

Sustainable Livelihood and Its Diversification through Community Based Ecotourism at Pichavaram and Surroundings : An Investigative Study

SAMPAD KUMAR SWAIN* and DEBASISH BATABYAL**

*Sampad Kumar Swain, Professor, Dean of Commerce & Management, Indira Gandhi National Tribal University, Amarkantak, M.P., India

**Debasish Batabyal, Ph.D., Assistant Professor, Pailan College of Management & Technology, Near IIM Kolkata, W.B., India

ABSTRACT

Alternative implications of tourism have been predominating in modern societies. Almost all reserved and ecologically areas are increasingly accepting this use and benefits pertaining to diversified and sustainable scope for income and employment generations. This article is an attempt in a Tsunami affected ecotourism site Pichavaram and surrounding areas where the source of income was found either agriculture or marine resource collections. This article has highlighted the policy issues for livelihood diversifications of the local communities with reference to ecotourism and other alternative opportunities through Transformed Herfindahl Index. The findings of the study exhibited the some measures to enhance the capability of small farmers/fishermen to face the challenges of globalization and ecological threats. It is also found desirable to undertake appropriate ecotourism programs adjusted with the dynamics of crop diversification and marine resource exploitation to achieve a higher economic growth leading to sustainable development.

KEYWORDS :

Introduction:

The conventional socio-economic growth and development has resulted in many unsustainable practices around the world. Though relatively new, tourism industry is not exception to that. Traditional institutionalized form of tourism or mass tourism has many adverse socio-economic and cultural impacts on ecology and stakeholders. As a result, the opinion and practices recommended by environmental economists and environmentalists are incorporated to resist adverse consequences of so-called traditional development. Now, environment and ecology, along with socio-economic and cultural issues are increasingly addressed to ensure development with dignity. Tourism in the 21st century will not only be the world's biggest industry, it will be the largest by far that the world has ever seen (Page and Dowling, 2001). As it grows the tourism industry will need to embrace greater responsibility for its impacts, be they economic, social or environmental. The World Tourism Organization indicates that tourists of the 21st century will be travelling further afield on their holidays. China will be the world's most popular destination by the year 2020, and it will also become the fourth most important generating

market. Agriculture, the primary means of livelihood for millions of people in India still is in a very bad shape. Though billions of rupees are spent through various mega projects for alleviating poverty, it continues to be very acute. The growth of Indian population is unsustainable along with its agricultural and industrial practices. A broadest estimate (Utsa Patnaik's study) using NSS data vis-à-vis the calorie intake prescribed by the ICMR (Indian Council of Medical Research) has shown that around 70 percent of the Indian population are living below the poverty line. Many such other problems are social and gender inequalities, malnutrition, illiteracy, improper and inadequate health facilities, unplanned urbanization, environmental degradation etc. But, from the Himalayas in Kashmir to the seacoasts of Kanyakumari and from the Kutch in Gujrat to the humid forests of the northeast, India displays her wealth of diversity in cultures, religious fairs and festivals. Indeed, India follows unity in diversity. The country extends up to 3200km from south to north and 3000km from east to west covering 32,87,263 sq.km. In the global scenario, India has a prime position in the field of tourism among world's Top 50 (Fifty) tourist destination countries. In India, tourism sector is the second largest net foreign exchange earner. This is a country with second largest human resources of the world. The country has a large treasure of natural beauty, archaeological and architectural monuments. All the hill stations beaches, mountains, lakes, river basins etc. comprise separate bio-geographic regions which are ecologically fragile and socio-culturally vulnerable. Almost hundreds of these regions need an immediate attention for awareness, management and sustainable development. Considering the attraction features, ecotourism vary from one destination region to another.

Marine biology is the scientific study of organisms in the ocean or other marine or brackish bodies of water.

About the Site: The second largest mangrove forest in the world Pichavaram is located near Chidambaram in Cuddalore District, Tamil Nadu, in South India. The nearest railway station is Chidambaram from where it is accessible by road. The Pichavaram Mangrove Forest near Chidambaram, South India, by the Bay of Bengal is the world's second largest mangrove forest after Sundarban. Pichavaram mangrove forest is located between two prominent estuaries, the Vellar estuary in the north and Coleroon estuary in the south. The Vellar - Coleroon estuarine complex forms the Killai backwater and Pichavaram mangroves. The backwaters, interconnected by the Vellar and Coleroon river systems, offer abundant scope for water sports such as rowing, kayaking and canoeing. The Pichavaram forest not only offers waterscape and backwater cruises, but also another very rare sight - the mangrove forest trees are permanently rooted in a few feet of water. Pichavaram (Mad Boon) has a well-developed mangrove forest. Pichavaram consists of a number of islands interspersing a vast expanse of water covered with green trees.

The area is about 1100 Hectare and is separated from the sea by a sand bar. The Pichavaram mangrove biotope consists of rare species like *Avicennia* and *Rhizophora* presenting a distinctive attraction feature with its peculiar topography and environmental condition. It supports the existence of many rare varieties of economically important shell and fin-fishes.

The Pichavaram mangroves attract an appreciable bird population of residents, local migrants and true migrants. Amongst others, one can view birds like Water snips, Cormorants, Egrets, Storks, Herons, Spoonbills and Pelicans. At the mangroves, so far, 177 species of birds belonging to 15 orders and 41 families have been recorded. The season for birds is from September to April every year. Peak population of birds could be seen from November to January. This is due to high productive nature (in terms of prey organisms) of the ecosystem and coincidence of the time of arrival of true migrants from foreign countries and local migrants from their breeding grounds across India. The availability of different habitat types such as channels, creeks, gullies, mud flats and sand flats and adjacent sea shore offers ideal habitat for different species of birds and animals. Apart from all the above, Dawn fest is celebrated here in each year.

There are 53 boats (including mechanized vessels) as a full capacity for the site and found to be insufficient during the peak season/time. Boats are found insufficient during the peak season. There are two different peak seasons for domestic and international travellers. Domestic tourists visit the place during the period of April to June while their foreign counterparts visit during October to March. About forty six (46) persons are found to be reporting to the site almost round the year as full or part time employees and part time employees depend on agriculture and fishing to supplement their income during the lean season. Also, steps are taken to ensure alternative income through micro enterprises such as manufacture of dry fish, fish powder, fish pickles, dried and salted prawns among the artisan fisher-folks.

Fishing and farming communities belonging to 17 hamlets utilize the resources of the Pichavaram mangrove wetlands. Out of these 17 hamlets, 6 hamlets are under physical coverage of the mangrove wetlands, 5 hamlets are located on or near to the open beach and not protected by mangroves. Remaining 6 hamlets are far away from mangrove forest. There was no damage to 6 hamlets that are physically protected by the mangroves but hamlets located on or near to the beach have been totally devastated during the Tsunami. The site and its wildlife were severely affected during the tsunami in the year 2004, though this forest could have saved thousands of human lives of Irula tribes in nearby village. Gainful and sustainable income generation activities have already been initiated among the fisher folk. Processing and drying of sea food through two Marine Products Bulk Dryer units are there at TS

Pettai. These units run on eco-friendly solar power. Marketing of processed marine products through KVIC, Gandhi Gram and other Khadi showrooms is being done. Export market will also be tapped in due course, may be through duty paid or free shops in or outside the area.

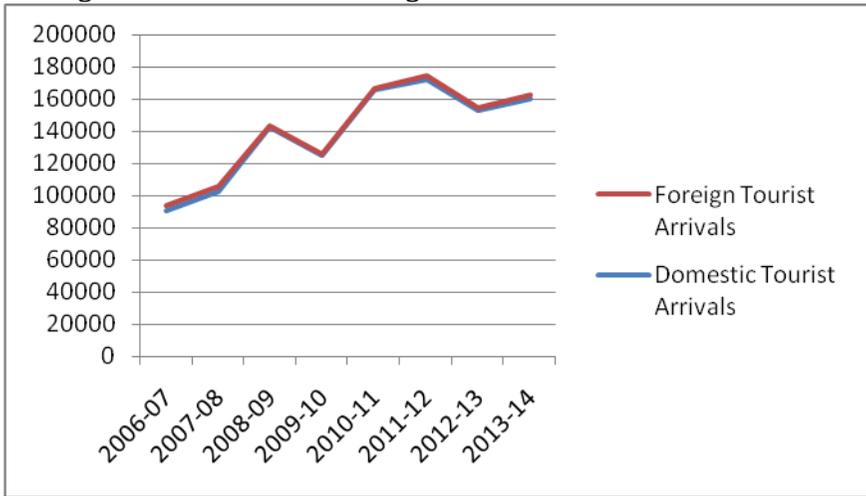
The arrival of tourists for last nine years is broadly divided into pre-Tsunami and Post Tsunami era and it is evident that the arrivals of foreigners decreased after Tsunami while their domestic counterparts took more interest in the destination during after Tsunami period.

Table 1: Coefficient of Variation for Tourists Arrivals in Pichavaram

Year	Domestic Tourists		International Tourists	
	Coefficient of Variation	Performance	Coefficient of Variation	Performance
2006-07	116318.9	2	24101.07	8
2007-08	170029.7	4	10345.66	7
2008-09	205513.8	6	10263.7	6
2009-10	244591.3	8	9941.103	5
2010-11	146488.5	3	*	--
2011-12	589606.1	9	9577.131	4
2012-13	199197.2	5	3486.779	1
2013-14	106984.9	1	6957.808	3
2014-15	211143.8	7	4438.934	2

*Data not available, Source: Tamil Nadu Tourism Development Corporation

More specifically, the table (1) measures the monthly fluctuations in arrivals of domestic and foreign tourists over last nine years with the coefficient of variation and less fluctuation is found in 2013-14 for domestic tourists while the year 2012-13 is found to be the best for the foreign tourist arrivals. A comparatively better performance in terms of foreign tourist arrivals is also evident on or from 2012.

Figure 1: Domestic and Foreign Tourist Arrivals in Pichavaram

Source: Tamil Nadu Tourism Development Corporation, Government of Tamil Nadu

Review of Literature:

Household livelihood diversification is a strategy to minimize risk and uncertainty. In fact, livelihood diversification activities have become an important income generating strategy for rural small farm households throughout the developing world. Although these are found to account for only part of the total income of rural small farm households, the diversified non-farm sector has gained in importance for rural household economies (Assan, 2014). Involvement of non-farm activity not only improves the economic condition of farmer households but also has a positive implication on the efficiency of their farm enterprises (Mehta, 2009). It is being realized for some time that rural people no longer remain confined to crop production, fishing, forest management or livestock-rearing but combine a range of occupations to construct a diverse portfolio of activities (Khatun & Roy, 2012; Dercon & Krishanan, 1996; Ellis, 2000; Unni, 1996). Thus ensuring sustainable livelihood through economic diversification¹ can place a center stage in rural development policy. However, livelihood diversification is a multi-dimensional concept. Livelihood diversification can be defined as the process by which rural families construct a diverse portfolio of activities and social support capabilities in their struggle for survival and in order to improve their standards of living (Ellis,

¹ Economic diversification refers to the production of diverse goods and services in the production boundary. In other words, it also relates to pursuance of diverse economic activities by the people of a geographical domain for producing larger range of goods and services (Mehta, 2009).

1998; Hussain & Nelson, 1998; Khatun & Roy, 2012). Essentially, sustainable livelihood diversification incorporates several individual dimensions, like, crop diversification, farm allied sector diversification, non-farm employment diversification, non-farm income diversification etc. In the commercial mode of agrarian economy, the crop diversification towards non-food crops might be more rewarding to the small farmers compared to the production of food grain crops (Jaleta, 2009). Dittmar, T. & Lara, R.J. (2001) mentioned that mangrove environments supply a large amount of nutrients to the ocean than the river systems. Mangroves are highly productive in the tropical environment and in the global ocean's biosphere. The woody coastline dwelling plants provide more than 10% of essential dissolved carbon that is supplied to the global ocean from land and regulates the biochemical cycling of nutrients and tropical food web.

Travis (1980: 82) states that 'the host population and local services are important in them and are incidentally basic resources in relation to tourism'. UNEP (1986) advocated that tourism should be subject to environmental planning and management taking into account the wellbeing of the local population, which too often has had to accept a large influx of tourists without having had a voice in such development. The public now demand that their concerns be incorporated into the decision-making process. This has resulted in the emergence of public participation programmes and requirements that environmental impact statements be prepared. Liu *et al.* (1987) carried out a major study of resident perceptions of the impact of tourism on the environment in Hawaii, North Wales and Turkey.

Residents of Hawaii and North Wales gave protection of the environment the highest priority. It was ranked higher than cultural benefits, social costs and even economic benefits. Conclusions drawn from the study were that the impact of tourism on the environment is of universal concern; different cultures view the ways environmental and negative impacts of tourism are perceived differently; destination communities perceive many of the benefits brought by tourism, such as the preservation of historic sites; and it is important to incorporate the perceptions of host communities when evaluating the effects of tourism development for planning purposes. General public participation in planning is important for a variety of reasons. They include gaining attitudes and perceptions of residents' views on their environment, tourism development, community aspirations and on the tourists themselves. Dasmann *et al.* (1973: 115) suggested that 'the more local people benefit from tourism, the more they will benefit from a commitment to preserve the environmental features which attract tourism'. A second reason for community consultation is because not all communities are in favour of tourism development. Therefore tourism planning should always be carried out in close collaboration with the local inhabitants who are most likely to be affected. Kad

(1979) lamented that he knew of no country that evaluated alternative approaches to tourism for the purpose of selecting one that promised to maximize social benefits to hosts. He recommended community controlled, forward-looking planning as opposed to typical remedial planning. This view was further strengthened by Murphy (1985) and Getz (1986) as they echoed the emphasis on community participation for its own gain. A third reason for community consultation is because it is the local people who have much to lose or gain from policy decisions. UNEP (1986: 2) suggested that 'tourism planning should always be carried out in close collaboration with the local inhabitants who are most likely to be affected'. Murphy (1983) asserted that tourism thrives on a community's resources and therefore it must take into consideration the opinions of the residents of a destination area. He added that there is a growing awareness of tourism's dependency on and responsibility to the local community. Consequently it is advocated that future planning be undertaken from the perspective of a community industry, one that is responsible to the community it is selling. This is also endorsed by Getz (1986), who suggested that a tourism development plan should include statements on what tourism is expected to contribute to more general goals including community development, enhancement of cultural identity, social welfare, the provision of leisure opportunities, as well as the provision and maintenance of living amenities.

The fourth aspect of gaining community views during the planning process is to gauge the perceptions of hosts (residents) to guests (tourists). Mathieson and Wall (1982) suggested that planners should consider the conflicting opinions of members of the community, and Romeril (1989) asserted that destination cultures vary in their degree of robustness or resilience to the impact of tourists. Many individuals involved in the tourist industry are likely to welcome tourists, whereas others may resent their presence and behavior.

Drumm (1998) pointed out that local communities view ecotourism as an accessible development alternative which can enable them to improve their living standards without having to sell off their natural resources or compromise their culture. In the absence of other sustainable alternatives, their participation in ecotourism is often perceived as the best option for achieving their aspiration of sustainable development. Drumm (1998) outlined a number of options for communities wanting to become involved in tourism development. These include (i) renting land to an operator to develop while simply monitoring impacts, (ii) working as occasional part-time or full-time staff members for outside operators, (iii) Providing services such as food preparation, guiding, transport or accommodation to operators, (iv) forming joint ventures with outside operators with a division of labour, which allows the community to provide most services,

while the operator takes care of marketing, (v) Operating fully independent community tourism programmes. He further stated that in each case, full community involvement in all stages of planning and management is essential to ensure healthy development.

In most of the current literature tourism's impacts on the physical environment have been seen in a negative light. Wall (1994) notes that ecotourism attracts attention to natural treasures, thereby increasing the pressures upon them. Hvenegaard (1994) describes a number of adverse environmental impacts caused by tourism. They include overcrowding, overdevelopment, unregulated recreation, pollution, wildlife disturbances and vehicle use. However, the positive benefits of the environment-tourism relationship have also been considered for over three decades. Tourism and the environment are interrelated and it is argued that there are a number of reasons why conservation should seek the support of tourism. These include the fact that tourism provides conservation with an economic justification, it is a means of building support for conservation, and it can bring in resources for conservation (Phillips, 1985).

In fact, economic impacts may be measured and quantified to identify financial and employment effects, social and cultural impacts on visitors and host communities are often only considered when tourism development leads to local opposition (Page and Dowling, 2002). The attitudes of a host community's residents are a key component in identifying, measuring and analyzing the impact of tourism. Resident perceptions of tourism may be one factor in shaping the attractiveness of a destination, and negative attitudes may be one indicator of an area's ability (or inability) to absorb tourism.

Doxey's (1975) Index of Tourist Irritation (Irridex) illustrates how the interaction of tourists and residents may be converted into different degrees of irritation. He argued that residents' responses would change in a predictable manner, passing through four stages – euphoria, apathy, annoyance and antagonism. However, at any one point in time, a community will be characterized by a range of views and grouping them into a simplified model such as Doxey's does not recognize local diversity (Page and Dowling, 2002). The socio-cultural environment also serves as both an attraction and a recipient of tourism's impacts on host communities (Lindberg and McKercher, 1997). If the impacts become adverse the sustainability of local tourism will be in danger. For the tourism industry, the main concerns are to ensure the local population are not alienated or adversely impacted to the point that they may want to affect the local resource base or deny future access to the resource, over which they are the custodians.

One of the key elements of tourism is that it should be beneficial, which also raises issues related to the degree of control local people have over ecotourism

ventures, highlighting the need to consider the empowerment of local communities (Ashley and Roe, 1998; Scheyvens, 1999). If positive attitudes to tourism are to be fostered, then destination communities should receive economic and social benefits. These include improved cultural appreciation and understanding, cultural heritage, and local pride (Ross and Wall, 1999). It is also important that local residents decide what level of tourism they want (i.e. self-determination), what cultural practices they wish to share, and where tourists will be allowed to go. Several levels of involvement are possible, from full community development of facilities, to partnerships or joint ventures with the industry (Brandon, 1996). The process should include raising the awareness of probable tourism impacts so that residents can make informed decisions regarding the desirability of tourism. Thus tourism development should only be considered successful if local communities have some measure of control over it and if they share equitably in the benefits emerging from ecotourism activities (Scheyvens, 1999).

In their article 'Adaptation and development: Livelihoods and climate change in Subarnabad, Bangladesh', Pouliotte J., Smith B. & Westerhoff L explored the relationship between environmental change and development through a vulnerability study of a rural village in southwest Bangladesh. Here, villagers dealt with a variety of pressing stresses, and climate change is not considered separately, if at all. All the environmental, political and economic conditions and adjustments in resource use systems, particularly shrimp farming, changed livelihood opportunities and increased the vulnerabilities of poor villagers to future environmental changes, including climate change. Practical adaptation strategies to reduce vulnerabilities to climate-related stresses reflected the dynamics of people's livelihoods and address the conditions they currently face. In this case, planned adaptations were mainstreamed in the sense that they contributed to the livelihoods of people and made some improvement in their capacity to deal with changes in climate, and they were undertaken via established non-government institutions.

In their article 'Poverty, Indigenous Culture and Ecotourism in Remote Australia', Fuller, D. Caldicott J. Cairncross G. & Wilde S. (2007) found significant challenges to be existing for indigenous people in identifying suitable economic and commercial development opportunities directed at enhancing economic and human development within their communities. Ecotourism was seen as one sector that could provide such opportunities there. The authors examined the importance and implications of indigenous culture for ecotourism developments in that remote Australian indigenous communities, in order to evaluate the potential of ecotourism ventures as a possible contributor to economic and human development within remote indigenous communities. In addition to examining the influence of culture, this paper suggested the important strategies for indigenous success in operating

ecotourism enterprises including the importance of consultation and planning processes, the availability of suitable education and training to indigenous business owner-operators and the availability of joint-venture partnerships with actors in the main stream economy.

Data Source and Methodology:

Data Source:

The concept of sustainable livelihood is the enhancement of multiple opportunities so that local community can avail of the scope for income and employment generation through sustainable tourism practices. The biggest challenge herein is not the available of opportunities but the overwhelming response of the local people to the diversified scopes or avenues introduced by tourism practices. Here, the diversification implies the various economic avenues round the year backed by formation of social capital and preservation of common property resources. Primary data have been collected from the villages purposively keeping in mind the influence of the water body of Pichavaram on households. Pichavaram, M.G.R. Nagar, Singarakuppam, Kuchhipalayam and Pillumade are five villages from where a total of 479 households have been surveyed. Once villages were selected, the household, the basic sampling unit of our study were selected randomly. The households under study have been categorized based on their sources of the household employment and income from non-farm activities and fisheries. Households with ten thousand and above belong to under privileged (UPC) whereas households below income of rupees ten thousand are considered privileged class (PC) as they presumed to have belonged to the vulnerable section of the society.

Methodology:

Several indices can be used to determine the extent of diversification of a region, such as Entropy index, Berry's index, Simpson's index (SID), Herfindahl index (HI) etc. However, in the context of agriculture and other marine resource collection scenario of Pichavaram and its surroundings, Transformed Herfindahl Index (a measure of crop-diversification and thereby steady shifting to alternative scopes) has been used in the present study. Transformed Herfindahl index and Simpson Index are technically similar and use to provide with similar estimates of diversification. Transformed Herfindahl Index (THI) is defined as:

$$THI = 1 - \sum_{i=1}^n p_i^2$$

Where p_i represents the relative share of any element to the gross value, i.e.,

$$p_i = \frac{A_i}{\sum_{i=1}^n A_i}$$

Here A_i = Value of i th element and $\sum A_i$ = cumulative or total value of all the elements together. The value of THI lies between zero and one, except two extreme cases i.e., perfect specialization (THI=0) and perfect diversification (THI=1).

Two individual dimensions each from farm and allied activities (i.e. crop diversification and farm allied diversification) and non-farm activities (i.e. employment diversification and income diversification) are considered to construct a composite index of sustainable livelihood diversification. The measurement issues and its data requirement are presented in table 2.

Table 2: Measurement of Livelihood Diversification and Its Data Requirement

Type of Diversification	Measurement	Data used
Employment Diversification	$D_1 = 1 - \sum_{i=1}^n p_i^2$ Where P_i = Population work participation rates in i th non-farm employment options. i = several non-farm employment options such as agricultural and allied works, business activity or unorganized service sectors.	Labor force participation ratio on the basis of time allocation of different non-farm economic activities
Income diversification	$D_2 = 1 - \sum_{i=1}^n p_i^2$ Where P_i = Share of income from i th non-farm income avenues. i = several income earning non-farm sectors	Income from different non-farm economic activities

Based on four diversification indices, we have constructed a composite index of Sustainable Livelihood Diversification Index (SLDI). The index is simply the weighted average of all four diversification indices, assuming equal weight to each index as follows:

$$SLDI = \frac{\sum_{i=1}^4 D_i}{2}$$

Determinants of Sustainable Livelihood Diversification Index:

A Multiple Regression analysis has been carried out using OLS technique in the study to determine the factors that influences the farmers' sustainability livelihood diversification practices by taking sustainability livelihood diversification indices (SLDI) as dependent variable and several other variables such as cropping intensity, operated land, economic status, work force participation rate, experience of the

head of the household, and district specific effects etc. as independent variables. The explanatory variables and hypothesis (as specified by expected sign) are presented below in table 3.

Table 3 : Expected Sign of the Determinants of Sustainable Livelihood Diversification Index

Independent Variables	Notation	Description	SLDI
Cropping intensity	CI	Share of net cropped area to gross cropped area of the household	+
Per capita operated land	PCOPL	Operated land cultivated by the farmer household, on average, in the village.	+
Economic status of the households	STATUS	D1=1 if the household belongs to above poverty line and 0, otherwise	+
Work force participation rate	WFPR	Working member as a proportion of total member of the household	+
Experience of the head of the household	AGE2	Square of age of the head of the household	+
Dummy variable of Kuchipalayam	D1_KUC	D1=1 if the household is in Kuchipalayam , 0, otherwise.	+/-
Dummy variable of Singarakuppam	D2_SIN	D2=1 if the household is in Singarakuppam, 0, otherwise.	+/-

Sustainable Livelihood Diversification in the Study Area

In this section, we have dealt with the pattern of livelihood diversification strategy of small farmers vis-à-vis large farmers in our study area through their participation into varied farm and tourism income earning opportunities.

Table 4 : Size-class Wise Diversification Indices in the Study Area

Villages	Other than agricultural & aqua-cultural activities				Sustainable livelihood diversification	
	Employment		Income		PC	UPC
	PC	UPC	PC	UPC		
Pichavaram	0.420	0.410	0.531	0.613	0.443	0.458
M.G.R.Nagar	0.492	0.312	0.662	0.319	0.541	0.435
Singarakuppam	0.448	0.375	0.645	0.392	0.528	0.480
Pillumade	0.280	0.410	0.611	0.575	0.310	0.361
Kuchipalayam	0.278	0.419	0.611	0.575	0.310	0.361

Source: Field Survey 2015 , Note: PC= Household less than Rs. 10,000 p.m., UPC = Household with or more than Rs. 10,000 p.m.

It is evident from the table 3 that in our survey region, Singarapuppam (0.528 and 0.480 respectively for small and large farmers/fishermen) has been found to be

more diversified with regard to each separate dimensions of diversification compared to the other districts indicating a varied source of sustaining livelihood options. In particular, employment diversification in Pillumade and Kuchipalayam is quite low.

Only Kuchipalayam is endowed with relatively better irrigation facility and some negligible amount of lands are devoted for agriculture. One important reason may be the salt water and unfavorable climate condition. In the farm allied sector, a significant proportion of farmer households in Singarakuppam involves in diversified type of farm-allied opportunities, viz. horticulture, livestock farming and fishery activities. A high participation of farmer households in a wide range of non-farm activities in Kuchipalayam can be explained by the lack of permanent income earning opportunities and thereby dependence on varied sources of casual income earning. This is reflected in our empirical evidences that Kuchipalayam excels in the performance of employment and income diversification in the non-farm sector.

Determinants of Sustainable Livelihood Diversification

An attempt has been made in this study to explore the factors influencing the extent of sustainable livelihood diversification practice of the farmers in various employment and income earning activities. Diversification indices are considered as the dependent variable while several other variables such as households' workforce participation rate, experience of the farmers (expressed by square of age of household head), agricultural asset, cropping intensity, economic status of the households are taken as explanatory variables. To check whether there exist any specified region effect two region dummy variables are included in the model.

Table 5 : Determinants of Sustainable Livelihood Diversification
Dependent variable: SLDI

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	0.0346761	0.0192809	1.7975	0.07274	*
ECO	-0.0150147	0.00831916	-1.8038	0.07174	*
WFPR	0.00781882	0.00338893	2.3072	0.02157	**
CI	-0.0567059	0.00598542	-9.4750	<0.00001	***
PCOPL	-0.00081421	0.000263248	-3.0939	0.00210	***
AGE2	3.07895	2.56676	1.1972	0.23323	
D3_Kuchipalayam	-0.0405928	0.0115385	-3.5178	0.00048	***
D1_Singarakuppam	0.0187877	0.00919977	2.0431	0.04159	**

The regression result using OLS technique reveals that cropping intensity (CI) of the farmers along with agricultural asset holdings (PCOPL) is found to have

significant implications on the extent of the sustainable livelihood diversification index. It appears that more intensive is the cultivation practice; less will be the level of livelihood diversification index. Per capita operated land holding is an important determinant of the livelihood diversification. Farmers with small operated landholding enjoy better opportunities in diversifying their livelihood. Both the variables are found to be significant at more than 1 percent level. Workforce participation rate (WFPR) has been found significantly affecting the extent of livelihood diversification. In fact, farmers are opting for diversified livelihood options through participation of their working population into different income earning opportunities. This variable has been found to be significant at 5 percent level of significance. Poverty level of the farmers, approximated by the binary variable STATUS, is found to have a significant impact on the level of livelihood diversification. Poor people intend to diversify more towards various livelihood activities so as to earn a subsistence income for the family. This variable is significant at 10 percent level of significance. Region effects are very much prominent in this case as expressed by the coefficients of district dummies.

Conclusions and Policy Implications:

An attempt has been made in this paper to deal with the multi-dimensional aspects of sustainable livelihood diversification of small farmers in our study area. Traditional farming practices are often found inadequate to generate livelihood options of farmer households unless it is accompanied by supplementary income from non-farm activities, specifically from ecotourism. Two individual dimensions each from farm and allied activities (i.e. crop diversification and Farm allied diversification) and non-farm activities (i.e. employment diversification and income diversification) are considered to construct a composite index of sustainable livelihood diversification. Households' workforce participation rate, cropping intensity, economic status of the households, and most importantly operated land holding can significantly explain the variation in sustainable livelihood diversification of farmer households. Overall, large farmers are found to diversify their economic opportunities in the agriculture and allied activities. Broadly, the large farmers diversify the farm activities towards the high valued crops. The small farmers, on the other hand, diversify their economic activities towards the non-farm activities. For the small farmers, cultivation provides insufficient livelihood opportunity and thus, in search of sustainable livelihood, they diversify their economic activities towards the non-farm sectors.

The findings of the study necessitate the adoption of some policy measures to enhance the capability of small farmers/ fishermen to face the challenges of globalization and to pursue the sustainable livelihood option. It is desirable to undertake appropriate extension programs suitably adjusted with the dynamics of

crop diversification to exploit the advantage of globalization and to achieve a higher growth path in agriculture in the state. To reduce the risk of cultivation, a suitable professional training program needs to be devised for the farming households to adopt successful livestock farms such as dairy, poultry etc. Ecotourism, fishing & netting, collection of other marine resources should be given priority to enhance the income generation from farming and allied activities.

References:

- Ashley, C. and Roe, D. (1998) *Enhancing Community Development in Wildlife Tourism: Issues and Challenges*. International Institute for Environment and Development, London.
- Brandon, K. (1996) *Ecotourism and Conservation: a Review of Key Issues*. World Bank, Washington, DC.
- Dasmann, R.F., Milton, J.P. and Freeman, P.H. (1973) *Ecological Principles for Economic Development*. John Wiley & Sons, Chichester.
- Dittmar, T & Lara, R.J.(2001). Driving forces behind nutrient and organic matter dynamics in a mangrove tidal creek in North Brazil. *Estuar, Coast, Shelf Sci.* Vol.52, pp. 249-259.
- Doxey, G.V. (1975) A causation theory of visitor resident irritants: methodology and research inferences. In: *The Impact of Tourism, Proceedings of the Sixth Annual Conference of The Travel and Tourism Research Association*. The Travel and Tourism Research Association (TTRA), San Diego, pp. 195-198.
- Fuller, D. Caldicott, J., Cairncross, G. & Wilde, S.(2007). Poverty, indigenous culture and ecotourism in remote Australia. *Development*, Vol.50, pp. 141-148. doi:10.1057/palgrave.development.1100368
- Hvenegaard, G.T. (1994) Ecotourism: a status report and conceptual framework. *The Journal of Tourism Studies* 5(2), 24-35.
- Laha, A. (2014). "Access to Credit to Micro, Small and Medium Enterprises in India: An Inter-State Analysis", *Vidyasagar University Journal of Commerce* (ISSN: 0973-5917), 19, March, 2014, 59-71
- Laha, A. (2015). "Association between Financial Inclusion and Human Development in South Asia: A Cross-Country Analysis with Special Reference to India", *Journal of Economic Policy and Research* (ISSN: 0975-8577), 10 (2), April-September, 2015, 69-91
- Lindberg, K. and McKercher, B. (1997) Ecotourism: a critical overview. *Pacific Tourism Review* 1, 65-79.
- Liu, J.C. Sheldon, P.J. and Var, T. (1987) Resident perception of the environmental impacts of tourism. *Annals of Tourism Research* 14, 17-37.
- Mehta, R. (2009). *Rural Livelihood Diversification and its Measurement Issues: Focus*

India, 2nd meeting of Wye city group on statistics on rural development and agriculture household income, June, 2009. Retrieved from http://www.fao.org/fileadmin/templates/ess/pages/rural/wye_city_group/2009/Paper_1_a1_Mehta-Wye-Grp-RurDiv-Final.doc

Page, S. and Dowling, R.K. (2002) *Ecotourism*. Pearson, Harlow.

Phillips, A. (1985) Opening address. In: *Tourism, Recreation and Conservation in National Parks and Equivalent Reserves*, Proceedings of a European Heritage Landscapes Conference. Peak Park Joint Planning Board, Derbyshire, UK.

Prasad, B.K. & Ramanathan A.L. (2008). Dissolved organic nutrients in the Pichavaram mangrove waters of East Coast of India. *Indian Journal of Marine Sciences*. Vol. 37, No.2 pp. 141-145.

Pouliotte J., Smith B. & Westerhoff L (2009). Adaptation and development: livelihoods and climate change in Subarnabad, Bangladesh. *Climate & Development*, Vol.1, No.1, pp.31-46. Taylor & Francis; New York. DOI: 10.3763/cdev.2009.0001

Ross, S. and Wall, G. (1999). Ecotourism: towards congruence between theory and practice. *Tourism Management* 20, 123-132.

Scheyvens, R. (1999) Ecotourism and the empowerment of local communities. *Tourism Management* 20, 245-249.

Singh S., Timothy D.J., & Dowling R.K. (Eds.). (2003). *Tourism in destination communities*. Cambridge :CABI.

Travis, A.S. (1980). The need for policy action. In: OECD (ed.) *The Impact of Tourism on the Environment*. Organization for Economic Cooperation and Development, Paris, pp. 79-97.

United Nations Environment Programme (UNEP) (1986). Carrying capacity for tourism activities, special issue. *UNEP Industry and Environment Newsletter* 9(1), 1-2.