Chapter II

REVIEW OF LITERATURE
REVIEW OF LITERATURE

The review of literature serves as a background for any scientific investigation and helps in understanding it in proper perspective. An exhaustive review of literature help the researcher to identify variables relevant for research, decide tools and techniques to be adopted, delineate a new area of study and relate the present study with the previous ones. Keeping this in view, all the available literatures concerning the problem is being reviewed under the following heads/ sub-heads:

2.1. Socio-economic and ecological aspects
2.2. Livelihood assets status
2.3. Forest based tribal livelihood
2.4. Strategies for poverty alleviation and ecological stability

2.1. Socio-economic and ecological aspects

2.1.1. Age

Rogers (1995) have shown a varied association of age of farmers on innovation adoption. Baidu-Forson (1999) in a study on adoption of conservation technology in Sahel, Niger, did not find any influence of age of the farmers. The maximum number of the participants of Social Forestry in Nainital district were of middle age (Singh et. al., 2001). The Participatory Rural Appraisal (PRA) analysis of wealth and livelihood of stakeholders of the micro-watershed revealed that the age group of the most of the stakeholders was found to be middle (Nirmala et. al., 2004). Sinha et. al. (2010) in a study on enhancing livelihoods of forest dependent communities through synergizing FDA activities with other development programs found that majority of the respondents were between the age group of 31-42 years that means a large percentage of villagers were from younger and middle age groups.

Atmis et. al. (2007) studied women participation in forestry at Bartin province, located in the West Black Sea Region of Turkey and the regression analysis indicated that age is an important variable for variation in levels of participation. Sood et. al. (2008) reported that majority of the agroforestry farmers were middle aged and there was no association between on-farm tree cultivation and age of the head of the household. Thamban et. al. (2008) found that the age of the farmers had non-significant effect on the
extent of participation in the field implementation of micro-irrigation technology in Kasaragod district of Kerala state. Pal et al. (2009) observed that majority of the lac growers belonged to middle age category.

2.1.2. Education

Mahapatra (1997) reported that the educational level of farmers adopting farm level tree planting under Social Forestry Programme in Orissa was low. Similar results were reported in coconut-based agroforestry in Sri Lanka (Fernado, 1997). Majority of the participants of Social Forestry in Nainital district were educated up to middle level and the association between education and the level of people’s participation in Social Forestry in Nainital district was positive and significant (Singh et al., 2001). Pal (2011) reported that 39% of the lac growers had education upto primary level, 25% upto high school level, 6% upto intermediate level, 3% upto degree level and rest 27% were illiterate in Kanker district of Chhattisgarh.

Gangadharappa et al. (2005) found that majority of the agroforestry farmers were having education up to primary school in Dharwad and Belgaun district in Karnataka. Singha et al. (2006) found that there was a positively significant relationship between the education level and participation level of the respondents in maintenance practices of forest resources. Education of head of household did not reveal any influence on on-farm tree cultivation (Sood et al., 2008). Thamban et al. (2008) observed that the education was found to have significant and positive relationship with extent of participation in the field implementation of micro-irrigation technology in Kasaragod district of Kerala state. Singh et al. (2011) found that 50.98% of the respondents are illiterate, 27.57% are educated upto primary level, 13.37% are educated upto middle class level and rest 8.08% are educated upto high school level in Achanamkar Amarkantak Biosphere Reserve, Chhattisgarh.

2.1.3. Social participation

Pandey (1999) found that the level of social participation among majority of the tribal and non-tribal respondents was low. Singha and Talukdar (2002) observed that the social participation was having negatively significant relationship with the extent of utilization of forest resources. Nagesha and Gangadharappa (2006) observed the existence of positive and significant association between social participation and adoption
behaviour of agroforestry practices. Shashidara et. al. (2007) found that the social participation has non-significant association with adoption of drip irrigation management practices by the plantation crop growers.

Prakash and Sharma (2008) reported the extent of people’s social participation as reflected by their membership of various socio-cultural organizations was recorded to be low and the social participation had strong positively significant association with participation in control of forest fire. Thamban et. al. (2008) found that the social participation of the farmers had non-significant effect on the extent of participation in the field implementation of micro-irrigation technology in Kasaragod district of Kerala state.

2.1.4. Family composition

Sankar (1996), Patil et. al. (1999), Bezbaruah (2004) and Gangadharappa (2005) had observed the prevalence of family composition having nuclear family of large size in their studies. Kumar (2001) has observed a positive and significant association of family composition with adoption level of agroforestry among rehabilitated tribals in Mysore district. The family composition was found to have positive and significant association with the extent of utilization of forest resources (Singha and Talukdar, 2002).

Thamban et. al. (2008) observed that the family composition was found to have significant and positive relationship with extent of participation in the field implementation of micro-irrigation technology in Kasaragod district of Kerala state. There was no association between family composition and on-farm tree cultivation (Chaudhary and Panjabi, 2005; Sood et. al., 2008). Ajake and Enang (2012) found that the exploitation and management of forest resources in the rainforest significantly and positively affected by the increased household size in the rural communities of cross river state, Nigeria.

2.1.5. Size of land holding

Kumar and Siddaramaiah (1996) observed that the size of land holding of the respondents has non-significant association with their level of knowledge and participation in Joint Forest Planning and Management. Pandey (1999) reported that majority of the tribal and non-tribal livestock farmers in the tribal setting of Bihar were having marginal and small size of land holding. The average total land holding/household was 0.67 ha to 0.70 ha among the forest dwelling Siddi tribal community in
Uttara Kannada district of Karnataka (Bharathkumar, 2010). The similar findings were also reported by Patil et. al. (1999), Bezbarua (2004), Prakash and Sharma (2008) and Pal et. al. (2009). The size of land holding had a positive and significant association with the adoption of agroforestry systems in north eastern districts of Karnataka (Nagesha and Gangadhararappa, 2006).

Madiwalar et. al. (2007) found that the size of land holding was positively and significantly correlated with the extent of adoption of agroforestry model. Thamban et. al. (2008) observed that the size of land holding was found to have significant and positive relationship with extent of participation in the field implementation of micro-irrigation technology in Kasaragod district of Kerala state. The size of land holding had showed no link to the people’s dependence and participation in forest management particularly fire management (Prakash and Sharma, 2008).

2.1.6. Main occupation

Pandey (1999) found that agricultural and non-agricultural labour remained the main occupation of majority of the tribal and non-tribal respondents. Sinha and Lakra (2006), Geetha and Devi (2008) and Pal et. al. (2009) also observed similar results in their studies. Jha and Jha (2001) reported that occupation played a positively significant role in adoption of modern techniques associated with lac cultivation among tribals of Chhotanagpur. The occupation has a negatively significant relationship with the extent of conservation and utilization of forest resources in forest villages of Assam (Singha and Talukdar, 2002).

Chaudhary and Panjabi (2005) found that there is a positive and significant relationship existing between occupation and adoption behaviour of tribal and non-tribal farmers regarding improved Social Forestry practices. Thamban et. al. (2008) observed that the main occupation was found to have significant and positive relationship with extent of participation in the field implementation of micro-irrigation technology in Kasaragod district of Kerala state. Kumaresan and Devi (2009) reported that occupation was not significantly related with the adoption of separate silkworm rearing houses in south India.
2.1.7. Housing status

Bhairamkar and Kadam (1999), Lakra and Cardenas (2002) and Pal et. al. (2009) reported that the majority of the respondents had owned one katcha house for their dwelling. A positively significant influence of housing status on people’s participation in Social Forestry in Nainital district was reported by Singh et. al. (2001).

Singha and Talukdar (2002) observed no firm relationship between housing status and the extent of conservation and utilization of forest resources in forest villages of Assam. Chaudhary et. al. (2004) also observed a positive and significant association between housing status and adoption of Social Forestry programme in tribal areas of Rajasthan. Pal et. al. (2009) reported that the housing status did not influence the lac holding and production status of lac growers.

2.1.8. Farm power

Kumar and Siddaramaiah (1996) reported that the farm power status of the respondents had no significant relationship with their level of knowledge and participation in Joint Forest Planning and Management. Patil et. al. (1999) and Singh et. al. (2007) revealed that majority of the respondents belong to medium farm power status.

Nagesha and Gangadharappa (2006) observed a positive and significant association between farm power status and the adoption of agroforestry systems in north eastern districts of Karnataka. Prakash (2007) found that farm power status was in positive and significant association with adoption of practices of potato cultivation. Prakash and Sharma (2008) reported that the farm power status of the respondents did not influence their dependence and participation in forest management particularly fire management.

2.1.9. Farm implements

Bhairamkar and Kadam (1999), Pandey (1999), Jha and Jha (2001) and Chaudhary and Panjabi (2005) had reported that the possession of farm implements among most of the respondents was medium. Jha and Jha (2001) found that the farm implements possession was positively and significantly correlated with the adoption of modern techniques associated with lac cultivation among tribals of Chhotanagpur. Singha and Talukdar (2002) observed the existence of positive and significant association
between farm implements possession and the extent of conservation and utilization of forest resources in forest villages of Assam.

Chaudhary and Panjabi (2005) reported that the farm implements possession was not related with the adoption behaviour of tribal and non-tribal farmers regarding improved Social Forestry practices. Similarly, Prakash and Sharma (2008) revealed that the farm implements possession is non-significantly related with the people’s dependence and participation in forest management particularly fire management.

2.1.10. Livestock possession

The status of livestock possession of the respondents had showed a non-significant correlation with their level of knowledge and participation in Joint Forest Planning and Management (Kumar and Siddaramaiah, 1996). The herd size or status of livestock possession among majority of the respondents was found to be medium (Bhairamkar and Kadam, 1999; Pandey, 1999; Singh et. al., 2001; Prakash and Sharma, 2008; Pal et. al., 2009). Bijalwan et. al. (2011) studied a total 443 households from six selected villages with a family size of about 5.5 members in Garhwal Himalaya, India and shown that 2 to 4 milch animals were kept by 37 to 56% families in different villages.

Singh et. al. (2001) found that the relationship existed between the status of livestock possession and people’s participation in Social Forestry in Nainital district was non-significant. Singha et. al. (2006) observed that there was positive and significant association between status of livestock possession and level of participation in maintenance practices of forest resources. Nagesha and Gangadharappa (2006) reported that the status of livestock possession was positively and significantly correlated with the adoption of agroforestry systems in north eastern districts of Karnataka.

2.1.11. Material possession

Bhairamkar and Kadam (1999), Pandey (1999), Seema and Manoharan (2002) and Lakra and Cardenas (2002) were reported that a considerable proportion of the respondents belonged to medium material possession category. Singh et. al. (2001) reported a non-significant bearing of material possession on people’s participation in Social Forestry in Nainital district. The material possession has played a non-significant
consequence on the extent of conservation and utilization of forest resources in forest villages of Assam (Singha and Talukdar, 2002).

Nagesha and Gangadharappa (2006) has found a positive and significant association between the material possession and adoption behaviour of agroforestry practices in Dharwad and Belgaun. Mahadik et. al. (2008) observed that the household materials status was having positive and significant association with adoption of specific recommended mango cultivation technologies in Konkan region.

2.1.12. Income from forestry

Shukla et. al. (1990) has reported that the tribal people earn about 33% of their household annual income from forest products in Danta taluka of Banaskantha district. Malhotra et. al. (1991) concluded that many village communities in west Medinapore district derive as much as 17% of their annual household income from NTFPs collection and sale. Kaur (1991) observed that 35% of the total earnings of tribal households were from NTFPs in Panchmahal district of Gujarat. Godoy et. al. (1995) reported an annual income of 40% from forest products by the people.

A study by Bajaj (1997) in the Kullu-Mandi region showed that about 10% of the families derive on an average 15% of their total cash income from NTFPs sales. A study conducted in 301 randomly selected tribal households (Kondhs, Mudas and Saoras) in six districts (Boudh, Phulbani, Keonjhar, Mayurbhanj, Sundergarh and Gajapati) showed that on an average a tribal family derives about 50% of its annual income from forests and trades (Anon., 1998). In a study of two districts in Chhattisgarh, Bajaj (1998) found that the NTFPs contributed to around 20% of the per capita income in villages.

Krishnamoorthy et. al. (2003) reported that income from forestry had showed a positive and significant association with the collection and marketing of non-timber forest products in Tamil Nadu. Srivastava (2006) concluded that most of the villagers inside the Dalma Wildlife Sanctuary get employment in sanctuary related works like census, anti-poaching, fire fighting operation, road repairs, wildlife trekking etc. generated by Forest Department and earn an average household annual income of `14554.

Singha et. al. (2006) observed that the income from forestry and level of participation in maintenance practices of forest resources was positively and significantly
correlated. Significant and positive association existed between income from collection of NTFPs and the conservation and management of natural resources in the Dalma Wildlife Sanctuary (Srivastava, 2006). Thakur and Thakur (2009) revealed that the families residing in Dhenkanal and Sundargarh districts of Orissa earn up to 78% of their total annual income from NTFPs. Singh et. al. (2009) observed that the tribal families in Tenda village of Sonua block in West Singhbhum could procure a trivial income annually from forest products which is around ₹ 538/family/year. The economic valuation of six major NTFPs extracted by the tribals from the forests in Bandgaon and Goelkera blocks of West Singhbhum district of Jharkhand by Singh and Quli (2011) shown that these NTFPs yield an income of ₹ 2613/ Hh/ annum. Batabyal et. al. (2011) inferred that the total household income per year from NTFPs varied between ₹ 8300/- to ₹ 27300/- in Ausgram Forest Beat of Burdwan district in West Bengal.

2.1.13. Gross annual income

A study conducted by Oberoi et. al. (1993) on socio-economic status and constraints of tribal economy in Kinnaura district of Himachal Pradesh concluded that on an average the annual income of sample household was ₹ 18412 only. A non-significant association between gross annual income and the extent of conservation and utilization of forest resources in forest villages of Assam was revealed by Singha and Talukdar (2002). Mehar (2002) worked out the average annual income generated through the employment among ST and SC people due to watershed development projects intervention during the implementation phase in Orissa to be ₹ 3243.33 for males and ₹ 2625.91 for females. Krishnamoorthy et. al. (2003) while studying the collection and marketing of non-timber forest products in Tamil Nadu observed that the average annual income per household in Kolli hills, Sathyamangalam and Pollachi was ₹ 25255.13, ₹ 19792.30 and ₹ 12962.58, respectively. Chaudhary et. al. (2004) reported that majority of the respondents were found having a medium level of annual income ranging between 22-105 thousands. Bezbaruah (2004) observed that the annual income level of majority of the Kaibartas in the Brahmaputra valley varied between ₹ 8500 to ₹ 11000 only. Almost all the families are engaged in farming and their average annual income per family per year is very low and varies from ₹ 4000/- to ₹ 6500/- per month in the surveyed villages in Henwal Watershed of Tehri Garhwal Himalayas (Kumar et. al., 2010).
In a study on demand and supply of bamboo in Majuli block of Jorhat district in Assam, Kalita *et. al.* (2006) found that highest of the population belonged to the income slab of `20000–`30000. Nagesha and Gangadharappa (2006) observed a positive and significant relationship between the gross annual income and adoption behaviour of agroforestry practices in Dharwad and Belgaun. The annual income of majority of the respondents was in the slab of `35001 to 60000 in Bilaspur district of Chhattisgarh (David *et. al.*, 2008).

Sood *et. al.* (2008) reported that the total household income had a positive and significant influence on uptake of tree cultivation in agroforestry systems. Thamban *et. al.* (2008) observed that the gross annual income had significant and positive relationship with extent of participation in the field implementation of micro-irrigation technology in Kasaragod district of Kerala state. Prakash and Sharma (2008) found that the gross annual income had non-significant association with participation in control of forest fire.

**2.1.14. Level of aspiration**

Kumar (1993) reported that aspiration was the main causal factor in symbolic adoption of the progressive farmers and had positive and significant direct impact on change in knowledge and attitude of the farmers. Kumar and Siddaramaiah (1996) observed that the level of aspiration of the respondents was medium and it was positively and significantly associated with their level of knowledge and participation in Joint Forest Planning and Management.

Jha (1998) reported a positive and significant association between level of aspiration and adoption of modern farm practices. Satyanarayan and Jagadeeswary (2010) found that more than half of the livestock farmers possessed medium level of aspiration and it has a non-significant association with the level of knowledge and adoption of improved dairy management practices.

**2.1.15. Knowledge about forestry practices**

Kumar and Siddaramaiah (1996) reported that knowledge of majority of the participant farmers about Joint Forest Planning and Management (JFPM) was medium. Mahapatra (1997) reported that the knowledge of tree planting has significant influence on farmer’s farm level tree planting under Social Forestry Programme in Orissa. Islam and Quli (1999) reported that majority of the farmers had a medium level of awareness
regarding various Social Forestry activities of *Chakriya Vikas Pranali* of Society of Hill Resource Management School (SHRMS) in Palamu district of Jharkhand. Singh *et. al.* (2001) reported that a positive and significant relationship existed between the knowledge of tree farming and people’s participation in Social Forestry in Nainital district. Gowda and Rajanna (2003) found that majority of the farmers exhibited medium level of knowledge regarding Social and Farm Forestry programme in Bangalore rural district of Karnataka state. Banyal *et. al.* (2011) revealed that the inhabitants of Ladoora village of Rohama block in Baramulla district are not well aware about the key points tested under knowledge of farmers about tree farming.

Basavaraj *et. al.* (2004) concluded that the level of awareness about agroforestry practices of the Tibetan settlers as well as native farmers in Mysore district was medium which indicated that the forestry extension and approaches should be strengthened and streamlined among the respondents. The categorization of the respondents according to their knowledge and adoption index revealed that majority of them belonged to medium category of knowledge and adoption level with regard to various recommended agroforestry practices in north Kashmir (Islam *et. al.*, 2005). Singha *et. al.* (2006) found that forestry knowledge of the respondents was positively significant with their level of participation in maintenance practices of forest resources. Dolli *et. al.* (2007) revealed that the knowledge level of farm families about natural resource management in Bijapur district was medium. Venkattakumar (2008) inferred that the majority of the cashew grower had medium level of knowledge towards recommended cashew cultivation practices in Sindhudurg district in Maharashtra and the knowledge level has a positive and significant correlation with the adoption level of cashew cultivation as well as cashew yield. The overall awareness and participation of beneficiaries in Social Forestry programme in Baramulla district of Kashmir valley was found to be medium (Islam, *et. al.*, 2009).

### 2.1.16. Adoption of forestry practices

Islam and Quli (1999) concluded that majority of the respondents exhibited a medium level of overall participation in various Social Forestry activities of *Chakriya Vikas Pranali* of Society of Hill Resource Management School (SHRMS) in Palamu district of Jharkhand. The extent of overall adoption with respect to recommended
Review of literature

Chapter II

Studies on forest based tribal livelihood in Bundu block (Ranchi, Jharkhand)” Ph.D. Thesis, Mohammad Ajaz-ul-Islam - 2012

Agroforestry practices among majority of the farmers was medium in Dharwad and Belgaun district of Karnataka (Nagesha and Gangadharappa, 2006). Singha et. al. (2006) found that the adoption of forestry practices of the respondents was positively and significantly related with their level of participation in maintenance behaviour of forest resources in Assam.

Venkattakumar (2008) inferred that the majority of the cashew grower had exhibited medium level of adoption of recommended cashew cultivation practices in Sindhudurg district in Maharashtra. Mahadik et. al. (2008) observed that a large majority of mango growers had medium extent of adoption of specific recommended mango cultivation technologies in Konkan region and the adoption of specific recommended cultivation technologies has significant impact on mango productivity and production. Similar reports were made by Palanna and Prajapati (1993), Singh et. al. (2001) and Chaudhary and Panjabi (2005).

The categorization of adoption index on the basis of mean plus or minus one standard deviation revealed that the respondents mostly have medium adoption index with respect to soil and water conservation practices in Kerala (Chandan and Joseph, 2009). Olujide et. al. (2009) revealed that the rural dwellers had medium level of participation in the conservation management of old Oyo National Park in Nigeria. Malathesh et. al. (2009) observed a strong positive and significant relationship between the adoption of sericulture based farming system and employment generation in eastern dry-zone of Karnataka. Pal (2009) reported that the level of technology adoption in lac cultivation has significant effect on output and profitability.

2.1.17. Attitude towards forestry

Sreenath and Veerabhadaiah (1993) inferred that majority of the farmers had more favourable attitude towards social Forestry programme in Chitradurga district of Karnataka state. Singh et. al. (2001) observed a positive and significant relationship between the attitude towards tree farming and people’s participation in Social Forestry in Nainital district. Jha and Jha (2001) found that the favourable attitude towards lac cultivation had positive significant impact on adoption of improved (modern) technologies associated with the lac production in Chhotanagpur. Singha and Talukdar (2002) reported that attitude towards forest resource conservation have positively
significant relationship with the extent of participation of respondents in selected protection practices of forest resources in Golaghat Forest Division of Assam.

Durai et al. (2005) reported that majority of the farmers expressed favourable attitude towards tree cultivation in homestead farming in four agro-climatic zone of Kerala. Attitude towards agroforestry played a non-significant consequence on overall adoption behaviour of recommended agroforestry practices in Dharwad and Belgaun district of Karnataka (Nagesha and Gangadharappa, 2006). A study on attitude of farmers towards agroforestry plantation by Islam et al. (2006) revealed that majority of the agroforestry farmers belonged to strongly favourable attitude category followed by favourable, neutral, unfavourable and strongly unfavourable categories in north Kashmir. Venkattakumar (2008) found that the majority of the cashew grower had favourable attitude towards recommended cashew cultivation practices in Sindhudurg district in Maharashtra.

2.1.18. Use of information sources

The level of use of information sources by the Kokani tribal farmers in getting the knowledge on agricultural technology in Sakri taluka of Dhule district in Maharashtra was medium (Patil et al., 2000). Singh et al. (2001) observed that the participants who had high exposure to information sources had a high extent of participation in Social Forestry programme in Nainital district. A medium utilization level of sources of information among farmers under different agriculture production system in Uttaranchal and Uttar Pradesh was reported by Gupta et al. (2003). Gowda and Rajanna (2003) found that majority of the farmers exhibited medium level of use of information sources in respect of Social and Farm Forestry programme in Bangalore rural district of Karnataka state. Similar findings were also reported by Nadre (2000), Manohari (2002), Kumar et al. (2001) and Mishra and Bhardwaj (2008).

Singha et al. (2006) found that the use of information sources of the respondents had a positive and significant association with their level of participation in maintenance behaviour of forest resources in Assam. Association between the use of information sources of the respondents and their overall adoption behaviour of recommended agroforestry practices in Dharwad and Belgaun district of Karnataka as reported by Nagesha and Gangadharappa (2006) was positive and significant. Thamban et al. (2008)
observed that the information sources utilization was found to have significant and positive relationship with extent of participation in the field implementation of micro-irrigation technology in Kasaragod district of Kerala state. Islam (2009) revealed that most used sources of information by the agroforestry farmers in Kashmir in descending order were family member and relatives, neighbours, friends, progressive farmers, radio, television, village leaders, landline telephone, mobile telephone and newspaper and overall utilization of communication sources and information access among agroforestry farmers was observed to be medium.

2.1.19. Extension contact

Kumar and Siddaramaiah (1996) observed that the level of extension contact of the participant farmers was positively and significantly associated with their level of knowledge and participation in Joint Forest Planning and Management. Kumar et. al. (2001) while studying information sources of rural poor in U.S. Nagar district of Uttaranchal inferred the existence of medium level of extension agency contact among majority of the respondents. A study conducted on utilization pattern of knowledge gained through various training programmes by the tribal farmers and farm women of Meghalaya by Kumar et. al. (2002) revealed that maximum of the respondents belonged to low extension contact category and there was no correlation between the extension contact and utilization pattern of knowledge.

Gupta et. al. (2003) reported that the level of extension contact with different extension functionaries for seeking information among farmers under different agriculture production system in Uttarakhand and Uttar Pradesh was medium. Singha et. al. (2006) found that the extension contact of the respondents had a positive and significant correlation with their level of participation in maintenance behaviour of forest resources in Assam. The level of extension contact of the respondents had a non-significant bearing on their overall adoption behaviour of recommended agroforestry practices in Dharwad and Belgaun district of Karnataka (Nagesha and Gangadharappa, 2006). Manjula et. al. (2007) found that the level of extension contact of the coconut grower was positively and significantly associated with their adoption behaviour in Tumkur district of Karnataka state.
The level of extension contact significantly influenced the adoption of drip irrigation management practices by the plantation crop growers in Shimoga and Davanagere districts of Karnataka (Shashidara et. al., 2007). An attempt made by Mishra and Bhardwaj (2008) to explore communication intervention and strategies used by forest officials and village forest committees to ensure active participation in various aspects of Joint Forest Management project, revealed that the extent of extension contact for seeking information among most of the respondents was medium. Thamban et. al. (2008) observed that the extension contact was found to have significant positive relationship with extent of participation in the field implementation of micro-irrigation technology in Kasaragod district of Kerala state. Pant (2011) reported that the level of contact with technical persons was positively and significantly correlated with level of motivation of villager’s participation in agroforestry in Betalghat block in Nainital district, Uttarakhand.

2.1.20. Employment status

Mehar (2002) found that the average number of employment per year among ST and SC people during the implementation phase of watershed development projects in Orissa were 117.64 and 96.47 man days in case of males and females respectively. Nirmala and Hiremath (2005) found that the employment status for farm households in watershed area and non-watershed area were 270.39 and 243.43 respectively in Rangareddy district of Andhra Pradesh. Phelan (2005) observed that the employment status of the farmers was positively and significantly associated with the sustainable livelihoods in Ireland. Ajayi (2005) found a positive and significant impact of employment status of the farmers on their income generation and poverty alleviation in Edo State, Nigeria.

Reddy and Jaysree (2006) concluded that the major proportion of labour force in rural north east region of India was unemployed and needs appropriate employment generation measures to tackle it. The share of employment in agriculture and allied activities was higher as compared to manufacturing (mining and quarrying, construction, trade, hotels etc.) and service (finance and insurance, public and private community services) sectors but a shift from farm to non-farm sector is profound in the rural areas of north east region of India. Rahman et. al. (2006) reported that the employment and
income generation in Social Forestry played a significant role on women’s empowerment in Jessore district of Bangla Desh. Koshti et. al. (2007) found that the employment status of male and female agricultural labourer were 222.35 and 202 man days in Akola district of Maharashtra state.

Surayya et. al. (2008) inferred that the employment and income generation through sericulture based micro enterprise has a profound impact on rural livelihood and poverty alleviation in Anantapur district of Andhra Pradesh. Pazhani and Isabella (2008) revealed that only 49.05% of the sample population of fishing labourers is employed, earning an average annual household income of ` 14150, which is below the poverty level of income in Tirunelveli district of Tamil Nadu. Kumar (2009) found that the rural employment status among farming households was 219.47 man days/annum in eastern India.

A study made by Thakur and Sharma (2009) on nature and extent of unemployment among the weaker sections in rural areas of Haryana concluded that the total number of available man days per households were 1209, 1224, 1413 and 1614 among marginal, small, medium and large size of land holding respectively. Among all households together, the total available man days worked out as 1365. The percentage of man days utilized in all the agricultural, non-agricultural and necessary activities were 66.00, 73.87, 87.84 and 91.85 among the marginal, small, medium and large size of land holding respectively. Among all the households together, the percentage of man days utilized in all these activities worked out to 80.96. Hence, the percentage of unemployment man days worked out as 34.00, 26.13, 12.52 and 8.27 among marginal, small, medium and large size of land holding respectively. Among all the households together, the percentage of unemployment man days worked out as 19.04.

Singh et. al. (2009) reported that majority of the family workers are either unpaid family labour or casual labour employed in sugarcane or cereal based farming systems in major portion of the year in mid-western plain of Uttar Pradesh. Malathesh et. al. (2009) found a high employment generation in case of crop + dairy + sericulture farming system (75 man days /year) followed by crop + sericulture farming system (59 man days /year), crop + dairy farming system (32 man days /year) and crop farming system (29 man days /year) in eastern dry-zone of Karnataka. Shendage et. al. (2009) concluded that most of
the male and female workers in the tribal families were engaged either as unpaid family labour or casual labour up to nine months in a year in Igatpuri tahsil of Nasik district of Maharashtra.

2.1.21. Migration status

Sharan and Sharma (1994) in their study of the coal field region found out many adverse impacts of migration as rise of slums, virtual break down of the civic amenities, change from a state of social soliditary to social disharmony, feuds, frictions and tensions, collapse of cultural equilibrium, rise in alcoholism, breakdown of the traditional mode of justice and leadership and changes in ideas, ideals, attitudes, values and patterns. Sharma and Sinha (2003) concluded that underdeveloped agriculture and lack of alternative employment opportunities are the major causes of low per capita income (~ 4479 only) and very high incidence of rural poverty (over 62%) in Jharkhand state compelling people to diversify their sources of livelihood throughout migration. De and Babu (2003) observed a stern impact of JFM on socio-economic status of the rural people in Kansavati Soil Conservation division of Bankura district in West Bengal.

Bezbaruah (2004) while studying the socio-economic traits of Kaibartas in the Brahamputra valley observed that since time immemorial the Kaibartas resort seasonal migration to urban areas of Assam in search of employment as labourers, rickshaw pullers, vegetable vendors, arsons, carpenters and many other such vocations. Sharma (2005) reported that the seasonal migration of family members for 3 to 7 months covering a distance of 200 km in Abdullapur of Aurangabad district in Maharashtra state was an important livelihood strategy of people to meet basic family requirements, cope up with drought-like conditions, enhance economic condition, look for better remuneration and pay off debts. Karthikeyan et. al. (2005) found that majority of the respondents were migrated outside their resident villages for a period of two months during lean season in search of employment avenues covering a distance of 16 to 90 km in the Lower Bhiwani Project command area of Cauvery River Basin in Erode district of Tamil Nadu.

Reddy and Jaysree (2006) concluded that the incidence of unemployment and poverty among labour force in rural north east region of India is very acute and to tackle it people resort seasonal migration. An attempt by Dayal and Akhouri (2008) to study labour migration from Jharkhand found that at least one member of around one third of
the households were migrating to nearby areas for short duration during lean period from this region and the migration have caused some improvement in the economic status of the migrants and helped in reducing their hardships. Surayya et. al. (2008) inferred that the sericulture based micro enterprise as a source of rural livelihood and poverty alleviation has a profound impact on curbing migration of jobless, landless and labourers in Anantapur district of Andhra Pradesh.

Palanisami and Kumar (2009) reported that the watershed development programme involving entire community and natural resources have significant positive impacts on overall socio-economic conditions of the rural poor, which resulted in checking their outside migration for livelihood improvements. The livelihood impacts due to agroforestry and rural development under the IFFCO/ IFFDC projects was measured in terms of employment generation, self help groups and micro-enterprises by Kareemulla et. al. (2009) and revealed that agroforestry played a vital role in shaping the livelihoods of millions of people more especially in the less favoured agro-climatic regions. The watershed development and management through participatory natural resource management has contributed a lot towards sustainable livelihood options and income generation for the beneficiaries within Gurguripal village in West Midnapore district of West Bengal, which checked the migration of the villagers to a great extent (Chakraborty et. al., 2009).

2.1.22. Utilization of forest resources

The efficient utilization of common property land resources directly or indirectly play an important role in enhancing and stabilizing the income, employment and sustenance of village community by providing multiple products and services (Beck, 1994; Chopra and Dasgupta, 2002). Singha and Talukdar (2002) revealed that a sizeable proportion of the respondents had shown medium level of utilization of forest resources in Golaghat Forest Division of Assam. Krishnamoorthy et. al. (2003) reported that the collection and marketing of non-timber forest products by the tribal families in Kolli hills, Sathyamangalam and Pollachi ranges was moderate having significant contribution in employment and income generation for tribal communities. Sati and Song (2012) concluded that the dependency of human population on the forest biomass for running
their livelihood is tremendously high and it is a century old practice in the montane mainland of the Uttarakhand Himalaya.

To a vast majority of tribal people, extraction, processing and marketing of NTFPs is a source of employment throughout the year and the income generated by NTFPs significantly contributes to household income in tribal areas (Saravanan, 2003). Sinha (2003) reported that the non-agricultural bio-resources are being exploited by the local people for household need and trade on unsustainable ways needing conservation of these bio-resources with a management plan for livelihood sustenance. Singh et al. (2006) found that the majority of the respondents were having medium level of participation in maintenance behaviour of forest resources in Golaghat Forest Division of Assam. The collection and sale of NTFPs has contributed significantly in the nutrition and livelihoods of the Gond and Korku tribal communities of Betul forests of Madhya Pradesh and Melghat forests of Maharashtra (Bhattacharya and Patra, 2007). Baruah and Mondal (2010) reported that altogether 47 wild food plant species belonging to 24 families are consumed by the Garo tribe of the Norke Biosphere Reserve, Meghalaya.

Redeppe (2007) inferred that the extent of exploitation of forest resources by the tribal communities was moderate having a great impact on people’s achieved livelihood security, improvement of living conditions, solving the community problems and creation of common facilities in Khammam and Adilabad district of Andhra Pradesh. Kandary and Omprakash (2009) has found that the collection and sale of NTFPs significantly enhanced livelihood requirements for rural community in Keonjhar district of Orissa state. Singh et al. (2009) observed that all the fifty eight tribal families in Tenda village of Sonua block in West Singhbhum had utilized altogether twenty types of NTFPs, which extends sustainable support to livelihood throughout the year. Rout and Panda (2011) reported that 54 important NTFP species are consumed as food by the tribal communities dependent on forests in Gandigadha Reserve Forests of district Mayurbhanj, Orissa.

Pandey (2009) reported that the Jaunsari households use an enormous range of forest resources including a wide variety of food stuff, a number of non-food direct uses, various uses of wood for energy, construction materials and various implements, other non-wood resources such as leaf litter, livestock fodder and browsing, the use of grasses, canes, reeds etc. for thatch, mats and baskets, soil for pottery and fertilizer in Jaunsar
Bawar in Chakrata and Kalsi tehsil of Dehradun district in Uttarakhand. Chakraborty et. al. (2009) revealed that the watershed development and management through participatory natural resource management has significant impact towards sustainable livelihoods and income generation for the beneficiaries in Gurguripal village in West Midnapore district of West Bengal. Pathania et. al. (2010) found that the extent of household dependence on common property land resources was medium and the contribution of these common property land resources is significant in terms of livelihood and income generation in Himachal Pradesh. Mohiuddin et. al. (2012) revealed that 339 plant species are used by Bwam, Marma, Murang and Tanchangya tribes for different purposes in Bandarban hill district, Bangladesh.

2.2. Livelihood assets status

The efficient land resource utilization through agroforestry plantation has the intrinsic ability to provide multiple outputs and services, implies soil and water conservation, improves environmental condition, meets raw material needs of industries, generate cash returns, builds up livelihood assets (physical, natural, financial, human and social capital), improve the standard of living of rural poor and accomplish social security notably (Mohankumar and Miah, 2004; Gangadharappa et. al., 2005). A research method based upon a sustainable livelihood conceptual framework was applied in a case study in Sudan to evaluate the performance of sustainable livelihood and environmental management measures for building resilience to today’s climate-related shocks and for their potential for reducing community vulnerability to future climate change by Elasha et. al. (2005) has reported that the access of forest resources drastically increased the poor people’s natural/ biological capital (i.e., land, water, common-property resources, flora, fauna), social capital (i.e., community, family, social networks), human capital (i.e., knowledge, creation by skills), physical capital (i.e., roads, markets, clinics, schools, bridges) and financial capital (cash assets, remittances, savings, livestock, income levels, variability over time, access to credit, debt levels, etc.).

A study made by Pandey (2005) on the impact of Joint Forest Management (JFM) on rural livelihood assets status in the sample villages of Udaipur in Rajasthan found that the condition of capitals in the sample villages before and after implementation of JFM improved drastically. The increase in the daily wages given by the forest department to
the village workers, development of entrepreneurial skills among villagers, increased availability of grasses, additional work during scarcity months and reducing the distress migration are the reasons for the progress in financial capital after JFM implementation. The physical capital has risen because there is a direct relationship between physical capital and financial capital in a sense that more money is now available to spend in building physical assets. The collaborative efforts of the Forest Department and village forest protection and management committees (VFPMCs) the condition of natural capitals increased substantially. The reasons for improvement in the human capital include the reduction in infant mortality rate, improvement in percentage of school age children attending school etc. The condition of social capital after implementing the JFM increased to large extent in all the sample villages of Udaipur due to VFPMCs meetings, gender equity, better communication and interaction platform and skills and knowledge development.

The extraction of forest resources by the adjacent communities for household consumption, cash saving, safety-net, trade, employment, cultural and spiritual benefits, tourism, ecosystem services etc. has considerable contribution in building livelihood assets (physical, natural, financial, human and social capital), poverty alleviation and social security (Singha and Talukdar, 2002; Prasad and Siddiqui, 2006; Arjunan, 2005; Singha et. al., 2006). Sustainable livelihood encompassing appropriate farm enterprise combinations of crop + dairy + poultry + horticulture + silviculture + sheepry + goatry resulted in generation of adequate income and employment, ensuring food and nutritional security, conserving environment, effective input recycling and creation of durable farm assets in coastal Tamil Nadu (Ponnusamy and Gupta, 2006).

Marschke and Berkes (2006) found that reduced access to natural resources base and chronic poor health are ongoing stresses for resource-dependent communities and the inter-community strife, forest fires, market closures, seasonal perturbations and theft are episodic shocks for households or community making the life for rural Cambodian people unquestionably filled with uncertainties and challenges. In the absence of basic services and social safety nets, communities are faced with real dilemmas in finding solutions to their challenges and uncertainties. The diversification of this household’s livelihood activities through common property resource lands is a coping strategy that is both
reactive and opportunistic, creating assets for freedom from poverty and social insecurity, risk mitigation, survival and well-being and sustenance of socio-economic and ecological systems.

Mourlin (2007) reported that the National Rural Employment Guarantee Act (NREGA) created ample opportunities in forest based direct, secondary and self employment for the tribal communities (Gonds, Korkus, Kurmis, Kunbis, B hoyars, Mehras, Chamars, Banias and Rajputs) enhancing their livelihood assets (physical, natural, financial, human and social capital) and social security and reducing unemployment, migration and poverty in Betul district of Madhya Pradesh.

The analysis presented by Luis (2007) provided a holistic and integrated view of the processes by which people achieve or fail to achieve sustainable livelihoods through urban agriculture in the city of Lima, capital of Peru, stating that the urban producers use a variety of livelihood assets namely, natural (access to land, water and forests), physical (animal breeding, access to roads and transportation, means of production and access to housing), human (local knowledge and training, health status and perception of poverty), financial (savings, loans and credits) and social (outlooks and values, memory of historical events, religion and myths, identity, rules of relationship, principles of reciprocity, social phenomena of neighbourhood and friendship at individuals, family, community groups and exogenous groups levels, indexes of confidence, networks and other forms of organization) which they combine in order to deal with the risks, stress, shocks, insecurity and vulnerabilities. Sharmin and Ali (2008) found that the emergence of commercial shrimp farming has improved both livelihood assets (physical, natural, financial, human and social capital) and household security of the stakeholders substantially in Paikgacha of Khulna, Shamnagar of Satkhira and Teknaf of Cox’s Bazar district in coastal areas of Bangladesh.

Kareemulla et. al. (2009) reported that the natural resources development in farmer’s and common property resource lands through water conservation, plantations, micro and minor irrigation, renovation of water bodies, land development, irrigation facilities, flood and drought control and rural connectivity under the National Rural Employment Guarantee Scheme (NREGS) created ample employment and income opportunities for rural mass enhancing their livelihood assets (physical, natural, financial,
human and social capital) and social security and reducing unemployment, migration and poverty in Ananthapur district of Andhra Pradesh.

Chakraborty et. al. (2009) concluded that the watershed development and management through participatory natural resource management has notably contributed towards the sustainability of the livelihoods for the community in Gurguripal village in West Midnapore district of West Bengal. The beneficiaries have enriched their livelihood assets namely, physical capital (housing, vehicles, agricultural machines, communication facilities, transport infrastructure, irrigation works, electricity, markets, clinics, schools, bridges etc.), natural capital (forest, land, water, flora, fauna, pasture, biodiversity etc.), financial capital (cash assets, remittances, savings, livestock, income levels, variability over time, access to credit, debt levels etc.), human capital (education, knowledge, labour availability, household size, skills, health etc.) and social capital (rights or claims, friends, kin, support from trade or professional associations, families, communities, committees, businesses, voluntary organizations, political claims etc.) due to impact of policy interventions through watershed development.

2.3. Forest based tribal livelihood

2.3.1. Contribution of forest resources to the tribal livelihoods

A study conducted in 301 randomly selected tribal households in Orissa showed that on average a tribal family derives about 50% of its annual income from forests and trades about one-third of the products gathered (Kaur, 1991). Barham et. al. (1995) concluded that initiatives aimed at promoting sustainable forest resource use and poverty alleviation among rain forest tribal people could improve their efficacy by giving greater attention to the role of forest based livelihood in income generation in the Pacaya-Samiria National Reserve area of the Peruvian Amazon, Latin America. In a study of Kullu-Mandi region, NTFPs contribute on an average 15% of the total household income for every family (Bajaj, 1997). The total contribution of NTFPs to annual household income was maximum (23%) in the villages of Miao circle followed by Diyun circle (21%), Nampong circle (19%), Vijaunagar circle (18%) and Bordumsa circle (11%) in the Changlang district of Arunachal Pradesh (Sarmah and Arunachalam, 2011). The practitioners and researchers working to help traditional forest dweller tribal people have recognized the need for deeper understanding of the factors that influence income
generation among tribal people beyond the market value of the wood and non-wood forest products (Godoy and Bawa, 1993; Coomes and Barham, 1997).

Forests create local people’s livelihoods through forestry production activities such as hunting, gathering, seeds making, preparing planting materials, planting, managing, harvesting, trading and so on (Mutwakil, 1998). Studies made by numerous non-governmental organizations and other groups from Amazonia pointed to the significant contribution of rain forest products to household, local, regional and even national economies (Fearnside, 1989; Peters et. al., 1989; Anon., 1993). Yemiru et. al. (2010) indicated that the forest products are the most important sources of income contributing 34% to 53% of household income in southern Ethiopia. NTFPs are obtained from about 3000 species in the country and form an important source of food and livelihood for communities, particularly tribal and rural poor living adjacent to forests (Prasad, 1999). Gathering of fuel wood, fodder and NTFPs is an important subsistence and economic activity of household for tribal people in the villages close to natural forests (Kumar et. al., 2000). NTFPs contribute an average of 34% of total household income for households that reported income from these sources in Zambia, particularly for households in Luapula, Northwestern and Western provinces (Mulenga et. al., 2011).

Anon. (2001) has reported that more than 25% of the world’s population- an estimated 1.6 billion people rely on forest resources for their livelihoods and of these almost 1.2 billion live in extreme poverty. These people lack the basic necessities to maintain a decent standard of living, sufficient and nutritious food, adequate shelter, access to health services, energy sources, safe drinking water, education and a healthy environment. These people depend on forests and trees for food, fodder, timber, Non-Wood Forest Products (NTFPs), shelter, clothing and heating and generate employment and income through forest based livelihoods. However, the extent to which these resources can alleviate poverty and improve food security for vulnerable populations is not well documented.

It is highly note worthy that the income generated from the NWFP contributes about 80.88% of the total house income in West Singhbhum (Bandgaon and Chandil Block), Ranchi (Murhu and Tamar Block) and East Singhbhum (Nimdih Block) of Jharkhand (Vidhyarthi and Gupta, 2001). Over the world, millions of very poor people
rly on forests for food, fuel wood, medicine, fodder, fertilizer, shelter and clean water. Especially the local people who are living in or near forest area need to rely on forest resources as a supplementary source of their incomes (Lan et. al., 2002). Non-timber forest products (NTFPs) provide about 13.7% of the income from forestry activities for households in rural areas in Vietnam (Nguyen, 2003). Livelihood diversification by efficient utilization, mobilization and management of forest resources through Joint Forest Management (JFM) is an important angle of poverty alleviation and social security, a strategy for risk mitigation, a means of survival and well-being and an opportunity for sustenance of socio-economic and ecological systems (De and Babu, 2003).

An appraisal of livelihoods in rural Jharkhand made by Singh (2005) showed that there are many ways in which forests contribute to the economy of poor households in Jharkhand. Collection and sale of forest produces provide significant livelihood opportunities to the rural poor; require very little capital or any special skills like literacy; sales are possible in retail as well as in bulk; stored forests produces provide insurance against difficult periods to poor families; besides coming in handy for a number of other reasons, e.g. consumption as fruits, flowers, leaves, timber, oil for treatment, manure, fuel etc. unfortunately, there has been a steady decline in the availability of forest produces in Jharkhand and the gradient of decline has been the steepest during the last decade.

Natural forests not only act as a savings account for people living in and around them, but they also provide a range of products for subsistence. These forests are used for the industrial production of wood, fibre or NTFPs. Non-industrial production, on the other hand, is mostly for producing fuel wood and charcoal, restoring landscapes, rehabilitating degraded lands, combating desertification and protecting soil and water (Cord, 2005). Forests and trees play a significant role in all aspects of poverty reduction as they make people less poor, enable them to escape from poverty and prevent those on the margins from becoming poor. Better forest management and processing of specific products can increase incomes or improve the health of poor people even if those goods do not lift them out of poverty. Improvements in forestry can also be central to a more ambitious strategy for helping people to move out of poverty (Anon., 2005a). Fuel wood
is the most common type of NTFPs, normally accounting for 2/3 of the total NTFPs income of households (Sunderlin and Ba, 2005).

The study of the Anon. (2006) indicates that forests offer vast potential for poverty reduction and rural economic growth in India while also supporting critical national conservation goals. Forestry is the second land-use in India after agriculture. An estimated 275 million people in rural areas depend on forests for at least part of their livelihoods. Forest dwellers, which include a high proportion of tribal, are among the poorest and most vulnerable groups in society. The livelihood needs of forest dwellers and contribute to rural development is important for implementing agencies to understand community and tribal institutions and capacities, livelihood patterns and whether or not current systems for rural development address the needs of these communities.

Mishra et. al. (2007) found that the management of forest resources through Joint Forest Management (JFM) accrued benefits to the rural poor in terms of fuel wood, fodder, timber and fruit availability, increased village forest area and natural beauty, soil and water conservation, environmental amelioration and climate control, flood and drought protection, agriculture and livestock support, employment and income generation and increasing living standard which profoundly improved the sustainable livelihood and development of forests.

Shah and Sah (2007) in his study concluded that tribal people generally dwell in forested and hilly areas and depend on forests for their cultural, spiritual and economic needs. The higher incidence of tribal poverty is related to tribal people’s low bargaining capacity, their lack of proportional political representation, the poor quality of local governance and their constrained access to forests, land and water. A study made by Sunderlin et. al. (2007) suggested that forest based communities are not benefiting from integrated rural development. Most forest-fringe communities depend primarily on forest-based livelihoods. Until these communities are able to access better quality forests for fuel wood, fodder, timber and other NTFPs from standing forests, agriculture development will be vital to lifting the poorest segment of the population out of poverty. Redeppa (2007) observed that the efficient exploitation of forest resources by the tribal communities through vana sanrakhshana samithies built up the five livelihood assets (physical, natural, financial, human and social capital) for rural development in
Khammam and Adilabad district of Andhra Pradesh. On an average, 16% of total household income in the villages studied comes from collection, value addition and sale of NTFPs in Hazaribagh, Gumla and Simdega districts of Jharkhand (Gharai and Chakrabarti, 2009). Contribution of forest to the overall economy of the Kbori Village Forest Protection Committee in Sheopur forest division of M.P. was estimated to be 38% (Mishra and Horo, 2008). The economic valuation of six major NTFPs extracted by the tribals from the forests in Bandgaon and Goelkera blocks of West Singhbhum district of Jharkhand by Singh and Quli (2011) shown substantial contribution of NTFPs in the tribal.

2.3.2. Encouraging factors of forest based livelihood

Ray et. al. (1996) found that meeting fuel, fodder and wood need of the people is the most important motivational factor as perceived by the farmers for expansion of farm forestry programme followed by high lump sum return, utilization of unproductive land, availability of free seedlings and other inputs, little investments, availability of subsidy and utilization of free time in Kharagpur and Jhargram Social Forestry Ranges in Midnapore district of West Bengal. The most effective motivational factor considered responsible for generating people’s participation in the Social Forestry programme of Chakriya Vikas Pranali of Society of Hill Resource Management School (SHRMS) in Palamu district of Jharkhand was production of forest produce followed by economic gain, employment generation, reduction in exodus to urban areas, elimination of villager’s exploitation, social, cultural and political upliftment, efficient utilization of waste lands, soil and water conservation, environmental amelioration and cottage industries establishment (Islam and Quli, 1999).

Nirmala and Hiremath (2005) while studying the impact of watershed programme on the economy of farm households in Rangareddy district of Andhra Pradesh observed that increased income, increased moisture availability, increased productivity, increased employment, weed control, reduced soil erosion, increased ground water recharge and safeguarding environment are the major encouraging factors for livelihood improvement and poverty elimination through watershed development programme. An appraisal of livelihoods in rural Jharkhand made by Singh (2005) identified several promotional factors that support forest based livelihood of the community. The most important of
them are price of the forest produces, availability of the valuable trees which provide fuel wood, fodder, timber, fruits and also fulfill consumption need, accessibility of the market, govt. support and role of traders. There are many other factors also contributing forest based livelihood support to the community such as check of the illegal felling of forest trees, transportation to the community for accessing to the market, facility of the cold storage for preventing from getting spoils of the few of the produces, strong village forest protection committee, establishing effective co-ordination between village forest protection committee and the forest department and control of the community over forest produces.

Prakash and Sharma (2008) revealed that the concern for forest resources, social pressure, religious belief and legal pressure are the important factors felt by the local inhabitants affecting their dependence and participation in forest resources management particularly fire management in Bilaspur Forest Circle of Himachal Pradesh. Kareemulla et. al. (2008) reported that the important determinant factors for agroforestry adoption among the farmers were additional income, emergency source of money, supplemental employment and procurement of fuel wood in Saharanpur district in western Uttar Pradesh.

2.3.3. Discouraging factors of forest based livelihood

The tribal people identified twelve major problems in livelihood generation through collection and sale of NTFPs viz., low wage rate by the Large Area Multipurpose Society (LAMPS), wild animals, depletion of forest resources, distance of forest areas, remoteness of the areas, prompt payments, involvement of poachers and others, lack of transport facilities, perishability, distance of marketing point, lack of storage facilities and absence of industries in Kolli hills, Sathyamangalam and Pollachi in Tamil Nadu (Krishnamoorthy et. al., 2003). Competition with crops, small land holding, lack of adequate irrigation facilities, stray cattle menace, lack of market facility for tree products, fear of theft, long gestation period and non-availability of seedlings were expressed by the respondents as main discouraging factors for tree farming on farm lands in Bidar, Gulbarga and Raichur district of north east plains of Karnataka (Madiwalar et. al., 2007).

Ali and Chaturvedi (2008) found that the major constraints faced by the farmers in adoption of different agroforestry systems were lack of group interest, shortage of
labour, non-availability of healthy planting materials, frequent occurrence of floods, lack of knowledge/skill, lack of technological knowhow, lack of family interaction and marketing facilities in north Bihar. A study undertaken by Das et. al. (2008) revealed that illiteracy, lack of practical knowledge, lack of exposure to training programme, problems of financial support, family discouragement and heavy burden due to dual responsibility are the important hindrances to the tribal livelihood and gender empowerment in rice-based farming system as perceived by the people in Dhenkanal district of Orissa. The major constraints faced by the teak growers in adoption of teak plantation were, high prices of fertilizers and plant protection chemicals, non-availability of loan and skilled labour for planting, difficulty in getting information about teak plantation and permission to fell teak plantation in Akola district of Maharashtra State (Khandagale et. al., 2012).

The major constraints in livelihood diversification through watershed development programme experienced by the sample farmers were non-availability of irrigation water, non-availability of inputs and subsidy on time, lack of awareness about the beneficial programme, lack of supervision and follow-up, lack of technical guidance, political interference, inadequacy of sanctioned amount and insufficient credit availability in Eland watershed in Thrissur district of Kerala (Thomas et. al., 2009). Sekar et. al. (2010) reported that the important constraints encountered by the respondent in improving the forest cover and biodiversity through Tamil Nadu Afforestation Project (TAP) were water scarcity to nurse the young saplings, lack of contacts with higher officials, lack of agricultural and allied enterprises and lack of marketing facilities in Krishinagri taluk of Dharmapuri district in Tamil Nadu state. Reddy (2011) concluded that lack of appropriate technical know how and inadequate knowledge of the market of the products are the major constraints, agroforestry farmers are facing in India.

2.4. Strategies for poverty alleviation and ecological stability

Pal et. al. (2009) has suggested lac cultivation as a risk coping strategy for vulnerable cropping system in Jharkhand. Sericulture is advocated as an integral part of agriculture and a source of rural livelihood and poverty alleviation in Indian condition (Surayya et. al., 2008; Acharya and Alam, 2009; Bhatia et. al., 2011). Watershed development is considered a landmark in improvement of agricultural production and productivity to protect livelihoods of people (Mehar, 2002; Nirmala and Hiremath, 2005;
Phand and Arya, 2006; Pal and Prasad, 2007; Palanisami and Kumar, 2009; Thomas et al., 2009; Tilekar et al., 2009). Joint Forest Management (JFM) is conceived as an efficient strategy for sustainable development of the people (Sinha, 2003; De and Babu, 2003; Mishra et al., 2007; Behera, 2007; Redeppa, 2007; Bahuguna and Hilaluddin, 2011; Pandey et al., 2011).

Sustainable extraction of forest resources by the forest dwellers has been emphasized as a prominent strategy for their income and employment generation (Singha, and Talukdar, 2002; Krishnamoorthy et al., 2003; Surayya et al., 2003; Muraleedharan et al., 2004; Arjunan et al., 2005; Kinhal, 2006; Bhattacharya, 2007; Pandey, 2009; Chakraborty et al., 2009; Kandari and Omprakash, 2009; Anon., 2010a; Singh and Quli, 2011; Pandit, 2011). Agroforestry plantation is recognized as the most competent land use option for ensured sustainable development, increased productivity of land, eased environmental stress and enhanced livelihoods (Gangadharappa et al., 2005; Singh, 2007; Kareemulla et al., 2009; Quli and Singh, 2009; Roy and Tiwari, 2012; Dagar, 2012). Kalaichelvi and Swaminathan (2009) concluded that cultivation of medicinal and aromatic plants is a better alternative land use to diversify the livelihoods for forest and forest-fringe dwellers in India.