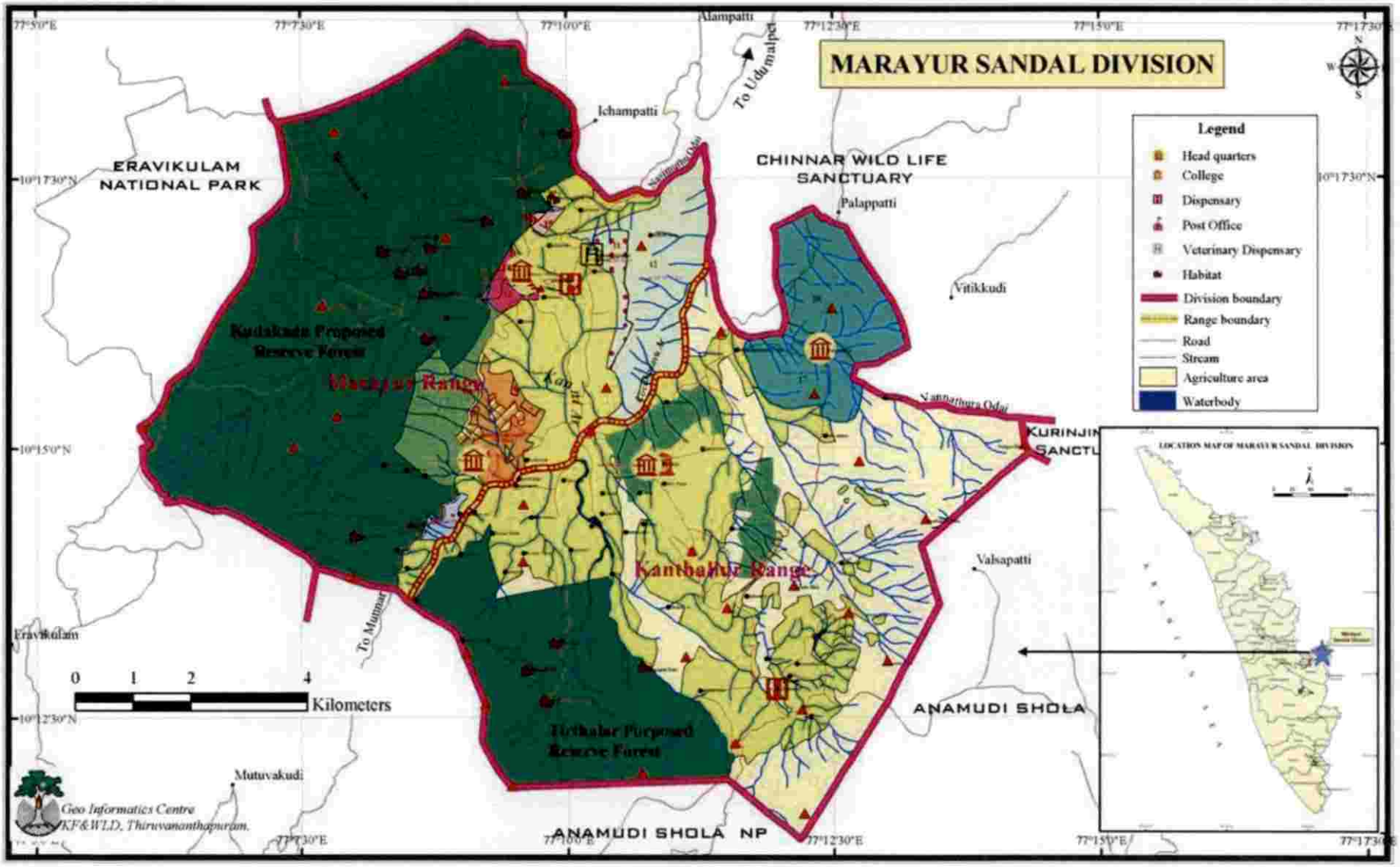
Altitude ranges from 1000 m to 2500 m at Marayoor. The highest peak is Kattadi Mala (2548 m) on the boundary between Eravikulam National Park and Marayoor Sandal Division. The other peaks are Manchola mala (2175 m), Chundakaatu mala (2132 m), Kumarickal mala (2522 m), Madavari mala (2153 m), Velligiri mala (2126 m), Annavari Mala (2104 m), Siramanagl mala (1847 m), Anjanattu parra (1798 m), Thalavari mala (1638 m), Kalpanil mala (1615 m), Kardikummittu mala (1538 m), and Killikoottu mala (1158 m) (KFD, 2011). This tract consists of different hills, so the terrain is undulated and rugged in most of the areas (KFD, 2011).

3.1.4 Forest Dwellers in Marayoor Sandal Division

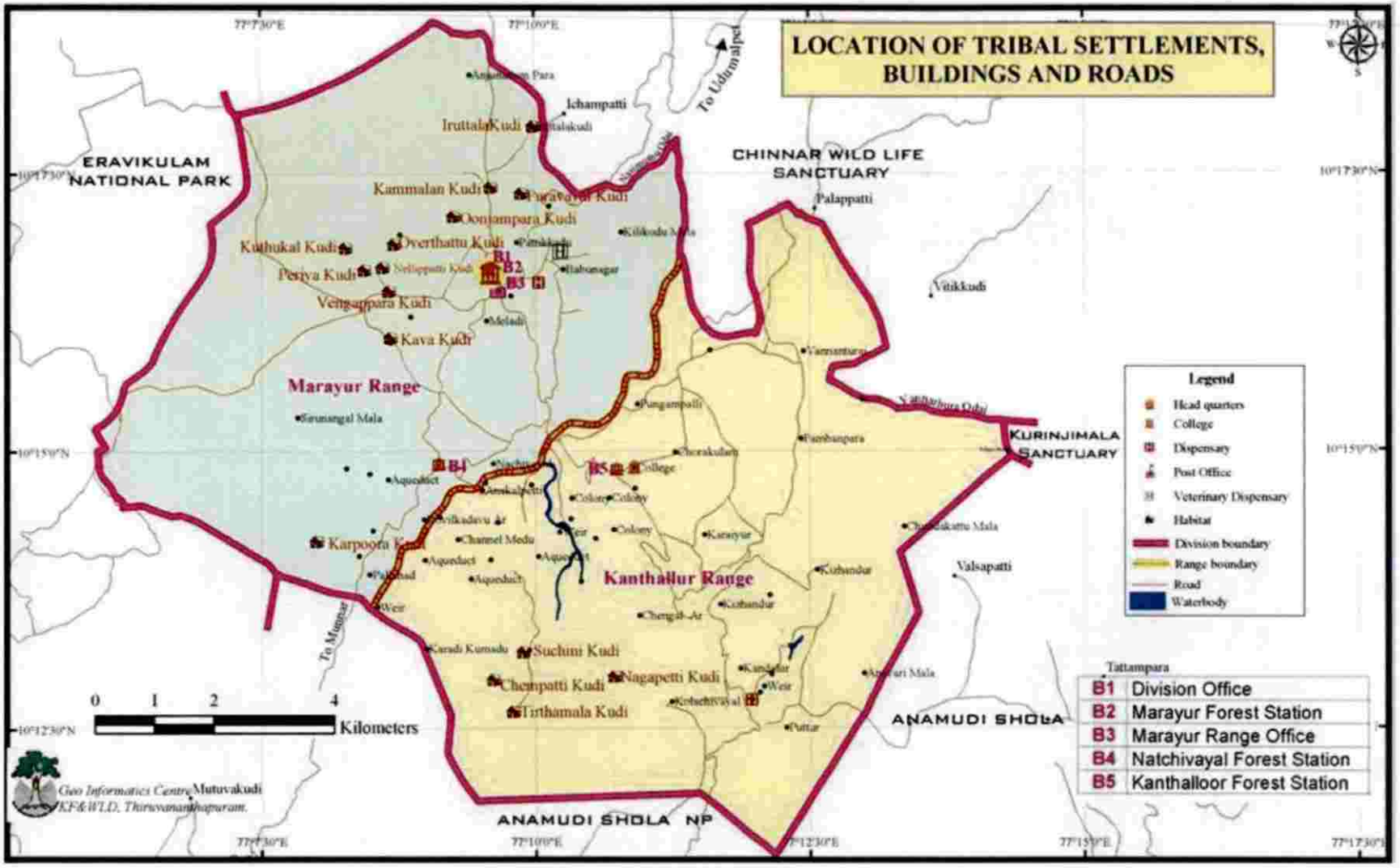
Muthuvans and Hill Pulayas are the main forest dwellers in the study area (KFD, 2011). They are settled in Marayoor and Kanthalloor ranges (Map 3.2) and are still continuing their customs, taboo and tradition. The language used is a derivative of Tamil and has a little connection with Malayalam. The tribes practice their own medical system using different plants collected from the forests. Similarly, they strictly practice endogamy. A total of 520 households are there in the Division which extend to 1389.43 hectares of forest land. The features of major tribal groups are discussed below:

Muthuvans

Muthuvan community is the main tribal group in Marayoor Sandal Division. They have been living inside the sandal forest Division and are still practicing shifting cultivation, agriculture practices, cattle rearing and NTFPs collection. Ragi and lemon grass are cultivated extensively around the settlements and each



Map 3.1. Marayoor Sandal Division



Map 3.2. Location map of forest dwellers

household has 3 to 10 acres of land. Around 485 Muduvan tribal families live inside the Division in 1380.23 hectares of land.

Hill Pulayas

The Hill Pulayas are the most backward tribes living inside the Marayoor Division. They inhabit small huts and their main occupations are collection of NTFPs, sandal Division works etc. They use Tamil language for communication and follows their own customs and traditions. This tribal group is only found in Idukki district. Their main source of income is from agriculture and forest related works. Besides, they are cultivating lemon grass because it gives good income to the families. There are only 35 Hill Pulayan families residing inside the sandal Division which covers an area of 9.20 hectares of forest land.

3.1.5 Condition of Marayoor Sandal Division

The Division falls on the eastern part of the Western Ghats. This Division comprises different forest types. The exposure of the sandal Division to severe abiotic and biotic damages, lead to the degradation and reduction of the ecological and economic values of the forest. The major constraints are unauthorised felling, smuggling of sandalwood, forest fire, grazing and profound weed growth, which diminishes the ecological and economic worth of the Division. Besides all those factors, overexploitation and unscientific collection of NTFPs disturb the forest ecosystem. The invasion of pulp wood plantations (wattle) to the shola and grassland hinder the ecological balance of the area. Similarly, the exotic invasive weeds like Lantana, Eupatorium and Parthinium obstruct regeneration of sandal. Lack of awareness among the people about the ecological, economic and social importance of the forest Division led to severe threat to the Division.

3.2 QUESTIONNAIRE SURVEY

A detailed survey was conducted among the stakeholders of Marayoor sandal Division by taking statistically valid samples using a pre-tested questionnaire. Information on the quality of forest management system in terms of environmental, social and economic perspectives were collected during the survey. Stakeholders as defined by Kotey *et al.* (1998) are, a group of persons and institutions who have a statutory, customary or moral right to use or benefit from the forest, and the power (legal, traditional or moral) to control or regulate conduct and behaviour which has an effect on the forest. All such persons and institutions may be said to have a stake in the forest and hence may be considered to be stakeholders. The Local Communities (LC), Forest Dwellers (FD), Forest Officials (FO), Casual Labourers (CL) in the Division, Major Bidders (MB) of Marayoor Sandal and Scientific Community (SC) were selected for the study as stakeholders.

3.2.1 Local Community

Local community are the people living in and around the Marayoor Division. They have been helping the Forest Department for various management practices. The Forest Department could not manage the sandal forest properly due to lack of sufficient staff, infrastructure and modern technologies. Apart from all these factors, the influx of smugglers in the Division alienated the youth from the sandal protection, providing quick money and liquor for unauthorised activities. The Department implemented different strategies for attaining the goal of protection from sandal smuggling and degradation of sandal forest. The local communities were involved in different activities; but they could not generate best results. So different methods were introduced for their active participations like Participatory Forest Management (PFM), and awareness programmes among local people. The PFM activities and Non-Wood Forest Product management activities play a pivotal role in the sandal reserve management.

3.2.2 Forest Dwellers

Forest dwelling scheduled tribes as defined by 'The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Right) Act, 2006' are, "the members or community of the scheduled tribes who primarily reside in and who depend on the forest or forest lands for bonafide livelihood needs and includes the scheduled tribe pastoralist communities". In Marayoor, Muthuvans and Hill Pulayas are the main tribal groups living inside the forest. They have been actively participating in the management and conservation of sandal Division. The tribal settlements in the Division are Chempattykudy, Vengappara-Nellippety, Kuthukallukudy, Kammalankudy Periyakudy, Kavakkudy, Karpoorakudy, Susannakudy, Theerthamalakudy Nakkupettykudy and Vannanthurakkudy. A total of 520 tribal households inhabit the Division and they cover an area of 1389.43 hectares of forest land. They are actively participating in Vana Samrakshana Samithies (VSS) and PFM activities, which weans the forest dwellers from unauthorised activities.

3.2.3 Forest Officials

The back bone of the Marayoor Division is the officials of the Kerala Forest Department. They are actively participating in the management aspects of the Division. The forest area is managed based on the working plan prescriptions of the Kerala Forest Department, which is built on the principle of sustained yield. About 98 permanent staff were involved in the sandal Division management activities under a Divisional Forest Officer (DFO).

3.2.4 Casual Labourers

The Casual Labourers have been involved in sandal depot work and field work in the sandal reserve. The Division provide good wages for most of the tribal

people and local community. They are an integral part in the management and conservation activities of the forest.

3.2.5 Bidders of Marayoor Sandal

The dictionary meaning of a bidder is 'an individual or organisation that offers to pay a particular amount of money for something'. Here, sandal is the product and sandalwood is sold to the person who offers the highest price. The Marayoor sandalwood auction is the largest sandal auction in the world. Usually one or two auctions are held annually. Sandalwood fetches high price in the market because of its high quality. Different bidders participate in the auction that include pharmaceutical companies, ayurvedic industries, cosmetics and perfume industries, and religious institutions. Now, the entire process of auction is carried out by e-auction or online auction. The major bidders of Marayoor sandal are large and small scale industries, ayurvedic pharmaceutical companies, and Hindu temples under Devaswom board.

3.2.6 Scientific Community (SC)

A diverse network of experts comprising scientists, academicians and technical experts gave suggestions about forest certification and its impact on the society. Different experts include scientists from Kerala Forest Research Institute, academicians and technical experts from Kerala Agricultural University. This very important group of individuals analysed the pros and cons of certification in our country.

3.2.7 Selection of respondents for the study

A total of 190 respondents were randomly selected for the present study. Amongst these, 60 each were from both Forest Dwellers and Local Community, 25 each were from both Forest Officials and Casual Labourers and 10 each from both

Plate 1. Sensitization workshop on 'Forest Certification and Registration of Geographic Indication of Marayoor sandal', held at Marayoor on 7-02-2015

Plate 2. Data collection exercises: a) Data collection from Kammalam Kudi, b) Data collection from Casual Labourers, c) Data collection from Range Forest Officer

Plate 3: Data collection: d) Data collection from Guruvayoor Devaswom, e) Data collection from Local community, f) Data collection from Scientist

Major Bidders and Scientific Community (Table 2). The information collected from these 190 respondents formed the material for this study.

Table 2. Distribution of sample size

Sl. No	Stakeholders	Number of respondents
1	Local Community	60
2	Forest Dwellers	60
3	Forest Officials	25
4	Casual Labourers	25
5	Major Bidders	10
6	Scientific Community	10
Total		**190**

3.2.8 Method of Data Collection

A sensitisation workshop on forest certification was conducted on 07th February 2015 (Plate 1) to elucidate information about the forest certification. The workshop enabled creating awareness among the different stakeholders. Based on this workshop, a detailed questionnaire was prepared to gather information from major six stakeholders of Marayoor sandal. A detailed survey was conducted by using a pre-tested structured questionnaire to obtain data of the general characteristics of each stakeholders as well as to understand the respondents' knowledge on Forest Certification and its importance in Marayoor. Similarly, a structured questionnaire was prepared for Major Bidders of Marayoor sandal and Scientific Community.

The survey schedule was framed with questions set separately for each of the stakeholders (Appendix I, Appendix II, Appendix III, Appendix IV, Appendix V and Appendix VI) and the responses were also set on different scales depending up on the nature and type of questions. The responses to certain questions were plotted on a five point Likert scale. It is defined as 'a psychometric response scale primarily used in questionnaires to obtain participant's preferences or degree of agreement with a statement or set of statements. Likert scales are a non-comparative scaling techniques and are unidimensional (only measure a single trait) in nature. Respondents are asked to indicate the level of agreement with a given statement by way of an ordinal scale' (Renis, 1932). The Likert scale indicate preferences, i.e.; strongly agree, agree, neutral, disagree and strongly disagree and were assigned scores 5, 4, 3, 2 and 1 respectively. Similarly, responses to certain questions were obtained on a bipolar mode of 'Yes' or 'No'. Both closed ended and open ended questions were included in the questionnaire.

3.2.8.1 Variables selected for the study

In order to meet the objectives of the research, the questionnaire included the following variables:

Part I: **Socio-demographic:** This section examined the factors such as age, gender, education, annual income, source of income and occupational status of the respondents. These factors were used for understanding the socio-economic status of the respondents.

Part II: **Perception of the respondents:** This section was related to individual perceptions about feasibility of forest certification in Marayoor sandal Division and its importance in present scenario. For this purpose, the information was collected from variables like ecological benefits from sandal forest, indirect benefits from sandal forest, major threat affecting sandal reserve, job related risk dimensions of workers, job satisfaction level of workers in the Division, management aspects,

policy aspects, implementation of managemental activities and ecological aspects, awareness on forest certification and relationship of major bidders to sandal reserve.

Statistical tools selected for the study

The study relied on both qualitative and quantitative data. The data were analysed, interpreted and presented by using both descriptive statistics and inferential statistics. To assess the socioeconomic status of the stakeholders' descriptive statistical tools of percentages and frequencies were employed. For the assessment of management aspects of MSD and its feasibility, along with descriptive statistical tools percentages, frequencies and Karl-Pearson's coefficient of correlation, and inferential statistical tools such as one-way analysis of variance and independent t-test were used. Some non-parametric statistical tests like chi-square and Kolmogorov-smirnov test were also applied. All the above mentioned analysis were carried out by using the statistical software SPSS version 20.

Results

4. RESULTS

The present study was undertaken to evaluate the potential of implementing forest certification in Marayoor sandal Division (MSD) of Kerala by an assessment of the socio-economic status of the stakeholders viz; Forest Dwellers (FD), Local Community (LC), Forest Officials (FO), Casual Labourers (CL), Major Bidders (MB) of Marayoor sandal and the Scientific Community (SC). The study also focused on the assessment of management aspects of the Division, particularly to see whether they comply with the sustainable forest management principles and criteria of FSC.

4.1 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF STAKEHOLDERS

The study sample consisted of respondents randomly drawn from among Forest Officials working in Marayoor Sandal Division, Casual Labourers in the Division, Forest Dwellers in and around the Marayoor forest Division and local people in the study area. Similarly, Scientific Community and Major Bidders of Marayoor sandal were selected as major stakeholders for this study. A total of 190 respondents were interviewed. Among these, 60 each were from both Forest Dwellers and Local Community, 25 each from both Forest Officials and Casual Labourers and 10 each from both Major Bidders and Scientific Community. The respondents were classified on the basis of relation with Marayoor Sandal Division. The socio-demographic characters like age, education status, monthly income and source of income of stakeholders like Forest Officials, Local Community, Casual Labourers and Forest Dwellers were analysed.

4.1.1 Stakeholders' Profile

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The primary data on socio-demographic characters of stakeholders except SC and Major Bidders were collected through pre-tested questionnaire surveys. The details of socio-demographic aspects of the above respondents are discussed below.

4.1.1.1Classification of respondents based on age

On classifying the respondents based on different age groups (Table 3), it was observed that majority of them fall under the category of middle age group of 31 to 50 years (61%). It was followed by the younger age group of 10 to 30 with a percentage of 20, and age group 51 to 70 (17%). However, hardly two percent fall under the age group of 71-90 years.

Table 3. Age profile of stakeholders

Sl. No	Age class (years)	FD (%)	LC (%)	CL (%)	FO (%)	Total (%)
1	10-30	28	12	32	8	**20**
2	31-50	58	64	44	76	**61**
3	51-70	10	22	20	16	**17**
4	71-90	4	2	4	0	**2**
Total		100	100	100	100	100

FD- Forest Dwellers, LC- Local Community, CL- Casual Labourers, FO- Forest Officials

4.1.1.2 Literacy

Table 4 indicates that majority of the respondents in the category of Forest Dwellers, Local Community and Casual Labourers were illiterate (33%), followed

by lower primary (25%), high school (20%) and upper primary (12%).None of the respondents in the category of Forest Dwellers had college education which highly reflected in the total percentage of the same category. However, all the respondents from the category of Forest Officials, Major Bidders and Scientific Community had college level education.

Table 4. Literacy level

Category	**FD (%)**	**LC (%)**	**CL (%)**	**Total (%)**
Illiterate	60	8	32	**33**
Lower primary	28	13	32	**25**
Upper primary	10	10	16	**12**
High school	2	47	12	**20**
College	0	22	8	**10**
Total				**100**

(Illiterate: one who can't read, write but can communicate verbally; lower primary: Class 1 to Class IV; Upper primary: Class V to Class VII; High school: Class VIII to Class X; College level: above Class X) (FD- Forest Dwellers, LC- Local Community, CL- Casual Labourers)

4.1.1.3Major sources of income of the respondents

Table 5 indicates that more number of respondents are depended on forest and forest based activities as their major source of income followed by agriculture sector, private sector, wages and government sector. On considering each respondent group, majority of the people depending on forest based jobs were Casual Labourers followed by Forest Dwellers. However, it was seen that the

income obtained by the forest dwellers from forest and agricultural sector is almost on par with each other.

Table 5. Sources of income of respondents

Source of Income	FD	LC	CL	Total (%)
Government sector	2	8	0	**3**
Private sector	3	50	4	**19**
Wages	10	13	4	**9**
Forest based	35	3	80	**39**
Agriculture	38	20	4	**21**
Others	12	5	8	**8**
Total				**100**

FD- Forest Dwellers, LC- Local Community, CL- Casual Labourers

4.1.1.4 Income

On assessing the annual income accrued by each respondent group (Table 6 and Table 7), it was evident that most of the forest dwellers (62%) were earning hardly Rs. 60,000 per annum, followed by 33 per cent of them earning between Rs. 60,000 to 1,20,000 per annum and only five per cent of them earning between Rs. 1,20,000-1,80,000 per annum.

While comparing the other stakeholders, viz, (Local Community, Casual Labourers and Forest Officials), it was clear that most of the respondents in Local Community (50%) and Casual Labourers (76%) come under the category of below Rs. 1,20,000 per annum, followed by 35 per cent and 20 per cent of them fall under Rs. 1,20,000 to 2,40,000 per annum respectively. The assessment of annual income of Forest Officials showed that about 88 per cent of the

respondents fall within the range of Rs. 2,40,000 to 3,60,000 followed by Rs. 3,60,000 to 4,80,000. Since forest officials are government employees they receive reasonably good income in the form of salary.

Table 6. Income status of Forest Dwellers

Sl. No	Annual income	Respondents (%)
1	Below 60,000	62
2	60,000-1,20,000	33
3	1,20,000-1,80,000	5
4	1,80,000-2,40,000	0
5	Above 2,40,000	0

Table 7. Income status of Local Community, Casual Labourers and Forest Officials

Sl. No	Monthly income (in Rs.)	LC (%)	CL (%)	FO (%)
1	Below1,20,000	50	76	0
2	1,20,000-2,40,000	35	20	0
3	2,40,000-3,60,000	10	4	88
4	3,60,000-4,80,000	3	0	12
5	Above 4,80,000	2	0	0

LC- Local Community, CL- Casual Labourers, FO- Forest Officials

4.2 ASSESSMENT OF FOREST CERTIFICATION IN MARAYOOR SANDAL DIVISION

In order to conduct the feasibility study of forest certification in Marayoor Sandal Division, P&C of FSC (Appendix VII) was taken as the guide line based on which a regional specific P&C was adopted for the purpose of data collection. In this study, the identified stakeholder group were provided with a questionnaire and were asked to score them based on their perception. The same was analysed using a five point Likert scale. The perceptions of each stakeholder are shown below.

A total of twenty-seven Likert items (ecological, indirect benefits and threat of forest) were analysed for evaluating the importance of existing sandal forest and its status (Appendix I and Appendix II). Since the direct beneficiaries are forest dwellers and local community, they were selected as the sample group. The stated opinions were further tested against the fifth and sixth principles of FSC (Benefits from forest &Environmental values and impacts). Under the ecological benefits the items considered for perception analysis are shown in Table 8 & Table 9.

From Table 8, it was clear that 88 per cent of respondents opined to the first statement 'The sandal reserve improves the water quality', because Forest Dwellers are one of the major users of water bodies in the forest area. They are of the belief that the existing forest highly influences the water quality. Similarly, increase in soil fertility (76%), reduction in soil erosion (70%), regulation of microclimate (74%), and influence on rainfall are the other major benefits stated by the respondents. On contrary to the general function of forests 52 per cent of the respondents were of the opinion that sandal reserve does not act as a wind break to the neighbouring agricultural fields.

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On examining the response of Local Community towards ecological benefits of sandal reserve (Table 9), 83 per cent of the respondents opined that the reserve improves the soil fertility. While, the other views are almost similar to that of Forest Dwellers.

Table 8. Forest Dwellers perception on ecological benefits

Sl. No	Statements	Likert Scale				
		SDA (%)	DA (%)	N (%)	A (%)	SA (%)
1	The sandal reserve improves the water quality	0	2	10	18	70
2	The forest area reduces the soil erosion	0	12	18	23	47
3	The sandal reserve regulates the microclimate	2	8	23	37	37
4	The forest area influences the rainfall of the region	0	5	20	47	28
5	The sandal reserve serves as a wind break for your agricultural field	30	22	25	13	10
6	The forest area reduces the dust and other allergic pollutants.	18	8	38	20	15
7	The sandal reserve or Forest controls agricultural pest	27	20	33	15	5
8	The reserve improves the fertility of soil	0	7	17	28	48

SDA-Strongly Disagree, DA- Disagree, N-Neutral, A-Agree, SA-Strongly Agree

Table 9. Local Community perception on ecological benefits

Sl. No	Statements	Likert Scale				
		SDA (%)	DA (%)	N (%)	A (%)	SA (%)
1	The sandal reserve improves the water quality	2	3	22	25	48
2	The forest area reduces the soil erosion	5	2	12	37	45
3	The sandal reserve regulates the microclimate	3	3	17	37	40
4	The forest area influences the rainfall of the region	2	3	15	47	33
5	The sandal reserve serves as a wind break for your agricultural field	33	17	25	15	10
6	The forest area reduces the dust and other allergic pollutants.	27	12	15	12	35
7	The sandal reserve or Forest controls garden pest	47	15	17	15	7
8	The reserve improves the fertility of soil	2	5	10	28	55

SDA-Strongly Disagree, DA- Disagree, N-Neutral, A-Agree, SA-Strongly Agree

The total score of all the eight likert items of 'ecological benefits' for both categories (FD and LC) were calculated separately. In order to classify the two respondent groups based on their scores on 'ecological benefits' the measure of dispersion (range) for the respondents were calculated, based on which they were categorised under three groups namely low (8 to 19), medium (19 to 30) and high (30 to 41). The classification of respondents based on the total score is given in the Table 10.

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Table 10. Classification of Forest Dwellers and Local Community on ecological benefits

Category	Range	Frequency		Percentage (%)	
		FD	LC	FD	LC
Low	8-19	0	1	0	2
Medium	19-30	30	31	50	52
High	30-41	30	28	50	46
Total		60	60	60	100

FD- Forest Dwellers, LC- Local Community

Table 10 shows that the responses of Forest Dwellers on ecological benefits equally fall in the response category of medium (50%) and high (50%). No respondents came under the category of 'low score'. While examining the responses of Casual Labourers, it was evident that most of the respondents came under the category of medium (52%) and high (46). This significantly indicates compliance to the FSC principle five and six entitled 'benefits from forest' and 'environmental values and impacts'.

The normality of the total score data of the two stakeholders (FD and LC) was checked by using the statistical test named 'One Sample Kolmogorov-Smirnov'. The result of the test is given below (Table 11). The tested null hypothesis was (H_0): the observed distribution fits the normal distribution.

Table 11. Normality test of ecological benefits

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		FD	LC
N		60	60
Normal Parameter	Mean	28.9	28.617
	Standard Deviation	4.33	4.83
Kolmogorov-Smirnov (Z value)		1.055	0.651
p-value		0.216	0.79

FD- Forest Dwellers, LC- Local Community

The p-value for Kolmogorov - Smirnov test statistic was non-significant at five per cent level for the both data set. A non-significant p-value means the sample distribution is shaped like a normal curve. Then the total scores of 'ecological benefit' obtained for the two groups (FD and LC) were compared by using the parametric independent t-test. The result of the t-test given in Table 12.

The result of t-test shows that statistically there is no significant difference between the group means of total scores on 'ecological benefit' at five per cent level. That is, the viewpoints of Forest Dwellers and Casual Labourers on each likert items of ecological benefits was almost same. So that, the MSD comply with ecological parameters of FSC.

Table 12. Independent sample t-test of ecological benefits

Group		N	Mean	S.D	S.E.M
Total score on ecological benefit	FD	60	28.9	4.3324	0.5593
	LC	60	28.617	4.8366	0.6244
t-value		**0.338^{ns}**			

ns- non-significant at 5% level

4.2.1.2 Response to indirect benefits of sandal forest

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To assess the view of Forest Dwellers and Local Community about the indirect benefits from sandal reserve, a set of nine and 10 likert items were employed respectively. For the purpose, a representative sample consisting of 60 respondents was selected from each category. The details of the statements are represented in Table 13 and 14.

Table 13 illustrates that, 82 per cent of the respondents opined to the sixth statement 'The reserve provides employment opportunities', because, MSD plays a key role in meeting the livelihood needs of most of the households. In contradiction to the general idea that, there will be no threats to the people because of the sandal Division, most of the respondents (57%) thought that sandal reserve is causing threats to their life because of its profound value. More than 45 per cent of respondents believed that, there was no cultural mix happening due to tourism and 45 per cent of them acknowledged that the forest division does not favour any educational facilities.

When the responses of Local Community are examined (Table 14), 88 per cent of the respondents considered the sandal reserve as an attraction to large number of tourist. Similarly, 85 per cent of them believed that the sandal reserve provides employment opportunities. But, 50 per cent of them were confident that the presence of forest division had nothing to do with the communication facilities. Even though there were varying responses, the general opinion was that the sandal reserve does provide immense indirect benefits to the Forest Dwellers and Local Community.

Table 13. Forest Dwellers' perception on indirect benefits of sandal reserve.

Sl. No	Statements	Likert Scale				
		SDA (%)	DA (%)	N (%)	A (%)	SA (%)
1	The sandal reserve attracts large number of tourist	7	5	13	38	37
2	Tourism provides good income for families	24	12	32	27	5
3	Cultural mix occurred by tourism	36	12	27	13	12
4	Because of sandal reserve there is threat to peaceful life	10	7	26	17	40
5	The presence of sandal reserve improves the infrastructure facilities	12	17	38	18	15
6	The reserve provides employment opportunities	0	3	15	19	63
7	The presence of forest division improves the communication facilities	25	13	32	20	10
8	The forest division influences the health status	8	8	34	25	25
9	The forest division favours the education facilities	28	17	17	15	23

SDA-Strongly Disagree, DA- Disagree, N-Neutral, A-Agree, SA-Strongly Agree

Table 14. Local Community perception on indirect benefits of sandal reserve.

Sl. No	Statements	Likert Scale					
		SDA (%)	DA (%)	N (%)	A (%)	SA (%)	Maximum response
1	The sandal reserve attracts large number of tourist	0	2	10	17	71	Strongly agree
2	Tourism provides good income for families	12	5	25	25	33	Strongly agree
3	Cultural mix occurred by tourism	20	22	32	23	3	Neutral
4	Because of sandal reserve there is threat to peaceful life	23	20	28	8	21	Neutral
5	The presence of sandal reserve improves the infrastructure facilities	12	21	22	17	28	Strongly agree
6	The reserve provides employment opportunities	0	5	10	38	47	Strongly agree
7	The presence of forest division improves the communication facilities	37	13	20	18	12	Strongly disagree
8	The forest division influences the health status	7	15	25	36	17	Neutral
9	The forest division favourably impeded the facilities.	3	10	48	32	7	Neutral
10	The forest division favours the education facilities	8	7	50	18	17	Neutral

SDA-Strongly Disagree, DA- Disagree, N-Neutral, A-Agree, SA-Strongly Agree

The forest dwellers were classified based on their scores on indirect benefits, by calculating the range for the respondents, and they were categorised under three groups namely low (9.0 to 21.30), medium (21.31– 33.67) and high (33.68 – 46.0). This classification is shown in Table 15.

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Table 15. Classification of Forest Dwellers on indirect benefits

Category	Range	Frequency	Percentage (%)
Low	9.0 - 21.30	6	10
Medium	21.31– 33.67	42	70
High	33.68 – 46.0	12	20
Total		60	100

The response of more than 70 per cent of the forest dwellers was in the medium category. It means that, for most of the forest dwellers, the indirect benefits from the sandal Division were moderate. Only 20 per cent of them believed that, they were obtaining immense benefits from the Division.

The Local Community were classified based on their scores on indirect benefits, by calculating the range for the respondents, and they were categorised under three groups namely low (10 – 23.66), medium (23.67– 37.32) and high (37.33 - 51). This classification is shown in Table 16.

The responses of most of the Local Community (68%) were in the category medium. That is, most of them accepted that the existing sandal reserve provides a lot of indirect benefits to their locality.

Table 16. Classification of Local Community on indirect benefits

Category	Range	Frequency	Percentage
Low	10 – 23.66	2	3
Medium	23.67– 37.32	41	68
High	37.33 – 51	17	29
Total		60	100

For verifying the normality of the data, the total scores of the two stakeholders were compared and a 'one sample Kolmogorov-smirnov' test was conducted. The result is given in Table 17. It is evident that p-value for both sets is non-significant at five per cent level ($p>0.05$). That is, the sample distribution is normal.

From the result of the normality test, it is clear that, parametric t-test is appropriate for comparing the means of indirect benefits of two independent groups (FD and LC). The result of the t-test is given in Table 18.

Table 17. Normality test of indirect benefits

		FD	LC
N		60	60
Normal Parameter	Mean	29.5	33.77
	Standard Deviation	5.10	6.06
Kolmogorov-Smirnov (Z value)		0.913	0.651
p-value		0.375	0.791

FD- Forest Dwellers, LC- Local Community

Table 18. Independent sample t-test of indirect benefits

Group		**N**	**Mean**	**S. D**	**S.E.M**
Total score on Indirect benefit	FD	60	29.50	5.10	0.659
	LC	60	33.77	6.06	0.783
t-value		**4.168***			

* Significant at 5% level

Table 18 shows that t-value is statistically significant at five per cent level. This implies that, though the sandal reserve provides a lot of indirect benefits to Forest Dwellers and Local Community, their viewpoints were different. Tourism, infrastructure, cultural mix and other related items significantly influence the lives of local people than that of forest dwellers. Overall, the study revealed that, sandal reserve provides a lot of indirect benefits to the Forest Dwellers and Local Community.

4.2.1.3 Response of the stakeholders to the major threats of sandal division

A total of 10 items were included for the analysis of major threats of sandal Division. The FSC principle six (environmental values and impacts) analyses the values and impacts or threats in the region. Hence, the statements about major threats in the questionnaire was prepared by considering all the relevant aspects of principle six. For that purpose, a representative sample of 60 respondents were selected from each category (FD&LC). The details of the responses of Forest Dwellers towards the items are given in Table 19.

From Table 19, it is clear that, 79 per cent of respondents agreed to the statement "man animal conflict issues are increasing yearly" and 65 per cent of them agreed to the statement "reserve is affected by profound weed growth". Most of the other statements had a very low score. That is, the Forest Dwellers had a strong belief that there were no considerable threats except man-animal conflict and weed growth.

The analysis on the response of Local Community (Table 20) towards major threats in sandal reserve showed that, 77 per cent of the respondents were having the opinion that man-animal conflict was very high, whereas, the other threats like grazing, occurrence of fire, disease and pest attack, ganja cultivation, rate of poaching, deforestation and smuggling cases were less in the sandal

Division. It means that the overall responses from Forest Dwellers and Local Community were almost the same.

Table 19. Forest Dwellers' perception on major threats in sandal reserve

Sl. No	Statements	Likert Scale				
		SDA (%)	DA (%)	N (%)	A (%)	SA (%)
1	The grazing pressure on sandal division is high	15	12	20	32	21
2	The occurrence of fire in the sandal division is high	40	8	8	20	24
3	Very profound weed growth in the sandal division	0	5	30	30	35
4	The disease and pest attack on sandal reserve is high	13	25	48	10	4
5	Ganja cultivation is noticed in the reserve	53	27	17	3	0
6	Rapid deforestation is seen in the division	55	23	20	2	0
7	Man animal conflict issues are increasing yearly	3	8	10	28	51
8	The rate of poaching very high	75	13	8	4	0
9	Theft of sandal trees are very common	8	37	37	13	5
10	Smuggling cases from sandal reserve growing each year	55	32	10	3	0

SDA-Strongly Disagree, DA- Disagree, N-Neutral, A-Agree, SA-Strongly Agree

Table 20. Local Community perception on major threats in sandal reserve

Sl. No	Statements	Likert Scale				
		SDA (%)	DA (%)	N (%)	A (%)	SA (%)
1	The grazing pressure on sandal division is high	38	8	26	18	10
2	The occurrence of fire in the sandal division is high	40	8	10	25	17
3	Very profound weed growth in the sandal division	5	7	29	27	32
4	The disease and pest attack on sandal reserve is high	38	20	25	10	7
5	Ganja cultivation is noticed in the reserve	30	27	28	8	7
6	Rapid deforestation is seen in the division	63	13	10	12	2
7	Man animal conflict issues are increasing yearly	5	6	12	30	47
8	The rate of poaching very high	75	12	7	3	3
9	Theft of sandal trees are very common	15	32	38	10	5
10	Smuggling cases from sandal reserve growing each year	50	30	13	5	2

SDA-Strongly Disagree, DA- Disagree, N-Neutral, A-Agree, SA-Strongly Agree

For identifying the major threat seen in sandal reserve, the opinions of both the stakeholders were combined. From the result obtained (Fig. 1), it is understood that 'man-animal conflict' is the major threat in the Marayoor area, while 'weed growth' and 'grazing' are the two major threats prevailing in the Marayoor Sandal Division.

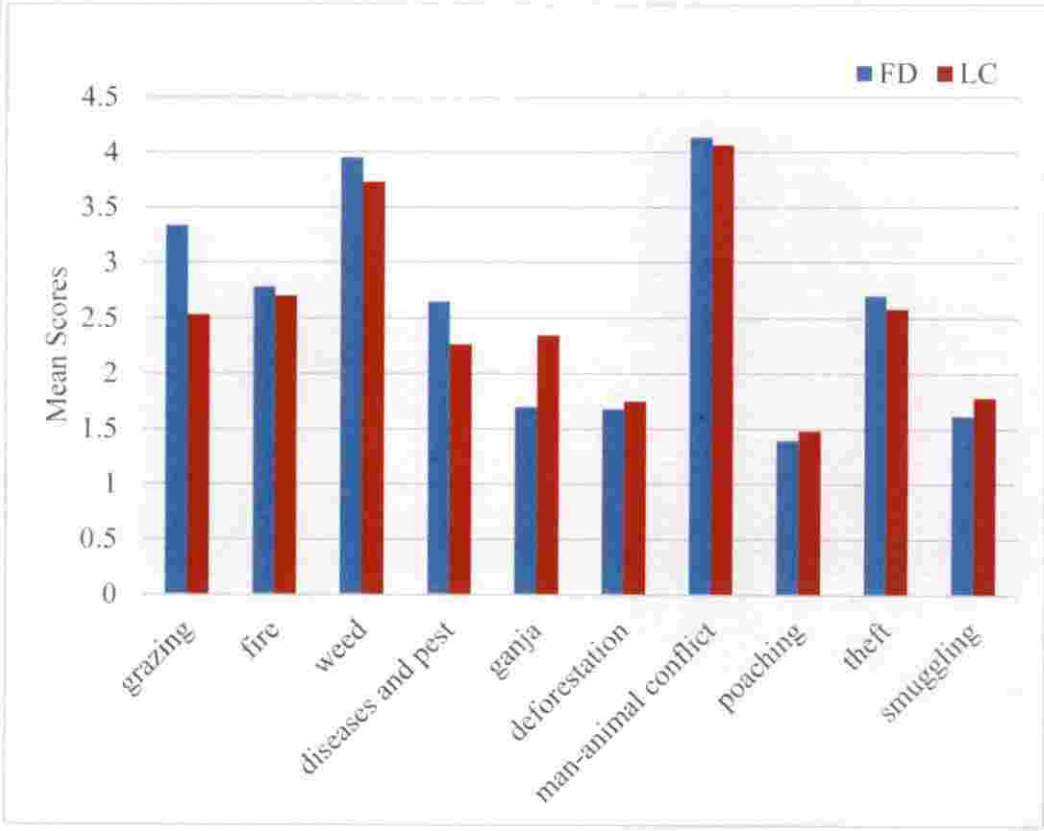

Fig 1. Forest Dwellers' and Local Community responses on major threat

Comparison of Forest Dwellers and Local Community responses

The total score of all the 10 likert items of 'major threats' for both categories (FD and LC) were calculated separately. In order to classify the two respondent groups based on their scores on 'major threats', the measure of range class for the respondents were calculated based on which they were categorised under three groups namely low (10.0 to 23.6), medium (23.7 to 37.3) and high (37.3 to 51.0). The classification of respondents based on the total score is given in Table 21.

Table 21. Classification of Forest Dwellers and Local Community on major threats.

Category	Range	Frequency of FD	Percentage of FD	Frequency of LC	Percentage of LC
Low	10.0 to 23.6	14	23	23	38
Medium	23.7 to 37.3	46	77	36	60
High	37.3 to 51.0	0	0	1	2
Total		60	100	60	100

FD- Forest Dwellers, LC- Local Community

The above table shows that more than half of the two respondent groups believed that there is some threat to the sandal reserve from biological and physical point of view. However, only less than five per cent of them indicated that the threat to the sandal reserve is very high. For checking the normality of the data, 'one-sample Kolmogorov smirnov test was employed and the outcome showed a positive result (Table 22).

Table 22. Normality test of major threats

		FD	LC
N		60	60
Normal Parameter	Mean	25.95	25.25
	Standard Deviation	3.456	5.210
Kolmogorov-Smirnov (Z value)		0.730	0.734
p-value		0.661	0.653

FD- Forest Dwellers, LC- Local Community

The p-value for the both data sets showed a non-significant value at five per cent level ($p>0.05$). A non-significant p-value means the sample distribution is normal.

From the normality test, it was clear that, the parametric t-test is appropriate for comparing the means of total scores of two independent groups (FD and LC). The result of the t-test is given in Table 23. The Table shows that there is not much deviation in the mean scores of the two group, which indicate that the opinion of the two groups about major threat to sandal division is almost the same.

Table 23. Independent sample t- test of major threats

Group		**N**	**Mean**	**S. D**	**S. E. M**
Total threat score	FD	60	25.950	3.456	0.446
	LC	60	25.250	5.209	0.673
t-value		**0.867^{ns}**			

ns- non significant at 5% level

4.2.1.4. Correlation between major threats, ecological benefits and indirect benefits

Karl-Pearson's coefficient of correlation was used to find out the relation between ecological and indirect benefits with major threats prevailing in the sandal Division. The data followed a normal distribution (Table11, Table 17, and Table 22) and the result of correlation is shown below (Table 24).

Table 24. Correlation between benefits and threat of sandal forest

Variables		Ecological benefits	Indirect benefits
Threat	FD	0.344**	0.470**
	LC	-0.199^{ns}	0.164^{ns}

** Significant at 1% level; ns-non significant at 5 % level

In case of Forest Dwellers, there was a positive significant correlation between ecological benefits and the threats, as well as indirect benefits and threats. This reveals that, when benefits (both ecological and indirect) provided by the sandal reserve increases, the threat posed to the sandal reserve also increases. In spite of this, the response given by the Local Community points to a non-significant relation between the threats and benefits.

4.2.1.5. Association of socio-demographic variables with benefits and threats.

Pearson's chi-square test was used to find out the association between the socio-demographic variables of Forest Dwellers with benefits and threats, as given in Table 25. Only two important socio-demographic variables were taken for this analysis. viz, educational status and monthly income.

The result from Table 25reflects that, there is no significant association between the socio-demographic variables and the perception of Forest Dwellers on benefits and threats.

Similarly, on assessing the association of perception of Local Community with the socio-demographic variables, the results showed almost similar relation except for educational status and threat. Majority of Local Community were in higher education profile, with 47 per cent having high school level and 22 per cent

having college level education. Hence, they had a better awareness of the threats. As the level of education increases, the understanding of Local Community about the threats (man-animal conflict, weed growth, poaching, deforestation etc.) that are faced by sandal reserve also increases. Hence, a significant relation was obtained for the two variables under consideration.

Table 25. Association between socio-demographic variables with benefits and threats.

Variables		Ecological benefits	Indirect benefits	Threat
Educational status	FD	7.796^{ns}	10.491^{ns}	5.967^{ns}
	LC	5.382^{ns}	7.805^{ns}	15.672*
Annual income	FD	2.286^{ns}	8.848^{ns}	1.293^{ns}
	LC	6.936^{ns}	8.562^{ns}	9.230^{ns}

ns: non-significant, *- significant at 5% level

4.2.2 Forest Officials and Casual Labourers

The Forest Officials and Casual Labourers are other two category of stakeholders. For the collection of data from Forest Officials and Casual Labourers, the questionnaire was divided into two parts. The first part dealt with the job related risks and job satisfaction and the second part dealt with feasibility study of forest certification.

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4.2.2.1 Forest Officials and Casual Labourers to job related risk dimensions

A total of eight Likert items were analysed for evaluating the job related risk dimensions faced by Casual Labourers and Forest Officials. Each items were scored in five-point likert scale. The likert items were prepared by considering all the relevant aspects of FSC principle three (workers right and employment conditions). Thus, a representative sample of respondents were selected from each category. The details of their response towards each likert items are given in (Table 26).

The job related risk dimensions pertaining to casual labourers are less. About 72 per cent of respondents opined that there was no harm to physical and mental capacity due to overnight duty, and 52 per cent of them stated that diseases like allergy and respiratory disorders from sandal wood dust are not a big problem. Similarly, 56 per cent of the respondents felt that, the accidental damage during timber harvesting and other processes were less. However, the response towards 'long term occupational health risk' and 'the percentage of wounds occur during timber processing' was neutrally stated.

While considering job related risk dimension of forest officials, majority (56%) of the stakeholders suggested that, overnight duty adversely affected their physical and mental capacity. Other responses were almost similar to that of casual labourers.

Table 26. Casual Labourers perception on job related risk dimension

Sl. No	Statements	Likert Scale				
		SDA (%)	DA (%)	N (%)	A (%)	SA (%)
1	There is enough protection from wild animals	31	12	33	12	12
2	The percentage of wounds occur during timber processing is high	24	12	40	16	8
3	Accidental damage occurs in timber harvesting and other processing stage	44	12	36	4	4
4	There are enough safeguard measures in the work place	44	12	20	12	12
5	There are long term occupational health risks	16	12	36	12	24
6	The chances of occurring diseases like allergy, respiratory disorders, etc. from sandal wood dust are high	48	4	16	12	20
7	The overnight duty harms your physical and mental capacity	52	20	12	8	8
8	There are health monitoring safeguard mechanisms for protecting health	8	20	16	40	16

SDA-Strongly Disagree, DA- Disagree, N-Neutral, A-Agree, SA-Strongly Agree

Table 27. Forest Officials perception on job related risk dimension

Sl. No	Statements	Likert Scale				
		SDA (%)	DA (%)	N (%)	A (%)	SA (%)
1	There is no enough protection from wild animals	4	0	52	24	20
2	The percentage of wounds occur during timber processing is high	56	32	12	0	0
3	Accidental damage occurs in timber harvesting and other processing stage	60	36	4	0	0
4	There are enough safeguard measures in the work place	0	12	44	28	16
5	There are long term occupational health risks	12	24	32	8	24
6	The chances of occurring diseases like allergy, respiratory disorders, etc. from sandal wood dust are high	60	36	4	0	0
7	The overnight duty harms your physical and mental capacity	12	12	20	24	32
8	There are health monitoring safeguard mechanisms for protecting health	12	4	16	36	32

SDA-Strongly Disagree, DA- Disagree, N-Neutral, A-Agree, SA-Strongly Agree

Comparing the responses of both stakeholders to find out the major risks faced by each group, it is clear that the risk related to lack of safe guard measures is highest in the case of Casual Labourers. Similarly, the risk related to overnight duty adversely affects the physical and mental capacity of Forest Officials (Fig 2).

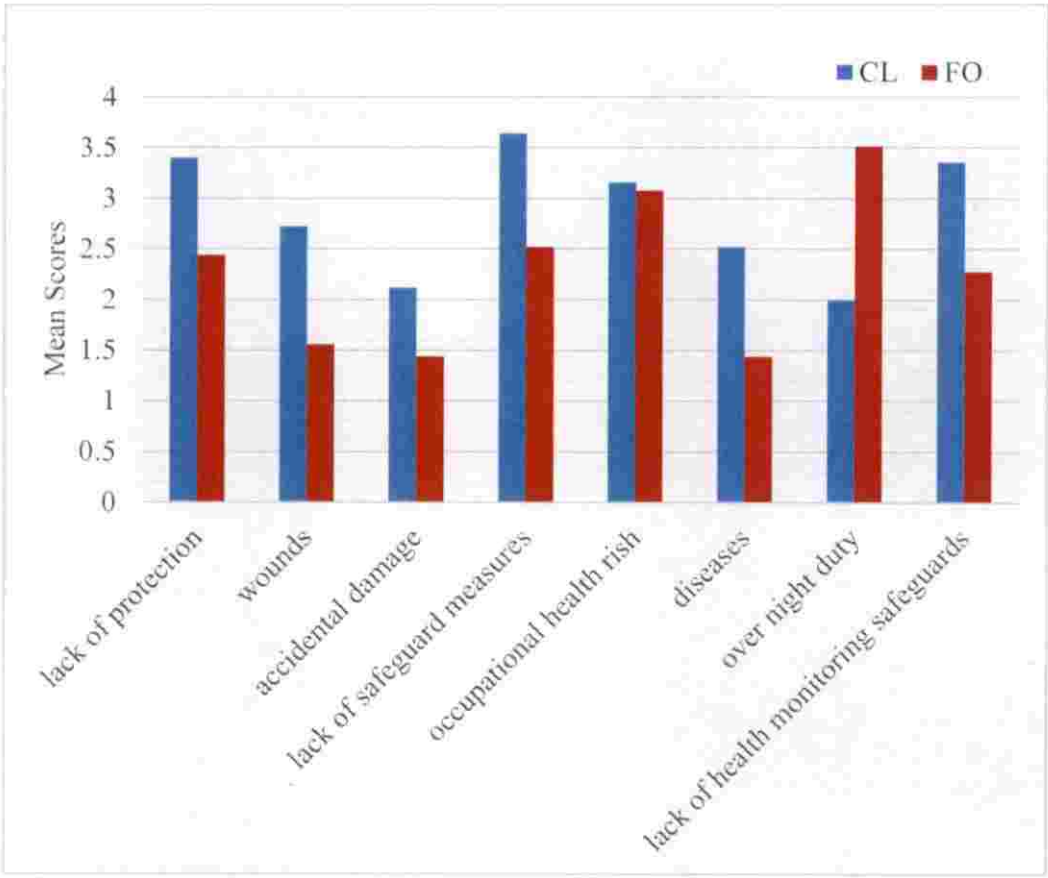

Fig 2. Job related risks prevailing in Casual Labourers and Forest Officials

Comparison of Forest Officials and Casual Labourers responses

The total score of all the eight likert items of 'job related risk dimension' for both categories (FO and CL) were calculated separately. In order to classify the two respondent groups based on their scores on 'job related risk' the measure of range class for the respondents were calculated, based on which they were categorised under three groups namely low (8-19), medium (19-30) and high (30-41). The classification of respondents based on the total score is given in Table 27.

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Table 28. Classification of Casual Labourers and Forest Officials on job related risk dimension.

Category	Range	Frequency of CL	Percentage of CL	Frequency of FO	Percentage of FO
Low	8-19	4	16	5	20
Medium	19-30	19	76	20	80
High	30-41	2	8	0	0
Total		25	100	25	100

CL- Casual Labourers, FO- Forest Officials

Table 28 shows that more than half of the two respondent groups believed that there was some job related risks in the sandal reserve. However, only very few respondents indicated that the job related risk is very high. For assessing the normality of the data, 'one-sample Kolmogorov smirnov test was employed and the outcome showed a positive result (Table 29).

The p-value for the both data sets shows a non-significant value at five per cent level ($p>0.05$). A non-significant p-value means the sample distribution is normal. Based on the result of normality test, the parametric t-test was used for comparing the means of total scores of two independent group (FO and CL). The result of the t-test is given in Table 30.

Table 30 shows that there was no significant deviation in the mean scores of both groups. The t- value was found to be non-significant, hence the opinion about job related risk dimension was almost the same. It means that the MSD comply with the FSC forest certification principle two (worker's rights and employment conditions).

Table29. Normality test of job-related risk dimensions

		FO	CL
N		25	25
Normal Parameter	Mean	22.92	21.40
	Standard Deviation	3.978	3.536
Kolmogorov-Smirnov (Z – value)		0.860	0.837
p-value		0.450	0.485

(FO- Forest Officials, CL- Casual Labourers)

Table 30. Independent sample t- test of job related risk dimensions

Group		N	Mean	S. D	S. E. M
Total score of job related risk dimensions	FO	25	21.40	3.536	0.707
	CL	25	22.92	3.978	0.796
t-value		**1.428^{ns}**			

ns-non significant at 5% level

4.2.2.2. Responses of Casual Labourers and Forest Officials on job satisfaction

A total of 15 likert items were analysed for evaluating the job satisfaction of Casual Labourers and Forest Officials. Each items were scored in five-point likert scale. The likert items were prepared by considering all the relevant aspects of FSC principle two (worker's right and employment conditions). Here, representative samples of respondents were selected from each category. The details of their response towards each likert items are shown in Table 31.

The table shows that, most of the casual labourers were satisfied with their job. About 92 per cent of respondents opined that, the relationship with fellow workers was good and 92 per cent of them stated that, the relationship with superior officials was good. However, item nine (there are Frequent instances of friction among the workers), item three (the allowances are sufficient and timely), item 14 (government or division provides programmes for improving soft skills and personality improvements) and item 12 (workers have sufficient facilities for recreational activities) were strongly disagreed by the respondents. Overall, most of the items came under the category "strongly disagree".

While considering the job satisfaction of forest officials (Table 32), all of them (100%) suggested that the relationship with fellow workers was good. However, 72 per cent of them disagreed with the item 14 (Government or Division provides programmes for improving soft skills and personality improvements).

Table 31. Casual Labourers perception on job satisfaction.

Sl. No	Statements	Likert Scale				
		SDA (%)	DA (%)	N (%)	A (%)	SA (%)
1	Salary matches with work and working condition	28	28	24	16	4
2	Existing salary is satisfactory with respect to the job	48	20	20	8	4
3	The allowances are sufficient and timely	72	4	4	4	16
4	The division provides basic facilities for rest and basic amenities	8	4	32	24	32
5	There is access to quality food	4	0	16	0	80

Table continued.....

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Sl. No	Statements	Likert Scale				
		SDA (%)	DA (%)	N (%)	A (%)	SA (%)
6	During working hours, you got enough leisure time	44	16	16	8	16
7	The relationship with fellow workers are good	8	0	0	8	84
8	The relationship with superior officials are good	4	0	4	12	80
9	There are Frequent instances of friction among the workers	88	0	0	0	12
10	The division or government provides job security	8	8	24	32	28
11	The government or division provides sufficient salaried leave	32	32	20	8	8
12	Workers have sufficient facilities for recreational activities	60	8	20	12	0
13	Whether there are frequent programmes for improving the efficiency of workers	52	32	16	0	0
14	Government or division provides programmes for improving soft skills and personality improvements	64	20	12	0	4
15	There are programmes for improving the welfare of family members (tuition fees, health insurance, medical camp etc.)	32	4	16	36	12

DA-Strongly Disagree, DA- Disagree, N-Neutral, A-Agree, SA-Strongly Agree

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Table 32. Forest Officials perception on job satisfaction.

Sl. No	Statements	Likert Scale				
		SDA (%)	DA (%)	N (%)	A (%)	SA (%)
1	Salary matches with work and working condition	24	36	24	4	12
2	Existing salary is satisfactory with respect to the job	32	36	16	4	12
3	The allowances are sufficient and timely	16	4	28	32	20
4	The division provides basic facilities for rest and basic amenities	12	24	40	0	24
5	There is access to quality food	0	0	44	32	24
6	During working hours, you got enough leisure time	32	40	16	8	4
7	The relationship with fellow workers are good	0	0	0	12	88
8	The relationship with superior officials are good	0	0	8	20	72
9	There are Frequent instances of friction among the workers	68	8	8	8	8
10	The division or government provides job security	0	0	4	28	68
11	The government or division provides sufficient salaried leave	20	16	32	16	16
12	Workers have sufficient facilities for recreational activities	40	44	16	0	0
13	Whether there are frequent programmes for improving the efficiency of workers	28	40	28	4	0

Table continued....

Sl. No	Statements	Likert Scale				
		SDA (%)	DA (%)	N (%)	A (%)	SA (%)
14	Government or division provides programmes for improving soft skills and personality improvements	48	24	20	8	0
15	There are programmes for improving the welfare of family members (tuition fees, health insurance, medical camp etc.)	24	36	36	0	4

SDA-Strongly Disagree, DA- Disagree, N-Neutral, A-Agree, SA-Strongly Agree

Comparison of Casual Labourers and Forest Officials responses

The total score of all the 15 likert items of 'job satisfaction' for both categories (FO and CL) were calculated separately. Forest Officials and Casual Labourers were classified in to various groups based on their scores on 'job satisfaction', by calculating the measure of range class. They were categorised under three groups namely low (15 - 35.33), medium (35.33 – 55.67) and high (55.67 - 76). Since we used a five point likert scale, the possible minimum score for each respondent was 15and maximum score was 75 (Table 33).

Table 33 shows that, more than 80 per cent of the Casual Labourers believed that they were facing a moderate level of risk, related to their jobs. Compared to Casual Labourers, more number of respondents from Forest Officials had to face more job related risks (92%), since the Forest Officials deals with most of the field works.

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Table 33. Classification of Casual Labourers and Forest Officials on job satisfaction.

Category	Range	Frequency of CL	Percentage of CL	Frequency of FO	Percentage of FO
Low	15.0 - 35.3	3	12	1	4
Medium	35.3 – 55.6	21	84	23	92
High	55.6 – 76.0	1	4	1	4
Total		25	100	25	100

(CL- Casual Labourers, FO- Forest Officials)

For comparing the total scores of the two stakeholders' (CL and FO) view on job satisfaction, the normality of data was assessed. The 'one sample Kolmogorov-Smirnov' test was used for checking the normality of the data (Table 34).The p-value was found to be non-significant in both the cases. A non-significant p-value means the sample is normally distributed. Based on the result of normality test, the parametric t-test was used to compare the means of total scores of the two independent groups (FO and CL). The result of the t-test is given in Table 35.

Table 34. Normality test of job satisfaction

		FO	CL
N		25	25
Normal Parameter	Mean	41.52	43.54
	Standard Deviation	6.995	6.176
Kolmogorov-Smirnov (Z-value)		0.763	0.616
p-value		0.605	0.842

(CL- Casual Labourers, FO- Forest Officials)

Table 35 shows that, the t-statistic is non-significant at five per cent. The mean scores did not show much variation between the two groups. That is, the opinion about job satisfaction was almost same in both cases.

Table 35. Independent t-test of job satisfaction

Group		N	Mean	S. D	S.E.M
Total job satisfaction score	FD	25	41.52	6.995	1.399
	LC	25	43.84	6.176	1.235
t-value		**1.243^{ns}**			

ns-non significant at 5% level

4.2.2.3. Correlation between job-related risk dimension and job satisfaction

Karl-Pearson coefficient of correlation was worked out to find whether there exists any relation between the scores of job related risk and their satisfaction level (Table 36).

Table 36. Correlation between job-related risk and job satisfaction

Variables	CL	FO
Correlation coefficient between job related risk and job satisfaction	-0.052^{ns}	0.221^{ns}

ns- non significant at 5% level

In the case of Casual Labourers, there is a non-significant negative correlation between the variables of job satisfaction and risk dimensions, because, the Casual Labourers were involved in most of the field and depot works.

Similarly, in the case of Forest Officials, the result shows a non-significant positive correlation between the variables of job satisfaction and risk dimensions.

4.2.2.4. Comparison of job satisfaction of casual labourers with work experience

The casual labourers were classified according to their work experience in sandal reserve (Table 37). The maximum number of respondents (48%) had an experience of 1 to 9.5 years in the reserve, while less than 10 per cent had more than 25 years. While carrying out one-way ANOVA (Table 38) to find out whether the difference in work experience is related to their job satisfaction, a non-significant F value was obtained. This depicts that there was no significant relation between job satisfaction and years of work experience.

Table 37. Classification of casual labourers based on work experience

Years of experience	Frequency	Percentage (%)
1-9.5	12	48
9.6-18	7	28
18.1-26.5	4	16
26.6-35	2	8
Total	25	100

Table 38. One-way ANOVA of casual labourers based on work experience

Years of experience	Mean score	S. D	F- value
1-9.5	40.50	8.24	**2.19^{ns}**
9.6-18	39.00	2.16	
18.1-26.5	49.00	6.16	
26.6-35	41.50	2.12	

ns- non significant at 5% level

4.2.2.5 Response of Forest Officials to management, policy and ecological aspects.

In order to analyse the management, policy, and ecological aspects of MSD, a separate section of questionnaire was prepared. Over 21 likert items were used for the assessment of management activities (Appendix IV) in the Division. The FSC principle seven (Management Planning) and ten (Implementation of Management Activities) were used as reference principles for the preparation of management items. The major items are listed below.

1) Management objectives are clearly and precisely described and documented
2) A comprehensive working plan exists, which ensures the economic and ecological sustainability of the sandal Division
3) Management plan is effectively implemented
4) Weed management aspects
5) Fire management aspects

Similarly, the policy aspects were analysed with 28 likert items (Appendix IV). The FSC principle one (compliance with laws) was taken as reference. For assessing the ecological aspects of the Division, 11 likert items were used. The FSC principle nine 'High Conservation Values' and ten 'Implementation of Management Activities' were used as baseline to the preparation of ecological items. The result of the management, policy and ecological aspects are shown in Table 39.

Table 39 shows that, more than 92 per cent of the respondents were satisfied with the management practices undertaken in the sandal Division. None of them negatively responded to the management practices in the Division.

Similarly, 86 per cent of the respondents were satisfied with the policy implementations in the sandal Division. All of them believed that, the Division strictly followed the laws and policies. In case of ecological aspects, more than half of the respondents (64%) were partially satisfied by the implementation of management practices, while none of them acknowledge a high score, reflecting that there is a need for proper implementation of the management practices.

Table 39. Classification of Forest Officials on Management aspects, Policy aspects and Implementation of management practices and ecological aspects.

Management aspects	Range	Frequency	Percentage
Low	21 – 49.33	0	0
Medium	49.34 – 77.66	23	92
High	77.67– 106	2	8
	Total	25	100
Policy aspects	**Range**	**Frequency**	**Percentage**
Low	28 – 65.66	0	0
Medium	65.67 – 103.34	21	86
High	103.35 – 141	4	16
	Total	25	100
Implementation of management practices and ecological aspects	**Range**	**Frequency**	**Percentage**
Low	11 -26	9	36
Medium	26 – 41	16	64
High	41 – 56	0	0
	Total	25	100

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In order to compare the total scores of management aspects, policy aspects and implementation of management activities and ecological aspects, the normality of the data set was assessed. The 'one sample Kolmogorov-Smirnov' test was used for assessing the normality of the data. The result of the test is given in Table 40. The p-value for all the data sets was non-significant ($p>0.05$) at 5 per cent level, which means the samples are normally distributed.

Table40. Normality test of management, policy and ecological aspects.

		Management aspects	**Policy aspects**	**Implementation of management practices and ecological aspects**
N		25	25	25
Normal Parameter	Mean	71.28	98.04	27.04
	Standard Deviation	6.017	6.465	3.506
Kolmogorov-Smirnov (Z-value)		0.607	0.688	1.039
p-value		0.855	0.732	0.230

Table 41. Correlation analysis between different principles of forest certification

Variables	Policy aspects	Implementation of management practices and ecological aspects	Job related risk	Job related satisfaction
Management aspects	0.156^{ns}	-0.307^{ns}	-0.227^{ns}	0.240^{ns}
Policy aspects		-0.074^{ns}	0.136^{ns}	0.099^{ns}
Implementation of management practices and ecological aspects			-0.055^{ns}	-0.514**
Job related risk				0.221^{ns}

ns- non significant at 5% level, **- significant at 1% level

Among different correlations done (Table 41), the correlation between job related satisfaction with implementation of management practices and ecological aspects was found to be significant (r= -0.514**). The two variables are negatively related. This shows the fact that, when the implementation of management activities increased, the satisfaction level of officers gradually decreased due to the very rigid working atmosphere.

4.2.3The awareness level of scientists about forest certification

In order to examine the awareness level of scientists about forest certification (Table 42), a response analysis was done with likert scale. From the result, it is clear that, half of the respondents had enough knowledge about forest certification, whereas rest of them had a vague idea about it. The total scores of

scientists were divided into low, medium and high category. The schedule included eleven items regarding awareness about certification.

Table 42. Classification of scientists on awareness level about certification

Category	Range	Frequency	Percentage (%)
Low	11-26	0	0
Medium	26-41	5	50
High	41-56	5	50
Total		10	100

Similarly, the schedule also included a descriptive part about certification with the viewpoints of each scientist. The first question was regarding the need of forest certification mechanism in India. Most of the scientists stated that, certification performs as a sustainable management tool. The second question was 'Is it necessary that certification council should not be a part of government'. Some of the respondents opined that it should be an independent body, and vice versa. The third question was about certification agencies in India, but most of them were unaware about it. However, some scientists mentioned examples of certifying agencies like FSC-India and Indian Institute of Forest Management-Sustainable Forest Management cell (IIFM-SFM). The fourth question was about the certification of NTFPs and timber. All of the respondents stated that certification is essential for both NTFPs and timber. The fifth question was about sustainable forest management; all respondents acknowledged that SFM is a major tool of forest certification. The last question was regarding the role of State Forest Department in the certification process. Most of the respondents stated that, State Forest Department has a key role in the sustainable forest management and forest certification process.

4.2.4 Perspectives of major bidders on forest certification

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For the collection of data on forest certification from major bidders, a separate questionnaire was prepared (Appendix VI). The questionnaire included statements regarding the relation of industries or devaswoms with MSD. Similarly, a secondary data was also collected from the MSD and further analysed, in order to quantify the demand of the Marayoor sandal as represented in figure 3.

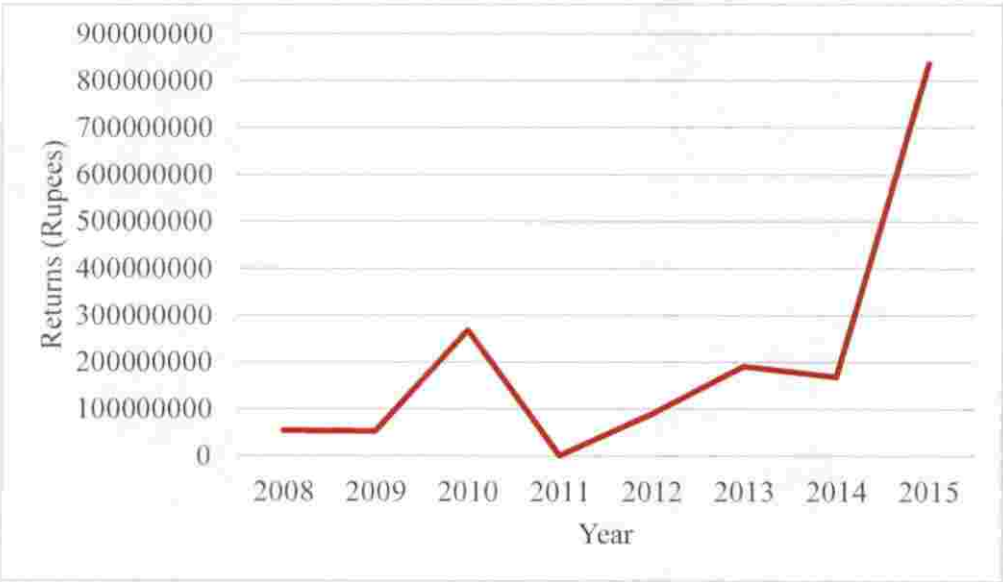

Fig 3. Returns obtained by Marayoor Sandal Division from 2008 to 2015

On analysing Figure 3, it is clear that, the returns obtained by Marayoor Sandal Division by selling of Marayoor Sandal went on increasing from 2009 to 2015, except in 2011. This clearly reflects the rising demand of the sandal from Marayoor region. In 2011, the availability of sandal wood was less compared to previous years. After 2014, the division has introduced e-auction which laid a new platform for marketing. As a result, the procedures for participating in the auction became less cumbersome and there was a steep hike in the quantity sold. So the Division fetched good return from the auction.

4.2.4.1. The awareness level of major bidders about certification

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The total scores of responses of major bidders were divided into three categories which were labelled as low, medium and high. The questionnaire included 18 items regarding relationship of industries or devaswoms with sandal Division. The details of the items are shown in Table 42.

All the respondents (100%) came under the category of 'medium'. (Table 43), which means that, all industries or devaswoms moderately depended on MSD.

Table 43. Classification of major bidders on relationship of industry/devaswom with sandal division.

Category	Range	Frequency	Percentage
Low	18 – 42.33	0	0
Medium	42.33 – 66.66	10	100
High	66.66 – 91	0	0
Total		10	100

Discussion

5. DISCUSSION

All over the world, forest certification and eco-labelling of forests and forest products are most debated as well as is a contentious issue in the emerging world. In developed countries, from the consumers view, forest certification is a tool for the lesser disturbance of forest resources. But when it comes to industries, they perceive forest certification as an assurance of quality product, made out of a sustainable forest. On the other hand, most of the developing countries are still ignorant of forest certification. They only regard 'certification' as a mechanism for improving the trade of developed nations (Rao, 2004).

Marayoor Sandal Division, where the study was carried out, is a unique tract of natural sandal reserve forest in India. Where better management activities and conservation measures were practiced. The Forest Dwellers in Marayoor Sandal Division constitute the Muthuvan and Hill Pulaya tribal community. They gained their livelihood from jobs related to the sandal reserve, and agricultural practices. A total of 520 households were in the division and occupying up to 1389.43 hectare of forest land. Similarly, more than 6000 households of local people live in Marayoor and Kanthalloor Panchayats.

The present study helped to find out the potential of implementing forest certification in Marayoor Sandal Division of Kerala, by an assessment of the socio-economic status of the stakeholders. The study also analysed the management aspects of the division, particularly to see whether they comply with the sustainable forest management principles and criteria of FSC. India, being a member of different international organizations such as International Tropical Timber Organisation (ITTO), General Agreement on Tariff and Trade (GATT) and signatory to Convention on Biological Diversity (CBD), has established C & I for Sustainable Forest Management through the 'Bhopal-India process'. However,

these C&I are in the juvenile stage of testing and evaluation. So the globally accepted C&I of FSC was selected for this study. 102

The study was undertaken in the background of FSC principles and criteria and it analysed the various aspects like social, economic, ecological, management and the policies. The study also assessed the worker's rights and conditions, impacts and constraints of Marayoor Sandal Division through the perspectives of the various stakeholders.

5.1 SOCIO-ECONOMIC CHARACTERISTICS OF STAKEHOLDERS

5.1.1 Socio-demographic profile of stakeholders

The present study discussed the age profile, educational status, major source of income, and annual income (Table 3, Table 4, Table 5, Table 6 and Table 7 respectively) of various stakeholders. The highest number of respondents fall in the age category of 31 to 50, then 10 to 30, which shows that, the major contributors of the study was from middle age group and youngsters. Similarly, the educational status of Forest Dwellers, Casual Labourers and Local Community was very poor compared to Forest Officials, Major Bidders and Scientific Community. In case of Forest Dwellers and Casual Labourers, majority of them were illiterate (60% & 32%) which means that, the tribes are still having a poor status of literacy.

The sandal reserve act as a major source of income to Forest Dwellers (35%) and Casual Labourers (80%), which shows that, for meeting the livelihood of them, the Marayoor Sandal Division play a pivotal role. In case of Forest Dwellers, 62 per cent of the respondents came under the category of annual income below Rs. 60,000, which means that, most of the tribes were financially poor. Likewise, Local Community (50%) and Casual Labourers (76%) came under the group of below Rs. 1,20,000 per annum. This also shows that people

living in and around the sandal reserve were also financially backward. The Marayoor Sandal Division is the major source of income to these stakeholders. So the conservation and management of the existing sandal forest division is important for the existence of these stakeholders.

In this study the major source of income for the Forest Dwellers was from forest based works and agriculture. The major forest related jobs include collection of NTFPs and the works in field and depot. Thomas (1996) observed that Forest Dwellers of Kerala heavily depended on the forest because of its rich biodiversity. He also referred that the tribal communities collected their major livelihood from forest and NTFPs are the main items of the collection which contributed to 56 per cent of their income. Krishnakumar *et al.* (2012) also suggested that NTFPs meets conservation aspects and livelihood option of the Forest Dwellers. In India, 80 per cent of ayurvedic industries is situated in Kerala. These industries are the largest consumers of NTFPs (Ramesh *et al.*, 2007; Menon, 2003). Similarly, Schreiber and Vincent (2012) reported that, forest certification increased income to local communities, and infrastructure investments. In the USA, some landowners receive payments for ecosystem services such as carbon sequestration which require certification as a prerequisite (Cubbage, *et al.*, 2003). All the above mentioned reports add to the significance of the present study.

5.2 FOREST CERTIFICATION FEASIBILITY IN MARAYOOR SANDAL DIVISION: STAKEHOLDERS PERCEPTION

The P & C of FSC was used as a reference for the study. The perspectives about ecological, economic, social, management and policy aspects, worker's rights and conditions, implementation of management practices and awareness level about forest certification were analysed for the study.

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5.2.1 Perception of Forest Dwellers and Local Community

A total of 27 Likert items were used for the analysis of ecological benefits, indirect benefits and major threats of the sandal division. On assessing the perception of two stakeholders (Forest Dwellers& Local Community) on ecological benefits of the existing sandal reserve, 88 per cent of the respondents noticed that it improves the water quality, whereas majority of Local Community responded in favour of improving soil fertility. The Forest Dwellers felt the importance of water quality over the soil fertility as their only resource of water is the natural stream. On the other hand, the Local Community emphasised on the soil fertility because they were more concerned about the agriculture. The main crops are sugar cane, paddy, coconut, plantain, and other fruit yielding trees. Due to the peculiar climate and rich supply of water, Marayoor and Kanthalloor areas form a better field for agricultural practices. Table 10 shows the responses of Forest Dwellers and Casual Labourers on ecological benefits, it was evident that most of the respondents fall in the response category of medium and high, which means that the Forest Dwellers and Casual Labourers getting many benefits from the existing sandal reserve forest. So the FSC principle five and six entitled 'benefits from forest' and 'environmental values and impacts' strongly comply with this study area.

In order to get the views of Forest Dwellers and Local Community about the indirect benefits from sandal reserve (Table 13 & Table 14), a set of nine and ten likert items were employed respectively. Over 82 per cent of the respondents (Forest Dwellers) positively acknowledged to the sixth statement 'The reserve provides employment opportunities', because, most of the Forest Dwellers depended on Marayoor Sandal Division as their main source of income. On the other hand, the higher level of positive responses from Local Community received for the statements such as "The sandal reserve attracts large number of tourist", "Tourism provides good income for families", and "The presence of sandal

reserve improves the infrastructure facilities" testifies the importance of Marayoor Sandal Division in the study area.

The statistical test (Table 16) on the total scores of indirect benefits of two stakeholders (Forest Dwellers & Local Community) showed a significant relation between the mean scores of two groups. That is, the sandal reserve provided a lot of indirect benefits to the Forest Dwellers and Local Community, but their view points on each Likert items were different. The items scored by local communities were high compared to tribes, because, the influence of tourism, infrastructural development, cultural mix, monthly income and educational facilities were more felt by Local Community.

The findings of this study is in agreement with an earlier observation by Lal (2012), who reported that forest certification helps to regulate water filtration and soil erosion. It also assists to protect natural water bodies, filter surface runoff and maintain water temperature. Schreiber and Vincent (2012) also suggested that certification helps to improve biodiversity, protect water and soil, and enhances the ecological functions. Gupta *et al* (2013) observed that, forest certification is a better tool for conservation of forest and forest resources. Gullison (2003) also reported that certification has greater potential in conservation of biodiversity and it improve the value of biodiversity.

The responses on major threats of sandal division were analysed with the help of Forest Dwellers and Local Community by using ten Likert items (Table 19 & Table 20). These items were prepared by considering the FSC principle six as mentioned earlier. The scores of Forest Dwellers were compared with Local Community (Table 21), and it showed that, they had almost similar opinion about the major threats of Marayoor Sandal Division. That is, when some of the threats highly affected the sandal division, some others did not. Figure 1 showed that, 'man-animal conflict', 'weed growth' and 'grazing' were the major threats. The man-animal conflict was mainly due to the shrinkage, fragmentation and

deterioration of habitat. This has often compelled the wild animals like spotted deer, sambar, wild boar, bonnet macaque, wild gaur etc. for long distance movement. This movement led to their encroachment on agricultural crops and is the major reason for attack over human beings. Nowadays, it is an important emerging management issue in Marayoor Sandal Division. In addition to that, gregarious growth of *Lantana camara, Mimosa invisa, Mikania micrantha and Eupatorium spp* prevented the growth of natural sandal seedlings, which resulted in the degradation of Marayoor sandal forest. Among the prominent weeds, *L. camara* covered large areas in the sandal reserve and its eradication was a complete failure in the division. *L. camara* attracted white flies, which caused economic losses from sandalwood. Similarly, the rate of poaching and deforestation were least reported in the division, because of better protection and conservation strategies. Similarly, the result of Karl-Pearson's correlation showed that, the existing sandal reserve provides numerous benefits to Forest Dwellers, even when the division faces a large number of threats, whereas, in case of Local Community there was no-significant relation between benefits and threats.

According to Lal (2012), forest certification plays an important role in minimizing negative environmental and social impacts of logging and enhancing ecosystem services. During 2013, Gupta *et al.* stated that certification is a good tool for minimizing the loss of biodiversity in logged forest. In Guatemala, the occurrence of fire in Maya biosphere reserve came down to 0.1 per cent from 6.5 per cent by FSC certification (Hughell and Butterfield, 2008). Similarly, Hirschberger (2005) observed that FSC certification banned the usage of toxins and pesticides inside the forest areas.

5.2.2 Association between socio-demographic variables and threats

Pearson's chi-square test was used to find out the association between the socio-demographic variables of Forest Dwellers with benefits and threats (Table 25). Only two important socio-demographic variables were taken for this analysis.

viz, educational status and annual income. The results reflect that, there was no significant association between the socio-demographic variables and the perception of Forest Dwellers on benefits and threats. Similarly, on assessing the association of perception of Local Community with the socio-demographic variables, the results marked almost similar relation except for educational status and threat. Majority of Local Community were in higher education profile, with 47 per cent having high school level and 22 per cent having college level education. Hence, they had a better awareness of the threats. As the level of education increases, the understanding of Local Community about the threats (man-animal conflict, weed growth, poaching, deforestation etc.) that are faced by sandal reserve also increases. Hence, a significant relation was obtained for the two variables under consideration.

5. 3 Perception of Forest Officials and Casual Labourers

For the collection of data from Forest Officials and Casual Labourers, the questionnaire was divided into two parts. The first part of the questionnaire was dealt with the job related risks and job satisfaction, and the second part include management aspects, policy aspects and implementation of management activities and ecological aspects. The likert items were prepared by considering all the relevant features of FSC principle one (compliance with laws), two (workers right and employment conditions), principle seven (Management Planning), principle nine (High Conservation Values) and principle ten (Implementation of Management Activities).

A total of eight likert items were analysed for evaluating the job related risk dimensions faced by Casual Labourers and Forest Officials. Table 28 indicated that, most of the respondents came under the category of medium and low, which means that the job related risk was less in the sandal division by the perception of Forest Officials and Casual Labourers. The major risks faced by these stakeholders were shown in Figure 2, from which it is clear that the risk

related to lack of safe guard measures were high in case of Casual Labourers. Similarly, the risk related to over-night duty highly harms the physical and mental capacity of Forest Officials. However, Table 30 shows that there was not much deviation in the mean scores of both group, hence the opinion about job related risk dimension was almost the same. It means that the Marayoor Sandal Division comply with the FSC forest certification principle two.

The response of Casual Labourers and Forest Officials about job satisfaction is explained in Table 33, which shows that, most of the respondents came under medium category. That is, they had optimum level of satisfaction towards sandal reserve works. The statistical test of total scores of job satisfaction is explained in Table 35. It is clearly understood that the mean scores did not show much variation, hence, the satisfaction level of Forest Officials and Casual Labourers were almost the same. So the Marayoor Sandal Division followed the principle two of FSC.

The correlation between the scores of job related risk dimension and job satisfaction is showed in Table 36, which explains that, in the case of Casual Labourers and Forest Officials, there is a non-significant negative correlation. The study done by Phiri *et al.* (2012) revealed that, active participation of local people occurred only when better monetary benefits played a crucial role. Similarly, Masuda *et al.* (2005) reported that, the delay in payments of JFM activities by forest departments were a factor of discouraging the active participation of members.

5.3.1 Comparison of job satisfaction of casual labourers with work experience

The Casual Labourers were classified according to their work experience in sandal reserve (Table 37). The maximum frequency of respondents (48%) were observed in the range of 1 to 9.5 years of experience. Then the job satisfaction

scores of Casual Labourers among these different groups were compared by using One-way analysis of variance. The results of one-way ANOVA showed a non-significant F-value (Table 38). This means that, there is no significant difference in the job satisfaction scores with respect to the number of years of work experience. This result is in concordance with the observation of Kardam and Rangnekar (2012) on the relation between job satisfaction and work experience among the employee of various sectors in India. They found that, there exists no significant difference between different experience groups and job satisfaction. On the other hand, the results of various other studies reflected that older workers are more faithful to organisation rather than new comer (Ruegger and King, 1992; Callan, 1992 and Serwinek, 1992). The results obtained during the study done by Gesinde and Adejumo (2012) indicated that there was significant positive relationship between age and work experience and job satisfaction among teachers with less and above five years of working experience. Hence, from our results it is clear that, the division equally provided ample facilities for each and every Casual Labourers. That is, the sandal division acts as a better place for work. So the division strictly follows FSC principle two (workers right and employment conditions), three (indigenous people rights) and principle four (community relation).

5.4 Management practices in Marayoor Sandal Division

The FSC principle seven (management planning) and principle nine (high conservation values) were used as the base for the preparation of 21 Likert items related to management aspects. The major objectives of management plan of Marayoor Sandal Division were:

1. To protect and improve the existing sandal
2. To protect and preserve the forests and biodiversity of the tract so that their extent, character and eco-system service values are improved substantially.
3. To protect the precipitous steep slopes and river catchments.

4. To improve the infrastructural facilities to meet the challenges of Management.
5. To improve living conditions of the tribes and forest dependent people
6. To protect and conserve the wildlife and its habitat.
7. To restore exotic plantation areas proximate to Protected Areas back to shoal grassland ecosystem. (KFD, 2011).

The total scores obtained for the management practices of Forest Officials were classified in to three equal groups and is given in Table 39. This Table shows that over 92 per cent of the responses fall in the medium category, followed by high. This shows that, the management practices were satisfactory in the sandal division. None of the respondents came in the low category, which means that the Marayoor Sandal Division strictly followed the working plan of the division. So, the present study area strictly complies with FSC principles seven and nine. Even though the study area follows FSC principle, the enumeration in sandal area reveals that the average number of seedlings or saplings per hectare is very less. Hence, artificial regeneration is required for restocking the area. So the Division started assisted natural regeneration. So the division has the potential for implementing FMU certification.

The direct effect of forest certification was studied by Bass and Simula in 1999. The study revealed that, it has a positive effect on the society. The quality of forest management was better than other conventional management activities, because it followed ISO 14001 type environmental standards or they complied with some international standards of FSC, PEFC, SFI and /or even followed some national standards (Gupta *et al*., 2013). So, forest certification protects the natural resources both directly and indirectly. Similarly, Vogt *et al.* (2000) stated that, certification is a motivating tool for industrial companies producing greenhouse gases, to sequester an equivalent amount of carbon in the existing biomass. Lal (2012) stated that environmentally suitable forest management guarantees that the harvest of timber and NTFPs sustains the forest's biodiversity, productivity and

ecological developments. That is, the forest certification acts as a better tool for conservation and management of the forest.

5.5 Relationship of forest certification with policies and laws

Forest certification is strictly related to the policies and laws associated with the forests. In order to implement forest certification in a country, the government must bring some modifications to the forest laws and policies of the country (Gupta *et al.*, 2013). In countries which have already started forest certification, there are a lot of new laws and policies related to certification and green public procurement. Green public procurement policies for forest products are a comparatively new tool and their execution is still at an early phase in most of the countries (Gupta *et al.*, 2013). By 2010, at least 16 national governments, namely New Zealand, Norway, Australia, Brazil, China, the EU, Ghana, Japan, Mexico, Belgium, Denmark, France, Germany, the Netherlands, the UK and Viet Nam had operational green procurement policies (Dam and Savenije, 2011). Although the number of national governments adopting green public procurement policies has not improved from 2009, there have been substantial progresses at the local level. For example, during the 2012 London Olympics, the Olympic Delivery Authority has specified that, PEFC and FSC certified timber will be used for all constructions (Oliver, 2010), in Russia, the Ministry of Natural Resources recommended "green standards" for the 2014 Winter Olympics. (Gupta *et al.*, 2013). Even though there are very few developments in the policies and planning related to forest certification, advances over the recent past have mainly been concerned with moves to fortify and expand the policies already in place.

There are substantial changes in the detailed legality and sustainability requirements of certification policies of various governments. This a concern for the producers supplying certified products to several markets. There is a demand that amendments be made to international certification standards and procedures before admitting sustainability credentials. This generates challenges to the

international certification frame works when it is essential to comply with internal rules and time tables for review of standards (Oliver, 2010).

The perspectives about the policy aspects discussed in Table 39, showed that the policy implementation in the sandal reserve was satisfactory. Most of the respondents came under medium category and none of them came under low category, which means that the division strictly followed the laws and policies. The principle one (compliance with laws) of FSC was used as a reference for the preparation of 28 Likert items about policy aspects of the division.

For forest certification, the organisation should have a legal status. The study area is under Kerala government. So the legality was not at all a problem. Similarly, the division followed a working plan for each ten year activities. That is, it followed a specific scientific method for the management and conservation of the division. Hence, this division strictly followed the FSC principle one as mentioned earlier.

5.6 Implementation of management practices and ecological aspects

The FSC principle ten was (implementation of management activities) used as the base for the preparation of 11 Likert items related to implementation of management activities and ecological aspects. Table 39 showed that, 64 per cent of the respondents came under medium category, followed by low category. None of the respondents scored high value. It means that, the implementation of management practices was only satisfactory (64%), but rest of them were not satisfied with the implementation and the ecological aspects of the sandal division. This is due to the strict implementation of laws and policies that increased the work load of the Forest Officials and also it could create some hindrance with indigenous people. The proper implementation of forestry schemes is possible only through the participation of local communities by Participatory Forest Management. It is clear that long term protection and management of

sandal forest is possible only by taking the local people into consideration. In Marayoor division, the participatory management activities were going well. So the present study area followed FSC principle ten as mentioned earlier.

The PFM activities will only succeed if it is able to produce good livelihood opportunities. Phiri *et al.* (2012) revealed that, active participation of local people occurred only when better monetary benefits played a crucial role. Similarly, Masuda *et al.* (2005) reported that, the delay in payments of JFM activities by forest departments were a factor of discouraging the active participation of members. In case of Marayoor division, the VSS in Marayoor Forest Range was started before the separation of the Marayoor Range from Munnar Division and at present there are 23 VSS in this Division. Among them, nine are the fringe area VSS and 14 are tribal VSSs. They help the Forest Officials in the protection of Sandal Forest and are also engaged in various types of regeneration activities like assisted natural regeneration, artificial regeneration, raising of plantations of bamboo and medicinal plants, because, the Marayoor Sandal Division timely provided the wages of the PFM activities.

The ecological aspects of forest certification are more related to the use of certification as a tool for conservation. According to Gullison (2003), forest certification is an instrument which incorporates preventive and curative aspects to take care of the effects of logging and other activities which disturbs the forests. The promotion of sustainable forestry through certification is a method to minimize the effect of industrial logging and conserve the natural resources of forests (de longh and Persoon, 2010). A study was done by Mannan *et al.* (2008), to analyse the additive effects of Reduced Impact Logging (RIL) on the composition and richness of fauna, flora and micro fauna, by comparing FSC-certified forests with the surrounding conventionally logged forests. The analysis showed that strict compliance with FSC requirements maintain the abundance of key stone species, large stems, foliage and litter.

The correlation analysis of different aspects of forest certification was done in Table 41. Among different correlations done, the correlation between scores of job related satisfaction with the scores of implementation of management aspects and ecological aspects were found to be significant. The two variables were negatively related. This showed that proper implementation of policies and laws imparted more job related risk, which eventually diminished the job satisfaction level.

5.7 Perspectives of Scientists on Forest Certification

The total scores of responses of scientists were divided into low, medium and high category. The schedule included eleven items regarding awareness about certification. So, the minimum score was eleven and maximum score was fifty-five for one item, because it followed a five point Likert scale. The responses about 'awareness level of the respondents on forest certification' came under medium and high category, which means that, most of them were aware of certification and its importance.

Similarly, the second part of the schedule was a descriptive part about certification, which was filled with the viewpoints of each scientist. The first question was regarding the need of forest certification mechanism in India. Most of the scientists stated that, the certification performs as a sustainable management tool. Their response was in accordance with the study of Higman *et al.* (2005) on the need for certification, in which the most common reasons for adopting certification are as follows,

1. The customers are demanding certified products.
2. The certification has a potential of assessing new markets.
3. Nowadays certification is a conditionality on loan, grant or insurance.
4. It acts as a good tool to achieve management goals or demonstrate best practices to stakeholders.

5. There is pressure from government for the allocation of forest management rights.

The second question was 'is it necessary that certification council should not be a part of government'. Some of the respondents stated that, it should be an independent body. The third question was about certification agencies in India, but most of them could not answer it properly. But some scientists gave some examples of certifying agencies like FSC-India and Indian Institute of Forest Management-Sustainable Forest Management cell (IIFM-SFM).

The fourth question was about the certification of NTFPs and timber, every one of them mentioned that, certification is essential for these two category. During 1990s, over extraction of forest resources particularly timber, led to the importance of sustained yield, which initiated the preparation of some guidelines for sustainable management (Krishnakumar *et al.*, 2012). The forest resources, especially Non-Timber Forest Products (NTFPs) have been playing an important role in the subsistence as well as the livelihood of Forest Dwellers and local communities in that region (Cunningham, 2011; Fagerberg *et al.*, 2007; Gubbi and MacMillan, 2008). So certification could enhance the sustainable production of timber and NTFPs. The fifth question was about sustainable forest management; all respondents mentioned that, Sustainable Forest Management is a major tool of forest certification. The Sustainable Forest Management is an inherent aim of certification (Gupta *et al.*, 2013). Similarly, Upton and Bass (1995) explained that 'the explicit aim of certification is to improve the management quality of forest and to reach the ultimate aim of sustainable management'. The last question was regarding the role of State Forest Department in certification process. Most of them had same opinion about State Forest Department that is, they have no special role at present. In the present study, State Forest Department was one of the stakeholder so that the expectations or idea about certifications of different stakeholders were important. The certification is an evolving concept, hence a

stakeholder's viewpoints have crucial effect on forest, forest management and other stakeholders, even it is positive and/ or negative (Higman *et al.*, 2006).

5.8 Perception of Major Bidders on forest certification

The data on forest certification from bidders, regarding the relationship of industries or devaswom with Marayoor Sandal Division, were collected. The questionnaire included 18 items and the total scores of responses of Major Bidders were divided into three categories which were labelled as low, medium and high. The details of the items are discussed in Table 43. All the respondents (100%) were coming under the category of 'medium', which means that, all industries or devaswoms were depending on Marayoor Sandal Division. Forest industries and forest companies did not support any special certification schemes, but certification provided more certainty to the working climate (Gupta *et al.*, 2013). Similarly, most of the forest product manufacturers and retailers adopted certification, because it captured good market in the eco certified wood niche (Gupta *et al.*, 2013). A study conducted by Volsky *et al.* (1999) explained that, there was a positive relation between the willingness to pay and certified wood price. A survey of retailers, architects and consumers conducted by Ozanne *et al.* (1999) stated that some groups of people were willing to pay more than 22 per cent price for certified woods or forest products. Producers in developed countries were largely obtaining certification because it added some important biodiversity values to the existing forest resources (Cerda and Lira, 2002). Over all, industries were recognising the forest certification as a means of credibility and sustainability of natural resources. So, they understood certification as an alternative and innovative market mechanism.

In short, the tropical countries have the potential of forest certification, because, several valuable timber species such as teak, rosewood, red sanders, mahogany and sandal are existing in different areas. Most of the species are managed by State Forest Department, which means that they followed working

plan for the management and conservation for these species. The working plan is prepared by the basic principle of sustainable forest management. The sustainability is the basic aim of forest certification. So, especially in India, a lot of forest areas have the capacity to pursue certification.

The present study has acknowledged the feasibility of forest certification in Marayoor Sandal Division, by assessing the socio-economic characters such as age, education, annual income, source of income and occupational status of the stakeholders. The study also enquired the feasibility of Marayoor Sandal Division to the P&C of FSC.

The socio-economic parameters such as education, monthly income and source of income were the important factors which greatly influenced the participation of respondents, because the sandal division directly and indirectly enhanced the socio-economic variables of the stakeholders, especially Forest Dwellers, Local Community, Casual Labourers and Forest Officials.

Similarly, the sandal division comply with most of the FSC principles, which means that the division had the potential of implementing forest certification.

Summary

6. SUMMARY

The National Forest Policy, 1952 changed the perception that forests, as a resource cannot be exploited without disturbances. This led to change in focus to production forestry along with maintenance of ecological balance and meeting the needs of various other stakeholders in the best way possible. The Criteria and Indicators (C&I) approach was developed with the idea of a set of specific forestry conditions evolved through various international processes among participating countries. In the initial phase, it was supposed to develop a framework for sustainable forest management (SFM) in the Indian context and also to establish a benchmark for sustainability according to prevailing global policy framework. In 1999, a workshop on "Development of National Level Criteria and Indicators for Sustainable Management of Dry Forests in Asia" (also called The Bhopal-India Process) was held at the Indian Institute of Forest Management (IIFM), Bhopal. This was a new step towards forest certification in India. In November 2010, the FSC and World Wide Fund for Nature (WWF) in Delhi has set up a trust called the Forest Certification Council of India (FCCI) to encourage FSC certification programmes in India. To provide impetus to certification initiatives, the FSC has also set up a national office for FSC-India and several FMU and CoC certificates have been issued so far.

The present study was undertaken to document the feasibility of forest certification in Marayoor Sandal Division, in Idukki district of Keralafocusing on forest dwellers, local community, casual labourers, forest officials, major biddersof Marayoor sandal and scientific community. The specific objective of the project was to analyse the Feasibility of implementing forest certification in Marayoor Sandal Division of Kerala by an assessment of the socio-economic status of the stakeholders. Another objective was to assess the management aspects of the division particularly to see whether they comply with the sustainable forest management principles and criteria of Forest Stewardship

Council (FSC). A total of 190 respondents from Marayoor Sandal Division belonging to six stakeholder groups were randomly selected and covered through a questionnaire-survey during the period from 2015-2016.

The salient findings of the study are summarized below:

1. Most of the respondents fall in the age category of 31 to 50 years, followed by the age category 10 to 30 years, which shows that, the major contribution of the study was from middle age group and youngsters. Similarly, the educational status of forest dwellers, local community and casual labourers was low compared to other stakeholders. In the case of forest dwellers and casual labourers, majority of them are illiterate which means that, the tribes are still largely illiterate.

2. The sandal reserve acts as a major source of income to casual labourers and forest dwellers which shows that, Marayoor Sandal Division plays a key role for meeting the livelihood requirement of the community.

3. While assessing the perception of forest dwellers & local community on ecological and indirect benefits from Marayoor Sandal Division, it is evident that the stakeholders are getting benefits from Marayoor Sandal Division, ie; the sandal reserve improves the water quality and soil fertility, provides employment opportunities, also sandal reserve is an attraction to a large number of tourists. The major threat highlighted in Marayoor Sandal Division are 'weed growth' and 'grazing', where gregarious growth of *Lantana camara, Mimosa invisa, Mikania micrantha* and *Eupatorium spp.* prevented the growth of sandal seedlings. Similarly, wild animals like spotted-deer, sambar and wild gaur were the major grazing animals.

4. The job related risk was generally less in the sandal division from the perspectives of the forest officials and casual labourers. Similarly, the job satisfaction was optimum for casual labourers and forest officials. There is no significant difference in the job satisfaction scores with respect to the number of years of work experience.

5. The FSC principle seven (management planning) and principle nine (high conservation values) were used as the basis for the preparation of management practices. The respondents admitted that, the management activities were satisfactory in the division. The working plan report of Marayoor shows the enumeration status of sandal seedlings. Since the average number of seedlings or saplings per hectare is very less, artificial regeneration is required for restocking the area.

6. Forest certification is intricately linked to the policies and laws associated with forests. The perspectives about the policy aspects showed that, the policy implementation in the sandal reserve was satisfactory. For the implementation of forest certification in India, the National Working Plan Code (2014) should be amended with a view to enhance the practice of forest certification.

7. The FSC principle ten was (implementation of management activities) used as the base for the preparation of 'implementation of management activities and ecological aspects'. The implementation of management practices was also satisfactory.

8. The correlation between job satisfaction with implementation of management practices and ecological aspects was found to be significant. This shows the fact that, when the implementation of management

activities increased, the satisfaction level of officers gradually decreased due to the very rigid working atmosphere.

9. The responses about 'awareness level of the scientific community on forest certification' came under medium and high category, which means that, most of them were aware of certification and its importance.

10. The perceptions of all bidders in relation with Marayoor Sandal Division came under the category of 'medium', which means that, all industries and Hindu temples in the state mainly managed by the Devaswom departments depended moderately on Marayoor Sandal Division.

11. The Marayoor Sandal Division started on-line auction or e- auction that stimulated the demand of Marayoor sandal. Hence, after 2014 the Division fetched good return from the auction. From the market and trade perspectives, exploring specialized, diversified and high end niche markets may offer improved long term sustainable returns.

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Appendices

APPENDIX- 1

Interview Schedule for data collection from Forest dwellers

Feasibility of Forest Certification in Marayoor Sandal Division, Kerala

Department of Wood Science
College of Forestry
Kerala Agriculture University
Vellanikkara, Thrissur.

Declaration

The information provided will be used only for the research work for thesis for Master's Degree and the identity of the respondent/information provided by them will not be revealed to a third party.

SOCIO ECONOMIC DETAILS

1. Name of the respondent : Mr. / Ms.....
2. Age : .....
3. Address : .....
   .....
   .....
4. Telephone Number : .....
5. Education status : Illiterate/Lower primary/Upper primary/ High school/ college /Any other
6. Occupational status : Wage employed / self-employed / unemployed

7. Family income per month

<60000	1
60000- 120,000	2
120,000-180,000	3
180,000-240,000	4
>240,000	5

8. Source of Income:

1. Government	
2. Private Sector	
3. Wages	
4. Forest Based	
5. Agriculture	
6. Others	

9. Ecological Benefits from Forest:

Benefits	SDA	D	N	A	SA
1. The sandal reserve improves the water quality					
2. The forest area reduces the soil erosion					
3. The sandal reserve regulates the microclimate					
4. The forest area influences the rainfall of the region					
5. The sandal reserve serves as a wind break for your agricultural field					
6. The forest area reduces the dust and other allergic pollutants.					
7. The sandal reserve or Forest controls garden pest					
8. The reserve improves the fertility of soil					

(SDA- Strongly Disagree, D- Disagree, N- Neutral, A- Agree, SA- Strongly Agree)

10. Indirect benefits from Forest

Indirect benefits	SDA	D	N	A	SA
1. The sandal reserve attracts large number of tourist					
2. Tourism provides good income for families					
3. Cultural mix occurred by tourism					
4. Because of sandal reserve there is threat to peaceful life					
5. The presence of sandal reserve improves the infrastructure (eg. transportation) facilities					
6. The reserve provides employment opportunities					
7. The presence of forest division improves the communication facilities					
8. The forest division influences the health status					
9. The forest division favours the education facilities					

(SDA- Strongly Disagree, D- Disagree, N- Neutral, A- Agree, SA- Strongly Agree)

11. Major Threats of Sandal Division:

Threats	SDA	D	N	A	SA
1. The grazing pressure on sandal division is high					
2. The occurrence of fire in the sandal division is high					
3. Very profound weed growth in the sandal division					
4. The disease and pest attack on sandal reserve is high					
5. Ganja cultivation is noticed in the reserve					
6. Rapid deforestation is seen in the division					
7. Man animal conflict issues are increasing yearly					
8. The rate of poaching very high					
9. Theft of sandal trees are very common					
10. Smuggling cases from sandal reserve growing each year					

(SDA- Strongly Disagree, D- Disagree, N- Neutral, A- Agree, SA- Strongly Agree)

APPENDIX- II

Interview Schedule for Data Collection from Local Communities

Feasibility of Forest Certification in Marayoor Sandal Division, Kerala

Department of Wood Science
College of Forestry
Kerala Agriculture University
Vellanikkara, Thrissur.

Declaration

The information provided will be used only for the research work for thesis for Master's Degree and the identity of the respondent/information provided by them will not be revealed to a third party.

SOCIO ECONOMIC DETAILS

1. Name of the respondent : Mr. / Ms.....
2. Age : .....
3. Address : .....
4. Telephone Number : .....
5. Education status : Illiterate/Lower primary/Upper primary/ High school/ college /Any other.
6. Family income per month

<120,000	1
120,000-240,000	2
240,000-360,000	3
360,000-480,000	4
>480,000	5

7. Source of Income:

1.Govt	
2. Private Sector	
3. Wages	
4. Forest Based	
5. Agriculture	
6. Others	

8. Ecological Benefits from Forest:

Benefits	SDA	D	N	A	SA
1. The sandal reserve improves the water quality					
2. The forest area reduces the soil erosion					
3. The sandal reserve regulates the microclimate					
4. The forest area influences the rainfall of the region					
5. The sandal reserve serves as a wind break for your agricultural field					
6. The forest area reduces the dust and other allergic pollutants.					
7. The sandal reserve or Forest controls garden pest					
8. The reserve improves the fertility of soil					

(SDA- Strongly Disagree, D- Disagree, N- Neutral, A- Agree, SA- Strongly Agree)

9. Indirect Benefits from Forest

Indirect benefits	SDA	D	N	A	SA
1. The sandal reserve attracts large number of tourist					
2. Tourism provides good income for families					
3. Cultural mix occurred by tourism					
4. Because of sandal reserve there is threat to peaceful life					

5. The presence of sandal reserve improves the transportation facilities					
6. The reserve provides employment opportunities					
7. The presence of forest division improves the communication facilities					
8. The presence of the division has enhanced the infrastructure in the region					
9. The forest division favourably impeded the facilities					
10. The forest division influences the health status					

(SDA- Strongly Disagree, D- Disagree, N- Neutral, A- Agree, SA- Strongly Agree)

10.Major Threats of Sandal Division:

Threats	SDA	D	N	A	SA
1. The grazing pressure on sandal division is high					
2. The occurrence of fire in the sandal division is high					
3. Very profound weed growth in the sandal division					
4. The disease and pest attack on sandal reserve is high					
5. Ganja cultivation is noticed in the reserve					
6. Rapid deforestation is seen in the division					
7. Man animal conflict issues are increasing yearly					
8. The rate of poaching very high					
9. Theft of sandal trees are very common					
10. Smuggling cases from sandal reserve growing each year					

(SDA- Strongly Disagree, D- Disagree, N- Neutral, A- Agree, SA- Strongly Agree)

APPENDIX- III

Interview Schedule for Data Collection from Casual Labourers

Feasibility of Forest Certification in Marayoor Sandal Division, Kerala

Department of Wood Science
College of Forestry
Kerala Agriculture University
Vellanikkara, Thrissur.

Declaration

The information provided will be used only for the research work for thesis for Master's Degree and the identity of the respondent/information provided by them will not be revealed to a third party.

SOCIO ECONOMIC DETAILS

1. Name of the respondent : Mr. / Ms.....
2. Age : .....
3. Address : .....
4. Telephone Number : .....
5. Education status : Illiterate/Lower primary/Upper primary/ High school/ college /Any other.
6. How long have you been working here : .....
7. Family income per month

<120,000	1
120,000-240,000	2
240,000-360,000	3
360,000-480,000	4
>480,000	5

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8. Source of Income:

1.Govt	
2. Private Sector	
3. Wages	
4. Forest Based	
5. Agriculture	
6. Others	

9. Job Related Risk Dimensions:

Sl.no	Dimensions	SDA	D	N	A	SA
1	There is enough protection from wild animals					
2	The percentage of wounds occur during timber processing is high					
3	Accidental damage occurs in timber harvesting and other processing stage					
4	There are enough safeguard measures in the work place					
5	There are long term occupational health risks					
6	The chances of occurring diseases like allergy, respiratory disorders, etc. from sandal wood dust are high					
7	The overnight duty harms your physical and mental capacity					
8	There are health monitoring safeguard mechanisms for protecting health					

(SDA- Strongly Disagree, D- Disagree, N- Neutral, A- Agree, SA- Strongly Agree)

10. Job Satisfaction

	Questions	SDA	D	N	A	SA
1	Salary matches with work and working condition					
2	Existing salary is satisfactory with respect to the job					
3	The allowances are sufficient and timely					
4	The division provides basic facilities for rest and basic amenities					
5	There is access to quality food					
6	During working hours, you got enough leisure time					
7	The relationship with fellow workers are good					
8	The relationship with superior officials are good					
9	There are Frequent instances of friction among the workers					
10	The division or government provides job security					
11	The government or division provides sufficient salaried leave					
12	Workers have sufficient facilities for recreational activities					
13	Whether there are frequent programmes for improving the efficiency of workers					
14	Government or division provides programmes for improving soft skills and personality improvements					
15	There are programmes for improving the welfare of family members (tuition fees, health insurance, medical camp etc.)					

(SDA- Strongly Disagree, D- Disagree, N- Neutral, A- Agree, SA- Strongly Agree)

APPENDIX- IV

Interview Schedule for data collection from Forest Officials

Feasibility of Forest Certification in Marayoor Sandal Division, Kerala

Department of Wood Science
College of Forestry
Kerala Agriculture University
Vellanikkara, Thrissur.

Declaration

The information provided will be used only for the research work for thesis for Master's Degree and the identity of the respondent/information provided by them will not be revealed to a third party.

SOCIO ECONOMIC DETAILS

1. Name of the respondent : Mr. / Ms.....
2. Age : .....
3. Address : .....
4. Telephone Number : .....
5. Education status : Illiterate/Lower primary/Upper primary/ High school/ college /Any other.
6. How long have you been working here : .....
7. Family income per month

<120,000	1
120,000-240,000	2
240,000-360,000	3
360,000-480,000	4
>480,000	5

8. Source of Income:

1.Govt	
2. Private Sector	
3. Wages	
4. Forest Based	
5. Agriculture	
6. Others	

9. Job Related Risk Dimensions:

Sl.no	Dimensions	SDA	D	N	A	SA
1	There is enough protection from wild animals					
2	The percentage of wounds occur during timber processing is high					
3	Accidental damage occurs in timber harvesting and other processing stage					
4	There are enough safeguard measures in the work place					
5	There are long term occupational health risks					
6	The chances of occurring diseases like allergy, respiratory disorders, etc. from sandal wood dust are high					
7	The overnight duty harms your physical and mental capacity					
8	There are health monitoring safeguard mechanisms for protecting health					

(SDA- Strongly Disagree, D- Disagree, N- Neutral, A- Agree, SA- Strongly Agree)

10. Job Satisfaction

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	Questions	SDA	D	N	A	SA
1	Salary matches with work and working condition					
2	Existing salary is satisfactory with respect to the job					
3	The allowances are sufficient and timely					
4	The division provides basic facilities for rest and basic amenities					
5	There is access to quality food					
6	During working hours, you got enough leisure time					
7	The relationship with fellow workers are good					
8	The relationship with superior officials are good					
9	There are Frequent instances of friction among the workers					
10	The division or government provides job security					
11	The government or division provides sufficient salaried leave					
12	Workers have sufficient facilities for recreational activities					
13	Whether there are frequent programmes for improving the efficiency of workers					
14	Government or division provides programmes for improving soft skills and personality improvements					
15	There are programmes for improving the welfare of family members (tuition fees, health insurance, medical camp etc.)					

(SDA- Strongly Disagree, D- Disagree, N- Neutral, A- Agree, SA- Strongly Agree)

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11.Management

Sl.no	Questions	SDA	D	N	A	SA
1	Management objectives are clearly and precisely described and documented a) In working plan, the objectives are clearly stated in terms of major functions and management of the sandal reserve					
2	A comprehensive working plan exists, which ensures the economic and ecological sustainability of the sandal division a) The working plan is prepared with the objectives of economic sustainability b) The working plan include the marketing strategies for avoiding glut in the market c) The current marketing plan (e-auction) ensures reasonable price realisation d) The management activities are strictly as per the working plan e) Management plans include action plan to ameliorate or counter natural catastrophes (eg. fires) f) The current management activities ensure maximum income from the sandal division g) There are better management options for improvement of sandal division					
3	Management plan effectively implemented a) Harvest efficiency and product utilisation ensures economic sustainability b) Sustainable timber production (in quality and quantity) is guaranteed c) Forest management improves the biodiversity, because it strictly follows the working plan					
4	An efficient monitoring and control system is present, that helps to periodically revise management prescriptions based on new information					

5	The economic or financial rotation is more appropriate for sandal reserve					
6	Weed management is effective 1. a) For controlling weeds biological methods are used b) For controlling weed mechanical methods are used c) For controlling weeds chemical methods are used 2. Lantana, tall and thick grass and Eupatorium are the common weeds, due to these weeds the sandal regeneration loss is greater than 50%					
7	Fire management is effective 1 a) For the management of fire, the construction of fire line is done by working plan prescriptions b) Fire line are constructed timely c) Adequate funding is available for fire line construction 2. The regeneration of sandal is less due to fire.					

(SDA- Strongly Disagree, D- Disagree, N- Neutral, A- Agree, SA- Strongly Agree)

12.Policy

Sl.NO	Questions	SDA	D	N	A	SA
1	The encroachment activities are very high in the sandal division					
2	The rate of encroachment is decreasing gradually					
3	All encroachment activities are registered and action taken					
4	Periodic monitoring and evaluation is done for minimising encroachment activities					
5	The theft is very high in sandal reserve compared to other forest divisions					
6	All thefts are registered on time and enquiries initiated					

7	The investigation procedures are trusty and not biased					
8	There is political influence in investigation and often the pressure is too high					
9	The involvement of local people in protection is satisfactory					
10	In management activities the permanent labours are involved effectively					
11	In management activities the casual labours involved effectively					
12	The proportion of SC/ST workers in total work force is as per govt. policy					
13	The proportion of female workers are fairly good					
14	Children (below 16 years) participate in management action					
15	Proper audit is conducted on time					
16	Audit objection of serious nature are not there during last two years					
17	There is frequent super vision by PCCF & HoFF					
18	There is frequent supervision by other forest officials (APCCF, CCF, CF)					
19	The existing policy is appropriate for sandal division management					
20	Specific management policy needed for sandal division management					
21	The existing "Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Right) Act, 2006" is helpful for sandal division management and conservation					
22	The existing "Kerala Forest (Sandalwood and Sandalwood oil) Rules, 2011" is enough for sandal division management and conservation.					
23	"No sandal tree below 50 cm girth at breast height shall be permitted to be cut"- do you agree?					
24	"For every sandal tree cut, uprooted, removed or sold the owner or his agent shall plant and nurture a minimum of five sandal seedlings within the time limit as prescribed by the authorised officer"- did you practiced?					

25	The officer in charge of the sandalwood depot shall, within three days from the date of receipt of sandalwood in the depot, arrange to desap and clean the sandal wood.					
26	Some changes are required for sandal cultivation and regeneration in outside the forest area					
27	The procedure for collection or harvesting of sandal trees from private land is lengthy and not people friendly					
28	Proportion of sale deeds given to private party is low and there is delay in effective payment					

(SDA- Strongly Disagree, D- Disagree, N- Neutral, A- Agree, SA- Strongly Agree)

13. Implementation of Management activities and Ecological Aspects

sl.no	Questions	SDA	D	N	A	SA
1	Impacts on biodiversity of the forest landscape are minimised 1. Endangered fauna like Tiger, Nilgiri Tahr etc are protected 2. Working plan management activities prescription is done for the maintenance of indigenous biota in Marayoor division 3. Afforestation activities suggest for improving area under natural forest is undertaken on ridges, steep slopes, etc.					
2	Maintenance of the health and vitality of sandal reserve ecosystem 1. The sandal division is protected properly from fire, pest and diseases, grazing etc. 2. There is restriction for the introduction of sandal from other region					
3	Impacts on the flora and fauna of the forest ecosystem					

	1. The key species population is declining each year 2. Rare bird's sighting decreases in the sandal division 3. The collection of medicinal plants harms the regeneration of sandal seedlings.					
4	Host plant 1. The weeds like lantana, tall grasses act as host plant for sandal seedling 2. Effective management of host plants is done in the division 3. Introduction of non-weedy species improves the regeneration of sandal seedlings					

(SDA- Strongly Disagree, D- Disagree, N- Neutral, A- Agree, SA- Strongly Agree)

APPENDIX- V

Interview Schedule for Data Collection from Scientists

Feasibility of Forest Certification in Marayoor Sandal Division, Kerala

Department of Wood Science
College of Forestry
Kerala Agriculture University
Vellanikkara, Thrissur.

Declaration

The information provided will be used only for the research work for thesis for Master's Degree and the identity of the respondent/information provided by them will not be revealed to a third party.

SOCIO-ECONOMIC DETAILS

Name :

Designation :

Telephone no. :

Definition of forest certification

"Forest certification is a mechanism for forest monitoring, tracing and labelling timber, wood and pulp products and non-timber forest products where the quality of management from environmental, social and economic perspectives is judged against a series of agreed standards" (Shanley, 2008).

Awareness level of Scientist about Forest Certification

Sl.No	Questions	1 SDA	2 D	3 N	4 A	5 SA
1	The importance of forest certification is high					
2	The forest certification is a new mechanism for sustainable forest management					
3	The forest certification is supposed to benefit forest owners economically					
4	The certification assures consumers of forest products that their purchase comes from a forest whose management meet certain standards					
5	The demand for certified products is high					
6	Certification is a means of assessing new markets					
7	Forest certification is an initiative to combat unauthorised logging					
8	There are limited markets for certified forest products					
9	The acceptance of forest certification is high in Indian markets					
10	Forest certification improves the management and conservation of sandal, especially Marayoor sandal					
11	The economic or financial rotation is more appropriate for sandal reserve other than physical rotation					

(SDA- Strongly Disagree, D- Disagree, N- Neutral, A- Agree, SA- Strongly Agree)

Expert's Opinions

1. What is the need to develop a certification mechanism in India?
2. Is it necessary that certification council should not be a part of government?
3. Are you aware of any agency in India working for the certification of forestry products?
4. In the forestry sector, is certification required only for NTFPs or for timber also?
5. How sustainable forest management is linked with certification?
6. What is the role of the State Forest Departments in the SFM and certification process?

APPENDIX- VI

Interview Schedule for Data Collection from Major Bidders

Feasibility of Forest Certification in Marayoor Sandal Division, Kerala

Department of Wood Science
College of Forestry
Kerala Agriculture University
Vellanikkara, Thrissur.

Declaration

The information provided will be used only for the research work for thesis for Master's Degree and the identity of the respondent/information provided by them will not be revealed to a third party.

SOCIO-ECONOMIC DETAILS

1. Name of company/devaswom :

2. Address :

3. Telephone Number :

4. Type of Industry :

Relationship of industry/devaswom with sandal division

Sl. No	QUESTIONS	SD	D	N	A	SA
1	The influence of Marayoor sandal division to your company is very high					
2	The division provides sufficient raw materials					
3	The price of the sandal is reasonable					
4	There is no rapid hike in the price of the sandal					
5	There is a difficulty for the transportation of sandal.					
6	Whether there is difficulty for the permission of sandal collection					
7	You are procuring huge amount of sandal from other localities					
8	The company/ devaswom preferring sandal from other localities					
9	The quality of sandal from Marayoor is high					
10	The quality of sandal from other localities is high					
11	There is limitation for keeping huge amount of sandalwood					
12	There is high usage of alternative materials compared to sandalwood					
13	In our industry sandalwood plays an important role as raw material In the temple, the usage of sandalwood in religious purpose is high.					
14	There is delay in the sale deeds of Marayoor sandal					
15	The preference of the product is high because sandal used as raw material					
16	The auction procedure for sandalwood is easy					
17	The new marketing strategy e-auction is better than the normal auction procedure					
18	The marketing of sandal products is easy compared to other products					

(SDA- Strongly Disagree, D- Disagree, N- Neutral, A- Agree, SA- Strongly Agree)

APPENDIX- VII

FSC - PRINCIPLES

Principle 1: Compliance with Laws

Principle 2: Workers Rights and Employment Conditions

Principle 3: Indigenous Peoples' Rights

Principle 4: Community Relations

Principle 5: Benefits from the Forest

Principle 6: Environmental Values and Impacts

Principle 7: Management Planning

Principle 8: Monitoring and Assessment

Principle 9: High Conservation Values

Principle 10: Implementation of Management Activities

APPENDIX- VII

FSC - PRINCIPLES

Principle 1: Compliance with Laws

Principle 2: Workers Rights and Employment Conditions

Principle 3: Indigenous Peoples' Rights

Principle 4: Community Relations

Principle 5: Benefits from the Forest

Principle 6: Environmental Values and Impacts

Principle 7: Management Planning

Principle 8: Monitoring and Assessment

Principle 9: High Conservation Values

Principle 10: Implementation of Management Activities

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FEASIBILITY OF FOREST CERTIFICATION IN MARAYOOR SANDAL DIVISION, KERALA

By

TOJI ANTONY

(2014-17-106)

ABSTRACT OF THE THESIS

Submitted in partial fulfillment of the requirement for the degree of

MASTER OF SCIENCE IN FORESTRY

Faculty of Forestry

Kerala Agricultural University

DEPARTMENT OF WOOD SCIENCE

COLLEGE OF FORESTRY

VELLANIKKARA, THRISSUR - 680 656

KERALA, INDIA

2016

ABSTRACT

The study titled "Feasibility of forest certification in Marayoor Sandal Division, Kerala" was carried out during 2015-2016. The main objectives were to find out the potential of implementing forest certification in Marayoor Sandal Division of Kerala by an assessment of the socio-economic status of the stakeholders. It was also intended to assess the management aspects of the Division, particularly to see whether they comply with the sustainable forest management principles and criteria of forest stewardship council (FSC). A pre-tested questionnaire was used to gather information on socio-economic characteristics of the stakeholders' and for assessing the feasibility of forest certification. A total of 190 respondents from six stakeholders namely, forest dwellers, local community, casual labourers, forest officials, major bidders of Marayoor sandal and scientific community, were surveyed.

The study revealed that, the sandal reserve acts as a major source of income to forest dwellers and casual labourers, which shows that, Marayoor Sandal Division plays a key role for meeting their livelihood. The sandal reserve provides a lot of benefits to stakeholders such as forest dwellers and local community. The major threats prevailed in the division were weed growth and grazing. There was no significant association between the socio-demographic variables and the perception of forest dwellerson benefits and threats,whereas for local community the relation showed almost the same pattern except for educational status and threat. The job-related risk was generally less in the sandal division from the perspectives of forest officials and casual labourers. The risk related to night-duty significantly affected the physical and mental capacity of forest officials, while the lack of safe guard measures was reported as a problem by casual labourers. Similarly, there was no significant difference in the job satisfaction with respect to the number of years of work experience.

The management activities were satisfactory and the division complied with the government orders, guidelines, forest laws and policies. The strict adherence to the working plan prescriptions helped in the maintenance of the ecology of the division. The correlation between job satisfaction with implementation of management practices and ecological aspects was found to be negatively significant. This indicates that, when the implementation of rigid management practices in Marayoor Sandal Division is necessary on one hand, from the point of job satisfaction of the officials this is highly taxing given shortage of staff. Also, job dissatisfaction was because of the extra burden put on the under staffed workforce destined to ensure quality work. An analysis of the awareness level of a diverse network of experts comprising scientists, academicians, technical experts showed that, they were aware of certification and its importance. Also, the Marayoor Sandal Division was the only legal source of sandal to most of the ayurvedic industries, cosmetic industries and the Hindu temples in the state mainly managed by the Devaswom Boards.

The study points to the feasibility of Forest Certification of Marayoor Sandal Division which can help in improving the overall management of the forest division. For this, region-specific P&C pertinent to Marayoor division needs to be formulated. For the implementation of forest certification in India, the National Working Plan Code (2014) should be amended with a view to enhance the practice of forest certification. For ensuring the quality of sustainable forest management particularly that of plantation management, the hard work of staff is needed to be recognised through award of cash incentives.