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Knowledge of joint forest management committee (JFMC) members and non-members about sustainable forest management

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Abstract
Joint Forest Management (JFM) is an approach and programme initiated in the context of the National Forest Policy (1988), wherein the state forest department support local forest dwellers to protect and manage forests and share the costs and benefits from the forests with them. The present investigation was undertaken to study the knowledge of JFMC members and Non-JFMC members about forest management and conservation practices. The sample size comprised of 464 respondents who were selected by stratified random sampling technique (232 JFMC and 232 Non-JFMC members).Data was collected with structured interview schedule through personal interview and focus group discussion. The findings revealed that cent per cent of the JFMC members had knowledge about sustainable forest management activities like environmental awareness programmes, plantation management, fire management, biodiversity conservation, soil & moisture conservation and deforestation &land degradation while only 38.36 per cent of members had knowledge about sustainable non timber forest products (NTFP) harvesting techniques. With respect to the forest conservation practices cent per cent of the JFM members were having knowledge about forest land preparation & planting of seedlings, necessity of planting of indigenous species rather than exotic species, application of FYM at the time of planting and watering the plants as per requirement. Non-JFM members were not involved in forest management activities so they have little or no knowledge about many management practices. However they were aware of the environmental awareness programmes (84.05%), deforestation & land degradation (40.08%), plantation management (35.34%) and biodiversity conservation (34.91%).

Keywords: Conservation, forest, joint forest management committee, knowledge, sustainable forest management

Introduction
Knowledge is the understanding of a subject which may be acquired through experience, association or education and in this instance it is understanding of sustainable forest management (SFM) and conservation of forest resources.

The concept of SFM has been specifically designed by the forest department to ensure more sustainable use of forest resources by incorporating different interests related to forests in decision making and management. Sustainable forest management is the use of forest resources in such a manner that it does not compromise the ability of the future generation to use the resources. The SFM addresses issues of forest degradation and deforestation. When forests and trees are sustainably managed they make vital contributions to the people as well as the planet. It improves livelihood, provide clean air & water and conserves biodiversity.

It was thought that effective conservation and sustainable management was possible only by involving the local communities because forests are home to the forest dwellers and they will go all out to conserve and protect them. In order to involve village communities living in the vicinity of forests, the Karnataka Forest Department (KFD) has evolved a comprehensive forest management process called the Joint Forest Planning and Management (JFPM). This programme focuses on providing the basic needs of communities, while at the same time regenerating and maintaining the natural forests. The JFMC concept is developing partnership between JFMC members and the forest department based on common trust and jointly defined roles and responsibilities with regards to forest protection and development.

The duties and responsibilities of the JFMC members is to 1) Assist the forest department to plan, protect, conserve and develop water lands.

2) Help identify land, choose the species and mode of protection & management. The JFMC members are themselves responsible for protecting the forests and plantations raised under the JFPM area. 3) Attend general body meetings conducted by forest department once every three months to discuss management strategies. 4) Attend the training programmes organized by the forest department to update knowledge and develop skills about forest management. The present investigation was under taken to know the knowledge of joint forest management committee members and non-members about sustainable forest management activities.

Material and Methods

The study was conducted in the Western Ghats region of Uttara Kannada district of Northern Karnataka during the year 2018-19. By using proportionate stratified random sampling technique 70 percent of the Village Forest Committees (VFCs) in each zone were selected. Thus 4 VFCs from Coastal region, 11 VFCs from Upghat region and 7 VFCs from plain region were selected. Further from each of these VFCs 70 per cent of respondents were selected (35% JFM & 35% non JFM members). They include 96 respondents from coastal region, 252 respondents from upghat region and 116 respondents from plain region. Thus making a total sample of 464 respondents (232 JFM and 232 Non-JFM members). The primary data were collected from the JFMC members only by using pre tested interview schedule through personal interview, informal discussion and focused group discussion methods. The data collected was tabulated and analyzed using suitable statistical technique.

Construction of teacher made knowledge test

Teacher made knowledge test was developed to understand the knowledge of the JFMC members and non-members about sustainable forest management activities.

To know the knowledge of respondents about sustainable forest management activities, close ended and open ended questions were framed on different topics like Environmental awareness programmes, Plantation management, Fire management, Biodiversity conservation, Soil & moisture conservation, Deforestation & land degradation and Conservation & sustainable harvesting techniques of NTFPs. Close ended questions help to know whether respondents are having knowledge about particular topic or not (Yes/No). A score of 1 was given to the response "Yes" and 0 to the response "No". For the response "Yes" qualitative data was collected. The qualitative approach was considered the most appropriate and relevant approach for studying knowledge of forest management and conservation of forest. Qualitative measures like observations, in-depth interviews and focused group discussions were carried out to understand the knowledge of JFMC members about forest management activities & conservation practices.

Based on the total score, the respondents were grouped into two categories following the equal distribution method based on class intervals as follows.

$$\text{Class interval} = \frac{\text{Maximum score} - \text{Minimum score}}{2}$$

$$\text{Class interval} = \frac{8 - 0}{2} = \frac{8}{2} = 4$$

Taking the class interval as four, the following three categories were made.

Category	Range
Low	1- 4
High	5- 8

Conservation Practices

Conservation practices are voluntary practical methods or practices used for sustainable forest management. Forest conservation practices included for the study were nursery management, seed collection, plantation activities and soil & moisture conservation. A total of 9 statements were prepared on these topics. Respondents were asked about their knowledge regarding forest conservation practices by assigning score of 1 was for the response Yes and 0 to the response No.

Based on the total score, the respondents were grouped into three categories following the equal distribution method based on class intervals as follows.

$$\text{Class interval} = \frac{\text{Maximum score} - \text{Minimum score}}{3}$$

$$\text{Class interval} = \frac{9 - 0}{3} = \frac{9}{3} = 3$$

Taking the class interval as three, the following three categories were made.

Category	Range
Low	< 3
Medium	3-6
High	>6

Results and Discussion

Knowledge of JFMC and non- JFMC members about sustainable forest management activities

The data of Table 1 represents knowledge of JFMC and non JFMC members about sustainable forest management activities. In all the three regions cent per cent of the JFMC members had knowledge about environmental awareness programmes, plantation management, fire management, biodiversity conservation, soil & moisture conservation and deforestation &land degradation. It could also be seen that only 38.36 per cent of JFMC members had knowledge about conservation & sustainable harvesting techniques of NTFPs. In case of non JFMC members, majority (84.05%) of the members had knowledge about environmental awareness programmes. About 40.08 per cent had knowledge about deforestation & land degradation followed by plantation management (35.34%) and biodiversity conservation (34.91%)

In the present study it could be observed that, cent per cent of the JFMC members had knowledge about environmental awareness programmes, plantation management, fire management, bio diversity conservation, soil and moisture conservation and deforestation & land degradation. This is because it is enshrined in the programme that all JFMC members will actively participate in the JFMC programmes implemented by the forest department. Each of areas are where JFMC members have cent per cent knowledge discussed in detail as below:

Table 1: Knowledge of JFMC and Non JFMC members about sustainable forest management activities n=464

SL. No	Particulars	Coastal Region (n_1=96)		Upghat Region (n_2=252)		Plain Region (n_3=116)		Total (n=464)	
		JFMC Members	Non JFMC Members	JFMC Members	Non JFMC Members	JFMC Members	Non JFMC Members	JFMC Members	Non JFMC Members
		F (%)	F (%)	F (%)	F (%)	F (%)	F (%)	F (%)	F (%)
1	Environmental awareness programmes	48 (100.00)	30 (62.50)	126 (100.00)	120 (95.23)	58 (100.00)	45 (77.58)	232 (100.00)	195 (84.05)
2	Plantation Management	48 (100.00)	12 (25.00)	126 (100.00)	45 (35.71)	58 (100.00)	25 (43.10)	232 (100.00)	82 (35.34)
3	Fire Management	48 (100.00)	08 (16.00)	126 (100.00)	20 (15.87)	58 (00.00)	10 (17.24)	232 (100.00)	38 (16.37)
4	Biodiversity conservation	48 (100.00)	11 (22.91)	126 (100.00)	40 (31.74)	58 (100.00)	30 51.72	232 (100.00)	81 (34.91)
5	Soil and moisture conservation	48 (100.00)	07 (14.58)	126 (100.00)	20 (15.87)	58 (100.00)	05 (08.62)	232 (100.00)	32 (13.79)
6	Deforestation and land degradation	48 (100.00)	26 (54.16)	126 (100.00)	52 (41.26)	58 (100.00)	15 (25.86)	232 (100.00)	93 (40.08)
7	Conservation of NTFPs	12 (25.00)	-	63 (50.00)	-	14 (24.13)	-	89 (38.36)	-
8	Sustainable non timber forest products (NTFPs) harvesting techniques	12 (25.00)	-	63 (50.00)	-	14 (24.13)	-	89 (38.36)	-

*Multiple responses are possible

A number of programmes on environment awareness are implemented by the forest department through the VFCs by involving JFMC members. Some are state funded while others are central government funded schemes. They are Karnataka Sustainable Forest Management and Biodiversity Conservation (KSFMBC), National Afforestation Programme (NAP), Krishi Aranya Protsaha Yojane (KAPY), Samrudha Hasiru Grama Yojane (SHGY) and Maguvigondu Mara, Shalegondu Vana, Talukigondu Hasiru ShalaVana. All these programmes are implemented by forest department with the involvement of JFMC members who are persuaded to attend and participate in the programme. Hence they were having good knowledge about environmental programmes. Similarly the Vanamotsava is an important awareness creation programme. It is celebrated every year in the month of July (1^{st} to 7^{th}) with the collaboration of forest departments, VFC members, gram panchayat and schools. It is considered a great festival for people living in forest areas. It implies forest conservation and planting as many as trees possible. It is a people's programme of tree planting, where everyone can participate in. For this auspicious occasion seedlings are distributed free of cost.

Knowledge of plantation management was possessed by all the respondents. The JFMC members are involved in nursery raising activities like preparation of soil, filling of potting mixture & seed sowing and caring for the seedlings till they are ready for transplanting. The JFMC members raise commercial as well as miscellaneous plantations. They are engaged in protecting the plants raised by them from grazing, illegal harvesting, smuggling and other offences. They also put all efforts to see that the plantations survive well and hence good knowledge.

Regarding forest fire management all JFMC members are provided knowledge by the forest department in prevention of and control of forest fires. The JFMC members also have knowledge about forest fire protection measures like regular clearing of fallen tree branches, vegetation and flammable materials, clearing fire lines, fire tracing and informing control room etc. All these are made known to JFMC members by the forest department officials by way of lectures, discussions and trainings organized by the forest department. In case of fire incidents, the VFC members inform forest department and take primary measures to control the same.

Conservation of biodiversity is known to all the JFMC members. This is because of the JFMC members. This is because of the native and indigenous knowledge of the JFMC members. Biodiversity is also maintained because the JFMC members themselves take decisions on management like: grazing regulations on community lands, lake maintenance and riverside vegetation. They control illicit felling of trees in the plantation area and natural forests. A number of eco-development committees (EDCs) are established around wildlife area and eco- tourism spots for conservation of forest, water bodies and wildlife. In all of which the JFMC members actively participate.

Soil and moisture conservation is another important aspect where JFMC members had good knowledge because they were involved in SMC works and explained with scientific reasons. The SMC techniques like the importance of planting of trees in restoring soil fertility, improving soils by maintaining organic matter, fixing nitrogen, recycling of nutrients and increasing soil moisture. This knowledge is also inherent among the forest dwellers who are aware that forests also control soil erosion and maintain biodiversity.

The forest officials take help of the JFMC members in identifying degraded forest land and raising plantations in such areas. Since they are actively involved in protecting and regenerating degraded forests through many afforestation programmes taken up by the forest department, they are highly knowledgeable deforestation and land degradation.

Regarding conservation of NTFPs and scientific harvesting only 38.00 per cent of the JFMC members had knowledge. Forest resources have always been important for subsistence as well as livelihood for forest dwellers and rural communities. The NTFPs are an integral part of development and survival of people living in and around forests. Collection and either consumption / value addition / sale of NTFPs is

important for addressing issues of poverty by contributing to livelihoods, food security, income, health and sustainable human development.

The reasons for less people having knowledge is that collection of NTFP has been an age old practice for the people. When population pressure was not much, the forest dwellers collected NTFPs enough for their consumption and a little for sale. However overtime the NTFPs are being over harvested and the younger generations are not aware of the scientific methods of harvesting. The other reason is that among the sampled respondents all of them were not NTFP collectors.

Sustainable harvesting of NTFPs is important so as to provide a constant supply of plant resources throughout the year. Sometimes the yield of the NTFPs may also be increased by improved harvesting methods. Some sustainable and scientific NTFP harvesting techniques are; determining the right time for harvesting, selecting healthy and well developed NTFPs, gathering only those NTFPs which are abundant in the area, avoiding unnecessary damage to the plant and controlled harvesting i.e., biannual harvesting, selective harvesting (75:25) and fixed harvesting.

Here again the many younger generation NTFP collectors not aware of this knowledge or they have no knowledge because they do not collect NTFPs.

The knowledge of (Non-JFMC members) was also studied (Table 1) and it was seen that majority (84.05%) of them had knowledge about environmental awareness programmes. These are common programmes conducted by the forest department which are attended by all community members. Some of them are also having knowledge about plantation management (35.34%) and biodiversity conservation (34.91%). Non-members are basically forest dwellers and so some have basic knowledge about plantation and biodiversity conservation activities which they have picked from traditional knowledge or heard and seen senior family members managing plantation and conserving bio diversity.

Table 2: Categorization of respondents based on their knowledge about sustainable forest management activities n=464

Sl. No.	Category	JFMC Members (n_1=232)		Non-JFMC Members (n_2=232)	
		Frequency	Percentage	Frequency	Percentage
1.	Low (1-4)	32	13.79	180	77.58
2.	High (5-8)	200	86.20	52	22.41

With regard to overall knowledge level of JFMC members (Table 2) it could be seen that, a large majority (86.20%) of the JFMC members had high level of knowledge because they are basically forest dwellers and have traditional knowledge about forest management activities.

Table 2 indicates the categorization of respondents based on their knowledge about sustainable forest management activities. A large majority (86.20%) of the JFMC members had high level of knowledge and only 13.79 per cent had low knowledge about forest management activities. In case of non JFMC members, majority (77.58%) of them had low level of knowledge and about 22.41 per cent had high knowledge about sustainable forest management activities.

With regard to overall knowledge level of non-JFMC members (Table 2) about forest management activities. It could be seen that, majority (77.58%) of them had low level of knowledge. This is because they are non-members and not involved in any of the forest management related activities conducted by the forest department.

Table 2: Relationship between independent variables and knowledge level of JFMC and non JFMC members about sustainable forest management activities n=464

Sl. No	Independent Variables	JFMC Members	Non-Members
1	Age	0.021 ^{NS}	0.058^{NS}
2	Education	0.106 ^{NS}	0.310*
3	Family size	0.132*	0.010^{NS}
5	Land holding	0.034 ^{NS}	0.017^{NS}
6	Family income	0.084 ^{NS}	0.014^{NS}
7	Family occupation	0.029 ^{NS}	0.009^{NS}
8	Contact with extension agency	0.668**	0.087^{NS}
9	Extension participation	0.138*	0.054^{NS}
10	Mass media participation	0.485 **	0.074^{NS}
11	Organizational participation	0.453**	0.025^{NS}

** Significant @ 0.01 level (2-tailed)
* Significant @ 0.05 level (2-tailed)
NS- Non Significant

Knowledge of JFMC members about sustainable forest management activities (Table 2) was found positive and highly significant relationship with contact with extension agency, mass media participation and organizational participation. The VFC members who have frequent extension contacts with the forest department personnel would lead to an increase in the level of knowledge of the JFMC members. Through mass media also JFMC members gained knowledge about natural resource management. Organizational participation provides opportunity to social networking and sense of belongingness. Participation of respondents in different forest management activities through VFCs results in more exposure of the JFMC members to different dimension of the management aspects leads to increase in the knowledge level of VFC members. Family size and extension participation also had positive and significant relationship with knowledge of JFMC members about sustainable forest management activities.

In case of non JFMC members (Table 2) education had a positive and significant relationship with knowledge of non JFMC members about forest management activities. This is because education broadens the knowledge of the individuals about natural resources management. No other variables influenced the knowledge of non-JFMC members.

Knowledge of JFMC members about forest conservation practices

Table 3: Knowledge of JFMC members about forest conservation practices n=232

Sl. No	Statements	Coastal Region (n_1=48)		Upghat Region (n_2=126)		Plain region (n_3=116)		Total (n=232)	
		F	%	F	%	F	%	F	%
1	Seed identification, collection and establishment of nursery for seedling	-	-	-	-	-	-	-	-
2	Forest land preparation & planting activities	48	100.00	126	100.00	116	100.00	232	100.00
3	Planting indigenous species rather than exotic species	48	100.00	126	100.00	116	100.00	232	100.00
4	Soil testing before initiating forestry work	-	-	12	10.34	05	04.31	17	07.32
5	Application of FYM at the time of planting	48	100.00	126	100.00	116	100.00	232	100.00
6	Watering the plants as per requirement (Protective irrigation)	48	100.00	126	100.00	116	100.00	232	100.00
7	Growing wind breaks in rows for afforestation	08	16.66	32	27.58	24	20.68	64	27.58
8	Water catchment area conservation	35	72.00	63	54.31	52	44.82	150	64.65
9	Fire preventive measures	22	45.83	70	60.34	62	53.44	154	66.37

*Multiple responses are possible

With respect to forest conservation practices (Table 3) cent per cent of the JFMC members from all the had knowledge about forest land preparation & planting of seedlings, necessity of planting of indigenous species rather than exotic species, application of FYM at the time of planting and watering the plants as per requirement. Regarding water catchment area conservation, 72.00 per cent in coastal, 54.31 per cent in upghat and 44.82 per cent in plain region had knowledge about the same. The JFMC members also had knowledge about fire preventative measures i.e., 45.83 per cent, 60.34 per cent& 53.44 per cent in coastal, upghat and plain region respectively. About 17.00 per cent, 27.58 per cent and 20.68 per cent in coastal, upghat and plain region respectively had knowledge about growing wind breaks in rows for afforestation. A few JFMC members *i.e.,* 10.34 per cent in upghat and 4.31 per cent in plain region had knowledge about soil testing before initiating forestry work. It was observed that none of the JFMC members had knowledge about establishment of nursery for seedling production, seed identification and collection of seed from forest. This is because these works were taken up by the forest departments.

With respect to forest conservation practices (Table 3) cent per cent of the JFMC members had knowledge about forest land preparation and planting of seedlings, necessity of planting indigenous species rather than exotic species, application of FYM at the time of planting and watering the plants as per requirements. This is because the JFMC members are actively involved by the forest department officials in selection and preparation of site, layout for planting, digging the pits and planting the seedlings. Since they are themselves performing these activities cent per cent JFMC members have knowledge about land preparation and planting of seedlings. The JFMC members along with forest officials select local species for planting over the exotic species because local species are well suited to the climatic conditions and so better chance of survival and good yields are obtained. The JFMC members being forest dwellers also know about the knowledge of survivability of tree species for a locality. Cent per cent of the JFMC members had knowledge about application of FYM and protective irrigation. This is because JFMC members take up plantation under the supervision and guidance of the forest department officials and take care of the plants up to three years by fertilizer application and water management.

Further it was observed that, 27.58 per cent of JFMC members had knowledge about growing wind breaks in rows for afforestation and few members (7.32%) had knowledge about soil testing before initiating forestry work. Wind breaks are trees or shrubs that are planted in such a manner as to provide shelter from the wind and to protect soil from erosion. They are commonly planted in rows around the edges of the forest. These wind breaks have other benefits like supplying wildlife with food and shelter, providing wood if the trees are harvested and beautifying the surrounding areas. The wind breaks trees like bamboo, oak and casuarina were commonly planted by the forest department either with or without the JFMC member's hence only 27.58 per cent members are knowledgeable about these aspects.

Soil testing is carried out before initiating forestry work. Analysis of soil and plant material is carried out in forest planting to assess the ability of soil to provide adequate nutrients and to know their suitability for different tree species. In forests soil, analyzed for organic matter, soil pH, nitrate and ammonia content. Ground water recharge level is checked in eucalyptus and acacia plantation after harvesting and before starting other plantation activity. Many JFMC members are not having knowledge about these aspects because these are done by forest department at the laboratory level.

The JFMC members did not have knowledge about establishment of nursery for seedling production and seed identification & collection of seeds from forest. These works directly taken up by the forest department with or without involvement of JFMC members and later raised by JFMC members and so a lesser per cent had knowledge about this aspect.

Table 4: Categorization of JFMC members based on their knowledge about forest conservation practices n=232

Sl. No.	Category	Frequency	Percentage
1.	Low (< 3)	78	33.62
2.	Medium (3-6)	154	66.38
3.	High (>6)	-	-

Table 4 depicts the categorization of JFMC members based on their knowledge about sustainable forest conservation practices. Majority (66.38%) of the JFMC members had medium level of knowledge and 33.62 per cent had a low level Knowledge about forest conservation practices.

With regard to overall knowledge of JFMC members about forest conservation practices. Majority (66.38%) of the JFMC members had medium level of knowledge. Since they are themselves performing the many of the forest conservation activities they have medium level of knowledge.

Table 5: Relationship between independent variables and knowledge level of JFMC members about forest conservation practices n=232

Sl. No	Independent Variables	JFMC Members
1	Age	0.090 ^{NS}
2	Education	0.002 ^{NS}
5	Family size	0.120^{NS}
6	Land holding	0.034 ^{NS}
7	Family income	0.084 ^{NS}
8	Family occupation	0.110 ^{NS}
9	Contact with extension agency	0.258**
10	Extension participation	0.132*
11	Mass media participation	0.154*
12	Organizational participation	0.054*

** Significant @ 0.01 level (2-tailed)
* Significant @ 0.05 level (2-tailed)
NS- Non Significant

Knowledge of JFMC members about forest conservation activities (Table 5) was found to positive and highly significant relationship with contact with extension agency. Extension participation, mass media participation and organizational participation had positive and significant relationship with forest conservation activities. No other variables influenced knowledge about conservation activities.

Conclusion

The concept of Joint Forest Management was a positive step towards decentralized government and forest management, with the potential of empowering the community and increasing the livelihood security of the impoverished forest dependent communities. The sustainable utilization of forest resources requires a holistic multi-disciplinary approach along with local people's participation. All dwellers in forest ranges must be involved by the forest department in policy making and planning to ensure the most productive and efficient use of forest resources to improve their livelihoods. In order, to empower the JFMCs and the local communities an integrated strategy needs to be devised at policy level to exploit the opportunities available in recent national agenda like Green India Mission program, MGNREGA and Forest Rights Act. A more efficient, flexible, and transparent monitoring and control system is required in such a big national programme, where the roles and responsibilities among the forest departments and the communities are complementary for betterment and efficiency in the system.

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