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Editorial

“Star Research Reach,” a multi-disciplinary, peer reviewed international journal publishes the latest research and review articles. The journal possesses an International registration number, ISSN 0975-5101. Journal is a platform for researchers, teachers and students who pursue research and are successful academically.

The journal integrates specialized knowledge from different fields. It includes research works from community health, primary health care, nutritional care, epidemiology, medical sociology, social and preventive medicine, Economics, Management etc. This issue focuses on community relevant topics.

We express our sincere gratitude to our management and staff for the incessant support and motivation throughout. We are happy to express a special word of thanks to our Principal, Dr.Sr.Alphonsa M K, who had taken keen interest and extended support in publishing this journal regularly. A great word of thanks to all authors for the timely submission of articles. The peer reviews had helped in maintaining the quality of each article. Above all let me thank God Almighty for the bounteous blessings and grace showered upon us.

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STANDARDIZATION AND POPULARIZATION OF NUTRITIOUS RECIPES TO PREVENT COLORECTAL CANCER

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ABSTRACT

During adulthood nutrients are required for energy, for replacement of worn out tissues maintenance of body functions and to prevent communicable and non communicable diseases. The risk of developing colon - rectal cancer increases with age, as does the occurrence of most cancers. Diet and proper nutrition are vital tools in the fight against colon cancer. So the present study was done on “**Standardization and Popularization of Nutritious Recipes to Prevent Colorectal Cancer**”. It was aimed to prevent colorectal cancer among young adults. Ten recipes were prepared and standardized. A sensory analysis based on five quality attributes such as colour, flavour, texture, taste, and appearance was used to determine the acceptability of the developed recipes. For that a score card was formulated and the mean rank score was calculated. Nutritive value and the cost of the developed recipes were calculated. The recipes were popularized with the help of lectures, demonstration, brochure and charts. Pumpkin addai (96.8%) got highest percentage of overall acceptability over total score. The nutrient comparison, of all the products was done and it was found that all these selected products especially Vegetable wheat Dosa contained the entire important nutrients necessary for adults.

Key Words: *Colorectal Cancer, Standardization*

INTRODUCTION

Colorectal cancer can occur anywhere in the colon or in the rectum. Colon cancer develops when cells of the colon are exposed to chemicals or carcinogens that cause damage to their DNA. This damage leads to mutations in the cells, which may then reproduce out of

control and spread to other parts of the body, leading to organ damage and eventually death (Jemal *et al.*, 2010).

Albanes *et al.* (2000) reported that the risk of Colorectal Cancer begins to increase after the age of 40 years and rises sharply at ages 50 to 55 years; the risk doubles with each succeeding decade, and continues to rise exponentially. Modifiable risk factors include the cigarette smoking, total fat intake, saturated or animal fat intake, consumption of red meat, processed meats and meat cooked at very high temperatures, sugar consumption, refined grains, alcohol use, especially commercial beer, low fibre diet, low in fruits and vegetables, obesity, adult-onset diabetes and limited physical activity. Hence, effective primary and secondary preventive approaches must be developed to reduce the morbidity and mortality from Colorectal Cancer (Mariotto *et al.*, 2011).

Schatzkin *et al.* (2000) observed that diets high in vegetables, total fiber, fruits, fish, whole grains, and fermented dairy products such as yogurt, and legumes, especially soybeans, have all been shown to significantly reduce one's risk of developing colon cancer. Levi *et al.* (2001) open up that fiber decreases colon cancer risk by several different mechanisms. One way is by binding to bile salts, bile salts can be converted by certain intestinal bacteria into carcinogens. Fiber also helps to add bulk to the stool, which results in a dilution of the concentration of bile in the colon, further decreasing exposure.

Another important substance in the fight against colorectal and other cancers is the antioxidant. Antioxidants such as selenium, vitamin C and beta-carotene work by bolstering the body's defenses against potentially dangerous substances called free radicals (Satiya-About a *et al.*, 2003). Voorrips *et al.* (2000) found that Cruciferous vegetables, such as broccoli, cauliflower, turnips, brussel sprouts, rutabaga, cabbage, kale, and kohlrabi, and allium vegetables, such as onions, garlic, chives, shallots, leeks and scallions, helps to reduce the risk of colorectal cancer (Galeone *et al.* 2006).

In general, food consumption should not be excessive, but should provide just enough calories to support a healthy lifestyle that includes a moderate amount of exercise. Colorectal cancer (also called cancer of the bowel or bowel cancer) is common in all over the world. Increasing awareness may encourage lifestyle changes and adherence to dietary guidelines, which can prevent Colorectal Cancer. Keeping all these facts in mind the present study

“Standardization and Popularization of Nutritious Recipes to Prevent Colorectal Cancer” is carried out with the following **Objectives**

- To Develop and standardize Nutritious products to prevent Colorectal Cancer.
- To estimate the nutritive value and cost of these products.
- To educate young adults about Colorectal Cancer
- To popularize standardized products among young adults.
-

METHODOLOGY

Diet and proper nutrition are vital tools in the fight against colon cancer. The ingredients selection was based on its nutrient content, availability and therapeutic effect especially for Colorectal Cancer. Ten indigenous recipes were selected for the development of nutritious Product. The selected recipes were Sweet satin, Carrot beet root Dreams, Fruit passion, Fruit sap, Fruit Shake, Gazpacho, Smoothie, Vegetable Kozhikotta, Pumpkin Addai and Vegetable wheat Dosa.

Standardization requires repeated testing to ensure that the product meets the standard of quality and quantity. Recipe Verification and Sensory Evaluation steps were used for recipe standardization. Sensory evaluation involves the Selection of Judging Panel (a panel consisting of ten judges was selected by ranking method), Formulation of Score Card (through which the developed recipes were evaluated organoleptically) etc. In this test, a five point hedonic score card which evaluates the sensory qualities like taste, flavor, colour, texture and appearance of the products were given to the judging panel and asked to rate the products through evaluation.

The nutrient content of each standardized products per portion were calculated using nutritive value table (NIN, 2011) to refer their energy, protein, fat, calcium, iron, β carotene and Vitamin C content. Factor pricing method or markup method was used to calculate the cost of each recipes. For this, the desire percentages of all cost other than food cost were selected (60%) and divided into 100 to give a pricing factor (1.66). By multiplying the raw food cost with this factor resulted the cost of the product (Spears, 1995). Nutrition education was given to the subjects and educational materials used in this study were black-board, charts etc. The above listed educational materials included information on Colorectal

Cancer, causes, symptoms and prevention. Nutrition educations through lectures were administrated for the young adults in a formal classroom atmosphere by the investigator. All the standardized recipes were popularized among young adults with the help of demonstrations.

RESULTS AND DISCUSSION

Sensory analysis of the Standardized Products

The amount of food eaten during a meal is determined by both internal physiological events and factors in the environment such as the availability, cost and presentation of food as well as the time of day and the social situation. The acceptability of standardized products was judged through sensory analysis.

Overall acceptability of the developed recipes was evaluated with the help of score of five quality parameters obtained through sensory analysis / organoleptic evaluation. Figure 1 explained that Pumpkin Addai (96.8%) got highest percentage of overall acceptability over total score. Moreover the recipe was simple and found easy in preparation. Due to the lowest mean scores in all parameters Vegetable wheat Dosa got lowest overall acceptability (77.6%).

Table 1 Overall acceptability of the standardized Products

Sl.No	Product Name	Colour	Texture	Taste	Flavour	Appearance	Overall Acceptability	Percentage of overall Acceptability over Total score
1	Sweet Satin	4.6	4.6	4.4	4.4	4.4	4.48	89.6
2	Carrot beet root Dreams	5	4.6	4	4	4.4	4.4	88
3	Fruit passion	4.8	4.6	3.8	3.6	5	4.36	87.2
4	Fruit sap	5	4.8	4.2	4.2	4.6	4.56	91.2
5	Fruit Shake	4.8	4.6	3.8	4	4.6	4.36	87.2
6	Gazpacho	4.8	4.8	4.2	4.6	4.8	4.64	92.8
7	Smoothie	4.8	4.6	4.8	4.8	4.8	4.76	95.2
8	Vegetable Kozhikotta	4.6	4.4	5	5	4.6	4.72	94.4
9	Pumpkin Addai	4.6	5	4.8	4.8	5	4.84	96.8
10	Vegetable wheat Dosa	4.6	3.6	3.6	4	3.6	3.88	77.6

Nutritive value of the Standardized Recipes

Eating habits and preferences developed during childhood, adolescence and young adulthood influence health and fitness into adulthood. Some adults have gotten a healthy start and have established a sound diet and regular activity programme, which helps them, remain in good condition from young adulthood into the later years.

Table 2 showed that Carrot beet root Dreams achieved highest energy value (108.2kcal) because olive oil is an ingredient of Carrot beet root Dreams likewise Sweet Satin (52.2kcal) secured the least value of energy. Looking into protein, Vegetable wheat dosa gained highest value (12.089g) whereas sweet satin secured least protein value (0.495g). Vegetable wheat dosa contains soya chunks which is high in protein.

Table 2 Nutrient composition of the standardized Recipes (per portion)

Sl. No	Recipes	Energy (kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	β carotene (μ g)	Vitamin C (mg)
1	Sweet Satin	52.2	0.495	0.21	27.2	1.06	288.3	13.25
2	Carrot beet root Dreams	108.2	1.76	5.35	69.78	1.345	980.104	18
3	Fruit passion	54.2	1.15	0.39	42.05	4.76	121.15	18.85
4	Fruit sap	87.7	1.52	0.49	58.43	1.01	1113.45	403
5	Fruit Shake	102.7	3.63	4.27	130.5	0.965	825	11
6	Gazpacho	31.15	1.47	0.12	25.48	0.56	66.78	27.18
7	Smoothie	92.18	9.06	3.83	114	0.45	15.6	3.025
8	Vegetable Kozhikotta	63.5	2.08	0.29	24.24	0.648	85.66	6.125
9	Pumpkin Addai	98.36	1.266	1.33	8.44	0.456	4.98	0.228
10	Vegetable wheat Dosa	140.69	12.089	1.7	123.6	6.59	665.5	19.86

Carrot beet root Dreams got highest value of fat (5.35g), when compared with other products. The highest value of calcium was scored for Fruit Shake (130.5mg) because it is made up of milk. While discussing about, Iron, Vegetable wheat Dosa has highest value (6.59mg) of iron when comparing with other products, where as Pumpkin Addai and Smoothie has least value.

Carrot beet root Dreams got highest value of β carotene. β carotene is the nutrient high in antioxidant property, which helps to prevent cancer. Vitamin C is needed for the absorption of Iron and it is also an antioxidant, while comparing these recipes, fruit sap (403mg) gained highest value where as pumpkin addai secured least value. Sufficient amount of vitamins are required for smooth functioning of the body.

So all the recipes are good to prevent and treat many life style diseases in adulthood. More over all these products contains anti cancer agents such as antioxidants, photochemicals and other cancer preventing substances.

Cost of the standardized recipe

Table 3 explained cost per portion of the incorporated products, ranges between 2.5-17 Rupees. Among these products Fruit sap and smoothie has highest price (Rs. 17). All the Ten recipes were familiar and made variety in preparation and taste.

Table 3 Cost of the Developed recipes

Sl. No	Item	No. of Portion	Total cost (Rs)	Cost per Portion (Rs)
1	Sweet Satin	1	13.44	13.5
2	Carrot beet root Dreams	1	15.77	16
3	Fruit passion	1	13.11	13
4	Fruit sap	1	16.93	17
5	Fruit Shake	2	23.406	12
6	Gazpacho	3	12.45	4
7	Smoothie	2	33.2	17
8	Vegetable Kozhikotta	4	12.86	3
9	Pumpkin Addai	5	12.45	2.5
10	Vegetable wheat Dosa	4	26.56	4.5

Popularization of the Recipes

All the ten recipes were taken for popularization. To popularize the recipe, a class about “colorectal cancer and its prevention” was conducted among young adults. A brochure, including information like colorectal cancer preventing foods, ingredients of the standardized recipes, methods of its preparation, number of portion, cost and nutritive value were distributed.

CONCLUSION

This awareness can reduce the suffering due to cancer by educating person’s choices and supporting cancer prevention. To achieve our goals we provide accurate and understandable information in an innovative engaging manner. It is realized that each recipe prepared was good for the health and it should be made a point to include these food items at

least once in a weekly diet, especially for young adults, which not only helps to reduce the mortality but also increases the awareness of colorectal cancer in the community.

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NUTRITIONAL STATUS OF ADULTS WITH MULTIPLE ORGAN DYSFUNCTION SYNDROME

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ABSTRACT

The increasing prevalence of MODS has paralleled the aging of the society and advances in resuscitation and life-support for critical illness. Multiple organ failure is a life threatening condition which requires a patient to be treated within the ICU setting and needs correct nutritional support. Malnutrition is common among ICU patients. So the present study was carried out to assess the “Nutritional Status of Adults with Multiple Organ Dysfunction Syndrome”. The study was conducted among hundred MODS subjects from both sexes in the age group of 35-60 years. The subjects were selected by purposive sampling from a hospital in Thrissur. Nutritional status of the subjects was assessed through anthropometric, biochemical, dietary and Subjective Global assessment. Investigation cleared that, Consumption of all other food groups was less than the RDA. Mean nutrient intake of the MODS subjects revealed that all micro nutrients were inadequate when compared with the RDA. It was found that 40 per cent of the subjects were severely malnourished, 50 per cent were mild to moderate malnourished and 10 per cent were well nourished.

Key Words: *Multiple Organ Dysfunction Syndrome, Nutritional Status, RDI, RDA, Subjective Global assessment*

INTRODUCTION

According to Beal and Cerra (2000) the Multiple Organ Dysfunction Syndrome (MODS) can be defined as the development of potentially reversible physiologic

derangement involving two or more organ systems not involved in the disorder that resulted in ICU admission, and arising in the wake of a potentially life-threatening physiologic insult.

According to Sausia *et al.* (2000) the histologic features of the organs involved in MODS are less well characterized, but generally include evidence of edema, inflammation, tissue ischemia or necrosis, and variable degrees of fibrosis and repair. These alterations, in turn, are responsible for the clinical features of MODS in each of its component systems.

The metabolism in Multiple Organ Dysfunction Syndrome is characterized by increased total caloric requirements, hyperglycemia, triglyceride intolerance, increased net protein catabolism, and increased macronutrient and micronutrient requirements. Caloric requirements may need to be increased 10 to 20%. Optimal amount of energy and protein required by critically ill patient to reduce morbidity and mortality is controversial. Specifically, patient with a poor nutritional status are more likely to experience adverse effects from underfeeding or benefit the most from receiving an increased amount of energy and protein.

Keeping these facts in mind, the investigator conducted the present study **“Nutritional Status of adults with Multiple Organ Dysfunction Syndrome (MODS)”** with the following objectives,

- To identify the socio economic status and lifestyle pattern of the subjects.
- To ascertain the common cause for multiple organ dysfunction syndrome among these subjects.
- To assess nutritional status of multiple organ dysfunction syndrome subjects.
- To determine the extent of malnutrition in these subjects.

METHODOLOGY

For the present study hundred MODS subjects aged between 35-60 years from both sexes were selected by purposive sampling method from a Hospital in Thrissur. Through interview schedule details regarding socio-economic status and food habits of the subjects were collected. Basic anthropometric measurements like height, weight and body mass index were assessed for all the subjects. Dietary assessment was done by 24 hour recall method.

Biochemical parameters like Haemoglobin, blood sugar, cholesterol, bilirubin, SGOT, SGPT, urea, uric acid, creatinine, sodium, potassium and ESR of the samples were estimated. SGA is recommended because it gives a comprehensive overview of nutritional intake and body composition, including a rough assessment of both muscle mass and fat mass, and because it is correlated with mortality rates. The assessment consisted of i) weight loss during the preceding 6 months ii) Gastrointestinal (GI) symptoms iii) food intake iv) function capacity v) co-morbidities (Kalantar-Zaden *et al.*, 2003). Percentage analysis and appropriate inferential statistical measures were utilized for analyzing the data. Karl Pearson correlation coefficient and chi square test was used to find out the relation between various variables.

RESULTS AND DISCUSSION

Socio-economic status of the subjects

Socio economic status of the families revealed that the incidence rates had higher among Hindus (45 per cent) followed by Muslims (31 per cent). MODS were found in both sex (male 49% and female 51%). Ninety two per cent of the subjects were married. Nuclear family system (82 per cent) was predominant among them. Fifty one per cent of the MODS subjects were from the age group of 56-60 years. All of them were literate and had different levels of education. Majority of the families (54 per cent) had a monthly income more than Rs. 20000.

Anthropometric measurement of the subjects

An anthropometric measurement indicates the body's response to the dietary intake. Health status of the subjects was determined by assessing anthropometric measurements with respect to height, weight and BMI of the subjects. The mean height of the subjects was found to be 157.45cm and mean weight of the subjects were 50.69 kg. Physical measurements are an important component of nutritional status.

According to Ramaswami *et al.* (2005) BMI is a useful measurement for assessing the nutritional status which uses a patient's height and weight to classify a person underweight, normal or obese. From the study it was clear that 68 per cent of the subjects were in normal body weight and 30 per cent of the subjects were underweight.

Biochemical assessment of the subjects

Laboratory tests based on blood and urine can be important indicators of nutritional status, but they are influenced by non-nutritional factors as well (Radha, 2013). By assessing the data, it was found that 95 per cent of the subjects were anaemic. Majority of the subjects had high level of blood cholesterol (74%), triglycerides (66%), and LDL (89%) and low levels of HDL (90%). In this study Creatinine, uric acid and urea were found to be abnormal in 62 per cent, 88 per cent and 89 per cent respectively. Majority of the subjects had abnormal levels of Sodium (75%) and potassium (80%).

Table 1 Biochemical analysis of the subjects

Parameters	Normal	Below Normal	Above Normal
Haemoglobin	5	95	0
Blood sugar	29	0	71
Cholesterol	26	0	74
Triglyceride	34	0	66
HDL	10	90	0
LDL	11	0	89
Bilirubin – Total	60	0	40
Bilirubin – Direct	78	0	22
SGOT	63	0	37
SGPT	57	0	43
Urea	11	0	89
Uric acid	9	3	88
Creatinine	38	0	62
Sodium	17	8	75
Potassium	16	4	80
ESR	7	0	93

Seventy one per cent of the subjects had high levels of blood sugar. From the data, 43 per cent of the subjects had high levels of SGPT and 37 per cent had abnormal levels of SGOT. Serum total bilirubin was found to be high in 40 per cent of the subjects. High level of erythrocyte sedimentation rate was found in majority of the subjects (95%).

Dietary habits of the selected subjects

Nutrition is a corner stone that affects and defines the health of all people. It paves the way for us to grow, develop, work, play and resist infection and aspire to realization of our fullest potential as individual and societies (Madhavan, 2005).

Food habits studies done on the subjects and it showed that non-vegetarians predominated the scenario. Ninety per cent were non vegetarian and 10 per cent were vegetarians. Dietary pattern is different for each individual.

Food and nutrient intake of the selected subjects

The food intakes of the respondents were measured by 24 hour recall method in order to assess the food quantity and quality of nutrients present in their diet. From the amount of food consumed, nutrient intake and quantity of each food items were calculated and compared with RDA for sedentary worker men and women. Details of food intake were given in the table 2. From the study, it was revealed that food intake of the subjects was found to be lower than the RDI. Milk is the main component of the feed and the RDI was met by 96.73 per cent and 97.95 per cent in females and males respectively.

Table 2 Food intake of the subjects

Food groups	RDA (g)* (sedentary work)		Mean food intake (g)		Percentage of RDA met	
	Male	Female	Male	Female	Male	Female
Cereals	375	270	100	100	26.66	37.03
Pulses	75	60	16.32	16.47	21.76	27.45
Greenleafy vegetables	100	100	-	-	0	0
Other vegetables	200	200	9.38	8.23	4.69	4.11
Roots and tubers	200	200	16.32	16.47	8.16	8.23
Fruits	100	100	32.65	21.17	32.65	21.17
Milk and milk products	300	300	293.87	290.19	97.95	96.73
Egg	60	60	28.57	29.01	47.61	48.86
Meat and fish	60	60	1.02	-	1.70	-
Fats and oils	25	20	12.24	12.35	48.97	61.76
Sugar and jaggery	20	20	6.53	6.27	32.65	31.37

*(ICMR, 2011)

Supplements are very effective to meet the nutritional requirement to outcomes this health problems and to maintain the health status. With regard to the nutritional supplements 23 per cent were taking diabetic supplements, 21 per cent taking nephro supplement and 18 per cent were taking hepatic supplement, routinely prescribed by the physician.

Nutrition is the ultimate balance sheet of all the process by which the animal or human system utilizes food for proving energy for growth and maintenance and also other specified nutrients (Paul, 2005).Details of the nutrient intake of the subjects are given in table 3.

Sukhminder and Ashish (2014) found that the associated morbidities in critically sick patient not only pose clinical difficulties to maintain a normal nutritional status but also create various limitations in selection of a particular nutrient. Various diseases commonly found in intensive care patients produces, stress on the body and bring about changes in substrate metabolism thus leading to the deficiency of various nutrients.

From the table 3, it was found that the nutrient intake of the subjects was found to be lower than RDA. High biological value foods such as milk and egg provides protein and fat hence this nutrients were greater than 90 per cent when compared with RDA. Administration of nutritional supplements was also helped to meet these nutrients.

Table 3 Nutrient intake of the subjects

Nutrients	RDA		Mean		Percentage of RDA met	
	Male	Female	Male	Female	Male	Female
Energy (Kcal)	2320	1900	864.17	857.43	37.24	45.12
Protein (g)	60	55	51.75	52.25	86.25	95
Fat (g)	25	20	18.36	18.15	72.6	90.75
Calcium (mg)	600	600	422.41	418.10	70.40	69.66
Iron (mg)	21	21	1.84	3.28	8.76	15.61
Vitamin C (mg)	40	40	10.29	9.82	25.72	24.55

❖ (ICMR, 2011)

Goode *et al.* (2000) found that antioxidant vitamin concentration is significantly low in ICU patients. Anorexia and reduced food intake are characteristics of severe illness. ICU patients are generally unable to ensure the adequacy of their own nutritional intake. Negative nitrogen balance represented the result of massive increases in energy and substrate demand (hypermetabolism) (Michael, 2003).

4.8. Subjective Global Assessment of the subjects

Subjective Global Assessment of nutritional status appears to be simple and co-effective tool for assessing nutritional status of critically ill subjects. This assessment tool is also beneficial for identifying patients with increased risk of nutrition-associated complications as well as death (Rekha, 2013).

Analysis of data pertaining to weight change showed that 39 per cent of subjects had weight loss greater than ten per cent. Analysis of dietary intake of the subjects was showed that 82 per cent of the subjects took blenderised diet and 18 percent were takes soft diet. Physical examination of Subjective Global Assessment included looking out for loss of subcutaneous fat, muscle wasting, oedema and ascites. Loss of subcutaneous fat is present in 74 percent of the subjects, 42 percent had muscle wasting, 37 per cent had oedema and ascites is present in 36 percent of the subjects.

Overall Subjective Global Assessment Rating

The scored Patient-Generated Subjective Global Assessment (PG-SGA) as a nutrition assessment tool in patients. The scored PG-SGA is an easy to use nutrition assessment tool that allows quick identification and prioritization of malnutrition in hospitalized patients (Bauer *et al.*, 2002).

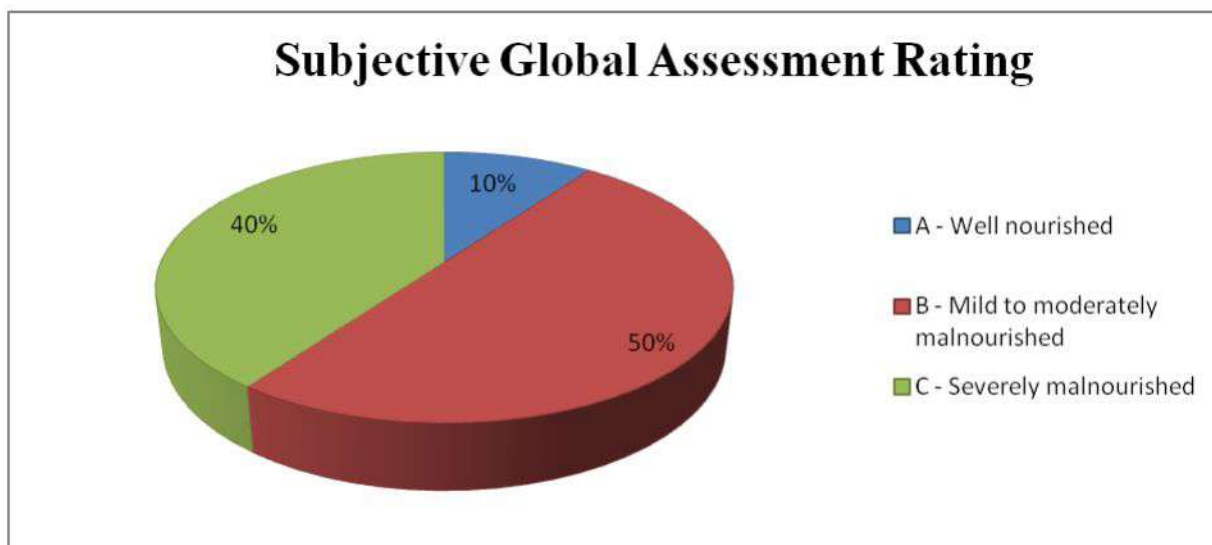


Figure 1 Distribution of subjects based on Subjective Global Assessment Rating

In the Overall Subjective Global Assessment rating, 10 per cent of the subjects were categorized as ‘A’ – well nourished. Fifty per cent were rated as ‘B’- Mild to moderately malnourished and 40 per cent were rated ‘C’- Severely malnourished. The rating of malnutrition was solely based on the recommended parameters for Subjective Global Assessment only. This study revealed that out of 40 severely malnourished subjects, 70 per cent of them were weak and 30 per cent were easily fatigued.

CONCLUSION

MODS patients experienced many health related problems, weight change (loss), lack of adequate food and nutrient intake and abnormality in biochemical parameters. Therefore, these patients were at risk of malnutrition.

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**SHIFTING DOMINANT TERRAINS THROUGH
RESISTANCE: WOMANIST ARTICULATIONS IN
ADICHIE'S PURPLE HIBISCUS**

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ABSTRACT

Postcolonial Literature is built around the concept of resistance as subversion, opposition and mimicry. It particularly focusses on colonized people who attempts to articulate identity and reclaim the past in the face of past's inevitable otherness. Feminism and post colonialism are occupied with the similar questions of representations, voice, marginalization and relation between politics and literature. The recognition of resistance help to locate the implicit urges of women to redefine their self and to survive not in abject passivity but with dignity. The African imaginative construct cannot be devoid from its social context because it is the context that animates it. As a postcolonial text, Chimamanda Ngozi Adichie's debut work *Purple Hibiscus* critiques the violence of Christian religion, colonial forces and patriarchal domination. This novel is a powerful tale of a family in postcolonial Nigeria and explores the growth process of the protagonist Kambili who struggles hard to liberate herself from the totalitarian temperament of her father's home. The paper attempts to trace the growth of the protagonist through the progress of nation. Kambili begins as the teller in the tale and at the end she herself becomes the tale. Throughout the discourse silence is conceptualized as a tool employed by the dominant group to regulate the existence of the subservient group around the margins. Gradually the subservient group attains power and agency in the subversion of the tool. The existential wrangling of African identity is well reflected in this work. Womanism, as a variant of African feminism, provides the platform for a holistic analysis of the works of African female writers.

Key Words: *Resistance, Subversion, Womanism, Feminism, Post colonialism and ,African Identity.*

One of the writer's main function has always been to expose and attack injustice. Should we keep at the old theme of racial injustice (sore as it still is) when new injustices have sprouted all around us? I think not.

- Chinua Achebe

The writings of African literary figures restored the people's faith in themselves and in the rich traditions of the African continent. The most important aspect of African literature is that being postcolonial writing, it is marked by strain of protest. The ever changing reality of life inevitably reflects itself in literature. The status of women all over the world has been undergoing a rapid change in recent times. The women of today has been fighting for recognition in the face of stiff resistance offered by man. Women writers like Flora Nwapa, Chimamanda Ngozi Adichie, Buchi Emecheta, Mabel Segun from Nigeria, Ama Ata Aidoo, Efua Sutherland from Ghana, Mariama Ba from Senegal, Rebecka Njau and Grace Ogot from Kenya and Bessie Head from South Africa are prominent. Their works are intimately concerned with the predicament of heroines who represent African womanhood under the stress of social change.

The modern women writers have been entrusted with the task of redeeming contemporary women from the narrow corridors of customs, traditions, social evils and male dominance. Today in Africa, a woman's writing is paralleled with woman's fighting. The women writers fight for truth, honesty, freedom and equality to complete their mission. This is particularly true of the portrait of women in the works of Adichie. She places her women characters in situations where their values conflict with those of their men and milieu. They show initial patience, meekly undergo suppression and suffer agony caused by male authority. But they break all the chains caused by male authority and constricting traditions of social setup. The characters like Kambili and Ugwa are considered to have a significant place among the new African women. The gender war has become one of Adichie's major themes and her mission obviously is to awake self-consciousness among women.

Literature has proved a worthy tool in interrogating the female condition. The African female writers normally focus on resistance to all forms of patriarchal behaviour. They wanted to generate women characters who can live their lives in the desired way and be responsible for their own livelihoods and future. They hold in high esteem womanist values which promote independence, togetherness and survival. Chimamanda Adichie's *Purple Hibiscus* is a womanist novel which propagates the womanist gospel particular to the

needs of African people and accommodates men, women and children. It looks at the struggles of African women from a holistic angle incorporating racial, cultural, national, economic, sexist and political issues with the ultimate goal of ensuring the survival and unity of all in black communities.

African feminism has been defined as an “abnegation of male protection and a determination to be resourceful and reliant” (Davies, p.561). It is more pragmatic and freed from the shackles of Western feminism; for it does not negate men rather it accommodates them. The mainstream feminism has failed to theorize aspects of the struggles of African women which do not affect white women. For example, white women only face the struggle of fighting for sexual equality in opposition to white men. On the other hand, black women must contend with oppression from their black/African male counterparts while also being suppressed economically, politically and racially by white patriarchal systems along with their men. She therefore calls African feminism “humanistic feminism” because it is dedicated to the total liberation of humanity.

Womanism, a significant variant of African feminism provides the platform for a comprehensive analysis of the works of African female writers. Ogunyemi’s womanist theory is relevant in *Purple Hibiscus*. It is clear that Adichie leans more towards challenging and usurping patriarchy and she is more aggressive in questioning, criticizing and subverting male authority as compared to Buchi Emecheta. Ogunyemi, in her article, “Womanism: The Dynamics of the Contemporary Black Female Novel in English,” asserts that “ the ultimate difference between the feminist and the womanist is thus what each sees of patriarchy and what each thinks can be changed” (69).

Purple Hibiscus can be read as another salvo against colonialism and the attendant patriarchy that has been apprehended in much of West African fiction. The tyrannical Catholic Father is completely predisposed towards Western colonial ideals. His domineering and violent attitude makes him beat his wife and children and these qualities possibly could be considered as part of the end products of the legacy of colonialism. Dawes observes that the novel begins with Achebe’s monumental narrative of a “clash of cultures” as the first sentence in the novel reads “things began to fall apart at home when my brother, Jaja did not go for communion and Papa flung his heavy missal across the room and broke the figurines

on the etagere” (1). The rigid Catholicism of Eugene Achike, immersed in abuse and hypocrisy really falls at the end of the novel.

Adichie belongs to the new generation of Nigerian writers who are rejecting the long silence imposed by dictatorial regimes. *Purple Hibiscus* is the coming of age of the trauma that leads to chaos in a family. It is in the period of trauma the father dies, his son goes to jail and his daughter and wife have to find a way to patch the wounds that will not heal. The work orbits around the life story of Kambili who is courageous enough to tell her experiences at home. This in fact mirrors the state of the Nigerian society; a society governed by patriarchy. The patriarch figure uses his own brand of Catholicism to dominate his family and Achike home is portrayed as a microcosm of the chaotic Nigerian nation.

The evolution of Kambili is womanist in character and her awakening is that of a womanist awakening. The only language that is perfected in the home is that of the language of speaking with spirits and the eyes. Both Kambili and Jaja become masters of this art of speaking. Silence becomes a means used by Achike to maintain his patriarchal control over his wife and children. Within womanist theoretical concerns, Palm Sunday becomes the day that begins the march towards freedom and independence for Kambili, Jaja and Beatrice from the abusive and sexist stance of their father. Likewise it is the trajectory of the transformation of Kambili’s life from the “timid, girlish and voiceless” sixteen-year old to a bold, vocal and enthusiastic woman. Kambili struggles hard to make her mouth function within the totalitarian temperament of her father’s home. According to Okuyade “The protagonist is involved in a crisis with religious and domestic stakes at the beginning of the narrative; she seems to be a mere observer and victim, but as the novel drags towards its denouement, she realizes her voice and role in the home after her awakening”(1).

Adichie is not a writer who dwells in the world of illusion but a writer who is true to the womanist representation and portrayal of life. Achike fails miserably to recognize that there is a thin line between the familial rule and the military rule of the nation. There is the paradox of Achike’s newspaper criticizing the military regime but he does not recognize that he is the symbol of military dictatorship within his home. From the beating of his wife and children, deploying a mechanical and compulsory lifestyle through time tables, insisting his children not to sing Igbo songs, to restricting his children’s relations her sister Ifeoma and others, Achike is becoming a replica of military leadership in the novel.

Kambili's formative years as an adolescent is marked by the wish to articulate several things to her father. But she lacks sociable disposition and emotional expression. Her inability to socialize with her classmates earns her the nickname "backyard snob". In her own words:

But I did not worry too much about that (emphasis mine, that referring to her status as a "backyard snob") because I carried a bigger load- the worry of making sure I came first this term. It was like balancing a sack of gravel on my head every day at school and not being allowed to steady it with my hand (52).

She masters knowledge and adopted several unique ways of studying. Thus Kambili is distinguished from her girlish classmates into a womanish adolescent as she is able to overcome many difficulties she encounters both at home and in school. It is further interesting to note that at the end of the term, she comes out as the topper. This is in fact Kambili's first triumph and an escape from her father's public ridicule.

Another womanist triumph comes through her meeting the inspirational aunt, Ifeoma who symbolizes the womanist vision of audaciousness, outrageousness and willful behaviour. She questions and challenges patriarchal authority and domination within Achike's home and in the country as a whole. Kambili is therefore right in describing her as an ancient forebear of matriarchal power and organization. Ifeoma's home in Nsukka becomes the agent of Kambili and Jaja's metamorphosis in various ways. Every change that occurs in their lives is instigated by Ifeoma's liberalism and fierce character. Apart from teaching and demonstrating to Jaja and Kambili how to laugh and be free minded, Ifeoma also teaches them to sing when they recite the rosary in Nsukka for the first time. When she questions them for not joining in the singing the answer she gets is "We don't sing at home" (125). The piece of information Jaja and Kambili relay to their Aunty is very significant within womanist theory. The Igbo songs are one of the ways of appropriating African culture to Catholicism. The natives sing Igbo songs to affirm their conviction that Igbo is as good as English and the fact that Western culture is not superior to African culture. Achike and Father Benedict's dislike Igbo songs of worship.

Ifeoma decided to educate Kambili through making her read *Equiano's Travels*, a pioneering work of African literature, which deals with the dictatorial, oppressive and inhumane atmosphere that exists within the Nigerian nation and the Achike home. It also

emphasizes the womanist idea of togetherness and inclusiveness in the sense that Ifeoma chooses to thrust a novel written by a male, and not that of a female, into the hands of Kambili. The meaning of Equiano's name is the fundamental crisis of Kambili's teenage years, the fact she does not have a loud voice, cannot speak well and cannot say the words she really wants to say. The novel offers inspiration for Kambili to break forth from her silence. Equiano further becomes an stimulating character for Kambili because he himself, a slave under difficult and inhuman conditions, lived, spoke against and fought for the abolitionist cause. The work also becomes a therapeutic tool for Kambili to gain strength and hope that her father's oppression will come to an end someday.

Like Kambili, Equiano is a Christian whose narrative is full of his belief and trust in God. Kambili therefore acquires two weapons to stand against her father's ill treatment: the spirit to speak out and the hope she has in God in the midst of her traumatic experiences. In contrast to the silence that exists in her life and that of her home in Enugu, Kambili sums up life under Aunt Ifeoma's care in this way:

Laughter always rang out in Aunt Ifeoma's house, and no matter where the laughter came from, it bounced around all the walls, all the rooms. Arguments rose quickly and fell just as quickly. Morning and night prayers were always peppered with songs, Igbo praise songs that usually called for hand clapping. Food had little meat, each person's piece the width of two fingers pressed close together and the length of half a finger. The flat always sparkled. Amaka scrubbed the floors with a stiff brush, Obiora did the sweeping, Chima plumped up the cushions on the stairs. Everybody took turns washing plates. Aunt Ifeoma included Jaja and me in the plate-washing schedule... (139).

Apart from transforming emotional inflexibility of Jaja and Kambili, Ifeoma also influences them ideologically. Adichie, through Ifeoma, gives a history of Jaja of Opobo in relation to colonialism and the fact that Jaja of Opobo did not give in to the demands of colonial authority. The most important detail in the historical anecdote is Ifeoma's view that "Being defiant can be a good thing sometimes" because "Defiance is like marijuana- it is not a bad thing when used right" (143-44). The result of positive side of defiance will begin to rear its head when Jaja questions his father's insistence of converting his grandfather, Papa Nnukwu to become a Christian. As a religious liberalist, Ifeoma encourages Kambili and Jaja not to regard Papa Nnukwu as a heathen but as a traditionalist.

Adichie places Amaka as a contrast to Kambili from the initial stages of the story to make the readers realize the transformation that takes place in Kambili's life. Amaka is a girl-womanist whose views on African culture are as mature as her mother's. She influences Kambili with her culturally conscious music. By intentionally choosing to listen to indigenous musicians as opposed to foreign musicians, Amaka is used by Adichie to make an appreciation for black culture. She believes that despite the corruption and lack of development, all Africans should stay in their countries and strive to make it better rather than migrate to greener pastures. Amaka is a culturally womanist character, who prefers Igbo names such as *Chiamaka* (God is beautiful), *Chima* (God knows best) and *Chiebuka* (God is the greatest) and refuses to take an English name for her confirmation despite pleas from her mother and father Amadi.

Adichie employs a rhetorical device through which she interrogates the Nigerian socio-political situation as part of womanist critical discourse. Kambili continues to search for her voice, likewise, Nigeria also continues her search for self-definition and nationhood. Wole Soyinka describes the silent spaces where the Nigerian people continue to be subjected as the art of stealing a nation's "most precious asset – its voice" (8). The novel displays the imperceptibility and insensitivity of government to the plight of the people who continue to stumble in poverty and oppression. The people are subjected to different forms of subjugation, ranging from poor supply of potable water, unstable power supply to the shortage of petroleum products. They protest their deplorable plights through industrial actions and demonstrations of different forms.

Achike's sexist oppression of his wife functions within a dominant patriarchal system. The process of "Othering" by Achike is carried out in a subordinating way that shows disregard for the basic humanity of his wife. The chasm in the economic status and power between Beatrice and Achike consolidates the patriarch's control and power. Achike causes Beatrice to experience three miscarriages. She laments to Ifeoma as she turns to Kambili, "You know that small table where we keep the family Bible, nne? Your father broke it on my belly"... "My blood finished on that floor even before he took me to St. Agnes" (243). Beatrice is less treated as a human being and a woman. Ifeoma on the other hand is an example of a woman whose role is multifaceted outside of marriage. She freely express her opinion on critical issues without mincing her words and rule her family as well. Women for her are not mere reproductive vessels but human beings.

The poisoning of Achike by his wife is not a sign of cowardice but a realization and utilization of her strength, a woman's strength. Beatrice on the other hand also realizes that she is the one who supervises everything that has to do with food within the Achike home. Eugene's death is no coincidence within womanist theory because bad men are sometimes eliminated in womanist novels so that men and women can live together harmoniously (Ogunyemi, 75 – 76).

Purple Hibiscus explores the issues of ethnic tensions and political unrest in Nigeria as parallels for coming of age and issues of identity definition. The allegory between personal and national identity elevates this story from a typical narrative of adolescent into a thoughtful analysis of the formation of self. The youth of Nigeria are tasked with rebuilding the nation, depopulated after a destructive war. Kambili and Jaja are allegories for burgeoning post-colonial Nigeria, which must also face an adolescent-like emergence into an identity separate from its colonial roots. Kambili and Jaja are bombarded by opposing forces: indigenous and colonial, Pagan and Christian, Nigerian and English, familial loyalty and individual identity. Eugene is the consummate colonizer, seeking to establish order within his family. Any individual or nation attempting to navigate a new identity must first come to terms with its past. Papa-Nnukwu represents indigenous culture specifically that of Igbo land. He is the only one who practices Igbo cultural traditions. It is this culture, combined with the colonizing culture that has created the sibling futures of Nigeria that Eugene and Ifeoma, represent: autocracy and democracy.

However, as Kambili enters her adolescence and incipient womanhood, she begins to shape her own identity. She has begun to explore her history. Like any colonizing country's attitude to the people under colonial rule, Eugene assumes that the needs of his children are the same as his own. He does not consider that their needs may be unique and uniquely suited to their circumstances. Eugene acts almost in the capacity of a feudal king, whose law is absolute and whose reign, at least in Kambili's eyes, is both immutable and eternal. Kambili never considers that a change in regime will come. She never considers "the possibility that Papa would die, that Papa could die . . . he had seemed immortal" (287). Eugene's authority and social standing represent the regime change of imperialism. His murder at the hands of his wife represents another sudden regime change, the overthrow of colonizing powers.

When Eugene represents Nigeriathrough the failed goals of colonizing Europe, Father Amadi is one of the imagined futures of Nigeria, representative of the ideal of Nigerian unification. He has successfully blended the colonizing culture with the indigenous one. His songs of praise are sung both in English and Igbo, and he is less bound to European Catholic tradition than Eugene. Ifeoma is representative of the democratic option for Nigeria's imagined future. It is a future where all people, regardless of ethnic group, religion, or gender, are allowed to have a voice. Although Ifeoma and Eugene share the same blood, they represent wildly divergent styles of rulership: Eugene, the somewhat tyrannical imperialism; Ifeoma, the modern Western democracy. Kambili and Jaja must choose from among the potential futures available to them. Their choice will solidify burgeoning identities. Ifeoma's style of parenting is represented by the flowers in her yard, which are the namesake of the novel: the purple hibiscus. Upon first sighting the flowers, Jaja is strangely drawn to them:

"That's a hibiscus, isn't it, Aunty?" Jaja asked, staring at a plant close to the barbed wire fence. "I didn't know there were purple hibiscuses." Aunty Ifeoma laughed and touched the flower, colored a deep shade of purple that was almost blue. "Everybody has that reaction the first time" (128).

According to Freud, "unhomely" is "that class of the terrifying which leads back to something long known to us, once very familiar" (1-2). Applying Freud's theory of "unhomely" to postcolonial fiction, Bhabha says that "unhomely" means "the estranging sense of relocation of the home and the world" (44), a place where "the borders between home and the world become confused" (9), and amalgamation of private and public leads to "a vision that is as divided as it is disorienting" (9). Bhabha uses the concept of the uncanny to characterize the post-colonial experience. This is relevant when the experiences of childhood that have once been repressed return to disrupt our everyday existence.

The paper also attempts to apply the concept of 'unhomely' and 'uncanny' to the conditions in the household of Eugene. He makes the life of his family members miserable by making them follow his false ideals. The home thus becomes 'unhomely' under the control of Eugene, who is conflicted in the confrontation of his native self with his projected self. His inherent goodness is in conflict with the induced values developed as a direct influence of his colonial education. This gulf between the once familiar values (his African

roots) and the assimilated unfamiliar values (acquired through education) evokes the sense of uncanny in him.

The life of children and mother in the home under the domination of Eugene parallels a situation where oppressive national histories express themselves in domestic spaces, converting the home into an 'unhomely' space where the family does not feel safe. They have internalized a sense of estrangement from Eugene due to the colonial influence on him. In Eugene's home, there are many parallels to the state of affairs in the country. The members in the house apart from Eugene are not allowed to express their feelings or opinions. Like the colonial masters, Eugene takes it upon himself to make every decision about the fate of the residents of his mini-republic. From religion and politics to their daily routine, everything is decided by the tyrannical man. Kambili, Jaja and their mother Beatrice try to adhere to the norms set by the whimsical father based upon his distorted readings of Christianity.

Inside his domestic space, Eugene loses the veneer of civilization and reverts back to a savage state quite unfamiliar to the outside people. However hard he tries to disown his roots, he cannot rid himself of them. The native part of his 'self' which he tries to subdue and dispossess surfaces at the most unexpected moments. Caught between this confusion of familiar and unfamiliar, even his goodness is at war with himself. His charity and social service show that he is a person who believes in basic goodness and humanity. However, like other aspects of his behaviour, this goodness too is reserved only for the Christians. Even his father is left untouched by the generosity he exhibits for Christians.

CONCLUSION

African literature has been enriched by the voices of women expressing their concerns. Adichie's *Purple Hibiscus* aptly portrays womanist aspirations and values. She is committed to the womanist goal of survival in the patriarchal culture. She imbues her female characters with strength, resilience, and courage while undermining patriarchal authority. Womanist hope permeates her agenda as Kambili, Jaja and Beatrice get another opportunity to begin their lives anew, afresh; it is in fact their rebirth. Ogunyemi's womanist theory regards the freedom of women through a meaningful union between black women, black men and black children. It also encourages men to change from their sexist stand. Likewise Adichie remains committed to the unity and survival of African race under one umbrella.

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AN ECONOMIC OUTLOOK ON ENVIRONMENTAL SUSTAINABILITY IN KERALA: AN APPRAISAL

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ABSTRACT

The Kerala Model of Development has gained global attention due to its major achievements in the state. Kerala has achieved high literacy rate, low infant mortality rate, high life expectancy, high standard of living; Kerala has attained economic growth and is still progressing. Kerala is the only state which has reached the third stage of demographic transition while India being still at the second stage. Kerala has achieved great standards in all fields comparatively with the national canons. Environmental sustainability includes the improvement of essential ecological processes, biodiversity and natural resource base. In the process of economic growth, the degradation of the ecosystem is inevitable. Environment is considered as a public good and the two main features of a public good are non-rivalry and non-excludability. Because of this, environment confronts the 'free-rider' problem and also leads to market failure. Unsustainability in the form environmental degradation, deforestation, water scarcity, ground water depletion, energy crisis, pollution, food scarcity, use of chemicals and fertilizers etc. can be seen widely. Kerala, a resource-rich state, face these dilemmas and lack of awareness among the people regarding the future consequences of mismanagement also adds to the cause. The deterioration of environment ultimately affects humans itself and it is our sole responsibility to conserve and protect the environment. Economists have put forward many methods and solutions for environmental sustainability. Conservation and efficient utilization of resources is necessary for socio-economic growth and ecological sustainability.

Hence, this paper reviews on the recent major developments in Kerala and its environmental impacts on the economy. This paper will also highlight the policies and programmes implemented for protection of ecology and will also throw a light on the environmental movements in Kerala.

Keywords: *Sustainable development, resource, ecology, economics, environmental movements.*

INTRODUCTION

The concept of sustainable development is an approach to development that brings forth an awareness of the environmental, social and economic limitations in an economy. According to the World Commission on Environment and Development, “*Sustainable development seeks to meet the needs and aspirations of the present without compromising the needs of the future generation to meet their own needs*”. This definition contains two key concepts: essential ‘needs’ of the world poor must be given priority and ‘limitations’ must be imposed on technologies for environmental stability (www.un-documents.com).

The first aspect of ‘needs’ relates to socio-economic development while the second aspect of ‘limitation’ relates to ecological development. The four main factors that determine sustainable development are: Natural capital, physical capital, social capital and human capital. Sustainability is achieved when the total stock of these assets increases or remains constant. Since natural capital and social capital are public goods, these are always undervalued (Véron, 2001).

The main emphasis of the sustainable development concept is on the relation between natural and produced capital. It can be widely observed in the Organization for Economic Co-operation and Development (OECD) countries, for instance. They have considered the introduction of price incentives and market-based measures like environmental taxes, emission permits etc. guided by the ‘polluter-pay-principle’. But for the developing and less-developed nations, these instruments tend to be ineffective as a result of failure to control environmental standards and market failure to give right price signals.

For developing nations, sustainable development is possible via local-level advocacy and community participation as local people depend on their immediate surroundings for their livelihood and hence, an inclusive participation can bring forth sustainability (Véron, 2001). Sustainable development cannot be achieved by implementing policies only. The society and the citizens must initiate profound changes in thinking, in social and economic structures and in consumption and production patterns for attaining a sound and sustainable ecosystem (www.ec.europa.com).

Sustainable Development In Kerala

Kerala, which is referred to as 'God's Own Country', is a state in the south-west region of India on the Malabar Coast. Kerala is rich in biodiversity with unique ecosystems like wetlands, mangroves, marine resources etc. The Western Ghats region, where the state is situated, is one of the 25 biodiversity hotspots in the whole world which contains varied species of flora and fauna (www.kerenvs.nic.in).

Kerala is known for its unique development pattern. According to 2011 Census, the decadal rural population has declined by -25.96 per cent constituting 52.3 per cent of rural populace as against 74.04 per cent in 2001 while the decadal urban population has increased by 92.72 per cent constituting 47.72 per cent of urban populace. Kerala tops in sex-ratio and literacy rate as against the corresponding national average. The overall sex-ratio is 1084 females per 1000 males and the literacy rate is 93.91 per cent as against the national average of 940 females per 1000 males and 74.04 per cent respectively (www.kerala.gov.in). This kind of exclusive development and accomplishments through participatory public action is known as the 'Kerala Model of Development'.

The growing urban population shows the increasing rate of urbanization in the State. Urbanization is a significant aspect of the process of social and economic development and but is also connected to many dilemmas like the increasing rural-urban migration, costs of service provisions, provision for basic amenities like housing, water supply, sanitation, drainage, transport, power etc. (www.townplanning.kerala.gov.in).

Urbanization leads to growth of economy as a whole but with serious consequences, taking into account, its effect on the environment. Urbanization paves way for economic development on one hand and environmental degradation on the other hand. This situation can be linked to the Pareto Optimality Criterion in Welfare Economics which states that "*no one can be made better-off without making someone worse-off*". In this context, for the expansion of an economy, environmental sustainability must be hampered, to an extent.

Urbanization paves way for industrialization which has a positive impact on the public regarding generation of employment opportunities, use of sophisticated technologies which are time and cost efficient, changing consumption and production patterns, high standard of living of the people, advanced modes of transportation, new products, redesign of products, material substitution, changes in food processing and packaging methods (*Fobil*

and Hogarh, 2007). But all these factors of economic development hinder the growth of a sustainable ecology.

Mounting Menace of Garbage

The result of urbanization and industrialization is the emergence of different kinds of wastes which is one of the mounting problems in Kerala. Heaps of wastes along road sides and in open spaces are a common view in the State. Though Kerala is advanced in all major sectors and even ranks top (0.854) in Human Development Index, when it comes to the management of wastes, Kerala stands at the bottom (*The Hindu, 2013*). Piles of plastic wastes and municipal solid wastes can be seen in many parts. Kochi city in Ernakulam district, which is known as the industrial capital of Kerala is one of the most highly populated city and hence, the generation of municipal solid wastes is also high. People dump household wastes in neatly wrapped plastic bags in public places. The city generates huge volumes of waste and tonnes of it can be seen piled up in different parts of the city.

The most common method of management of wastes adopted in Kerala is landfilling and incineration. Though many waste treatment plants have been setup, its functioning is inappropriate. The capacity of some waste treatment plants is very limited compared to the wastes generated in the respective area. According to *Ahluwalia and Tiwari (2013)*, all five Municipal Corporations in the State have waste processing plants, but only 27 out of 60 Municipalities have such plants. In order to curb the growing menace, the State Government has made it mandatory for hotels, hospitals, all commercial establishments, markets etc. to treat the wastes generated on their own in a safe manner.

Stringent penalties are said to be imposed on those who litter and dispose waste in open areas and water bodies. Even placards and boards are positioned along roadsides and public places with warning signs of levying fines and even imprisonment for those dumping wastes, but what can be seen is that around these placards itself, the wastes are found in heavy quantities and not even a single action has been reported to be taken against anyone.

Disposal of wastes on water bodies is widely prevalent in the State tampering the scenic beauty and also adversely affecting the marine resources. Be it public ponds or drains, water bodies are filled with all sorts of garbage. The rivers of Kerala are highly polluted from the industrial and domestic waste and from the fertilizers and pesticides from

agriculture. The river Periyar and Chaliyar are pure examples of marine pollution in the State due to industrial effluents (www.kerenvis.com).

Hence, the present situation of Kerala with regard to waste generation is heinous. It destroys the scenic beauty and greenery of the State. Disposing garbage in open places puts forth a breeding ground for mosquitoes, flies and stray animals will scatter the trash affecting the society's welfare. Such a breeding ground also leads to occurrence of various epidemics. Incineration of wastes emits poisonous smoke into the atmosphere causing deterioration in the quality of air.

Mismanagement of plastic and electronic wastes will have adverse effects on the environment in the long-run. Plastics refuse clogs the drainage system causing water stagnation. Electronic waste or e-waste, when disposed-off in a corner without proper handling leads to leakage of poisonous substances like lead, mercury, cadmium etc. which percolates down causing ground water corrosion. In this manner, the dilemma of waste hampers environmental sustainability in Kerala. Though many laws, policies and programmes have been implemented for management of wastes, the problem still persists.

Groundwater Exploitation

Groundwater is a vital resource for people in Kerala for meeting the domestic needs of more than 80 per cent of rural and 50 per cent of urban population, besides fulfilling the irrigation needs of around 50 per cent irrigated agriculture. The ease and simplicity of groundwater extraction has an important role in its development and exploitation.

The groundwater capacity in Kerala is very low compared to other States. Deep bore-wells and open wells are main source of extracting groundwater. The receding groundwater levels and drying up of open wells are common features in Kerala due to which people suffer from water scarcity (www.kerenvis.nic.in).

Groundwater quality problems in Kerala are mainly associated with human activities, industrial effluents and solid wastes. Groundwater issue in coastal regions of Alappuzha and Palakkad districts are mainly due to high salinity, water harness, low pH values, high iron content etc. In Ernakulam and parts of Palakkad, Kollam, Kannur and Kozhikode, groundwater pollution has been testified due to industrial pollution. The waste landfills are also causing severe distress to the groundwater quality (www.indiraps.blogspot.in).

Many concerns regarding groundwater depletion and exploitation have emerged. The major issue that attracted international attention was the Plachimada case in 2002. People, especially the tribal women protested against the opening up of Coca Cola bottling plant in Plachimada, Palakkad district of Kerala. The protest started demanding the closure of the plant alleging the misuse of local water resources by the Company. The over-use of groundwater from the bore-wells than permitted by their license as well as the ejection of poisonous waste substances back to the groundwater caused depletion of groundwater and also severe health problems to the local people (*Stainer, 2010*).

In Kollam district, a test conducted by NDTV in 2014 in the water accumulated in a paddy field from a nearby metal industry found acidic presence. People living nearby have been suffering from, almost a decade of toxic waste from the plant contaminating their ground water. The public had major health issues like breathing problems, skin diseases and even cancer (*www.ndtv.com*).

The fertilizers and chemical pesticides that are used in agriculture percolate down to the water table causing groundwater contamination (*Shaji, 2011*). Endosulfan became an extremely controversial agro-chemical due to its severely toxic nature. Reckless use of this pesticide led to ecological problems like soil and land degradation, pollution of soil and rivers (*www.endosulfanstudy.blogspot.com*).

Energy crisis

Acute shortage of power is widely experienced in Kerala mainly due to accumulative demand for electricity. The per capita power consumption in the State has shown significant increase with respect to industrialization and heavy use of electrical household appliances. The demand for power is rising at a rate of 10 per cent per annum due to which the Kerala State Electricity Board (KSEB) has to purchase power from other States at a much higher tariff leading to financial crisis. If this situation persists, then Kerala would require approximately 6000 Mega Watt (MW) of electricity by 2020-21 as against the present demand of more than 3200 MW (*Save Power show, 2013*).

Kerala is mainly dependent on conventional energy sources such as coal, diesel, gas and hydro energy for power generation and only 4 per cent of the total installed plant capacity is based on renewable resources (*Hegde and Ramachandra, 2012*).

In Kerala, hydel power generation commenced with the commissioning of Pallivassal Hydro Electric Project in 1940. The wind farm situated at Kanjikkode with an installed capacity of 2.025 MW is the only plant utilizing the non-conventional energy source. The Brahmapuram (106.6 MW) and Kozhikode (120 MW) Diesel Power plants use Low Sulphur Heavy Stock (LSHS) fuel and are owned by KSEB. Kasargod Power Corporation Limited (KPCL) uses naphtha-based plant to meet demand for power (20.44 MW). The other plants catering to the needs of power demand in the State are the Bombay Suburban Electric Supply (BSES) Limited, Kochi plant (157 MW) and the Kayamkulam plant of NTPC (359.58 MW).

Kerala has been utilizing hydel power as it is non-polluting and economical. But the declaration of Forest Conservation Act, 1980 restrained the construction of more hydel power plants in the State (*Nair, 2007*) and environmental objections raised against hydel power generation also stopped further development of hydro power. For instance, the Silent Valley Project was denied clearance on environmental grounds. The State's plan to generate hydro power by constructing dams across the Kunthipuzha River would have led to draining of the Silent Valley watershed and also one of the biologically and genetically rich wet evergreen forests across the world would have been destroyed if a campaign against the cause was not launched (*George, 2000*).

Due to increasing population, demand for power also shot up which led to dependency on thermal power, though it was expensive (coal transport) and caused eco-hazards. Failure of the monsoons further led to deficiency of the hydel power generation, leading to augmented importation of thermal power. This, in turn, caused the electricity costs to rise. But even though the State is experiencing power crisis, it is astounding to note that all the villages in the State have access to electricity and the percentage of households using electricity is 84 percent (*Nair, 2007*).

Deforestation and Land Degradation

Deforestation involves the permanent destruction of indigenous forests and woodlands (*Eugine, 2004*). The increased pressure on land due to high man-land ratio and need for scarce resources to fulfil the unlimited wants of the public has led to forest encroachment. Since scarcity of land is an emerging problem in the State, people have started to poach forest areas for their living and housing. There are other forms of human

interventions like mining, quarrying etc. which again leads to further land modifications and corrosions such as soil loss, landslides and floods. This adversely affects the biophysical system and hinders green sustainability.

High population demanded growing need for housing and urban infrastructure. With the advent of urbanization, small-scale and large-scale industries boomed in the State necessitating land for which paddy fields were converted for the purpose. Changing aspirations and living standards with cumulative education levels also had an effect on land use. The disintegration of traditional joint family system to nuclear family led to division and fragmentation of large land holdings.

The most crucial alterations in the land-use pattern were the declining area for food production and accelerating deforestation. At the time of formation of the State, the total area under cultivation of the dominant crop rice was 2 million hectares which declined to 7, 53, 009 hectares in 1961-62 and further fell to 2, 75,742 in 2005-06. During the same period, rice production also declined from 9, 88, 150 tonnes to 6, 29, 987 tonnes. Later, there was shift from food crops to commercial crops agriculture which had severe implications on the food security of the State. From staple food crops like rice and tapioca, Kerala's agronomy shifted to tree crops like rubber and coconut and also export-oriented crops such as pepper, ginger, coffee, cashew which made the State dependent on other States to meet more than half its food requirements.

Hence, rising population and accumulating demand for food, clothing and shelter, increasing commercialization of agriculture have ensued in over-exploitation of land in the preceding and current century. This has resulted in many natural disasters such as floods, droughts, landslides, soil erosion, salinity etc. reducing the productive capacity of land and also distressing the ecosystem unfavourably.

Destruction of wetlands, ongoing paddy conversions, disruption of backwaters and excessive sand mining have further deteriorated the ecological sustainability in Kerala. Human intervention with the aim of economic development led to obliteration of wetlands and conversion of paddy fields on a large-scale. Infrastructure development in the form of roads, railways and airports caused huge loss of wetlands and paddy fields (*State of Environment Report – Kerala, 2007*).

The latest instance regarding the illegal conversion of paddy fields and wetlands for infrastructural development is the construction of Aranmula International Airport in Pathanamthitta district. But the National Green Tribunal has cancelled the environmental clearance provided to the project that could have brought ecological damage (www.downtoearth.com). It was reported in *The Hindu* (2013) that more than 1400 trees had been chopped down for various developmental purposes and in dangerous situations. The Social Forestry granted permission to the FACT Cochin division to remove 101 trees situated along their company wall. For the latest infrastructural development activity of the construction of Kochi Metro Rail, the Delhi Metro Rail Corporation got the permission to cut down 48 trees for construction progress.

Thus, overlooking the issues regarding environmental sustainability in Kerala, it can be said that the ecological viability and sustainability is deeply vulnerable and is unsustainable.

Economic Theories on Ecological Sustainability

Economics studies resource getting and resource using activities of human beings in the environment to ensure general welfare to the society at large. Hence there is a strong relationship between environment and economics. **Environmental Economics** is defined as that part of economics which deals with the inter relationship between environment and economic development and studies the ways and means by which neither is the former impaired nor is the latter impeded.

The most imperative concept related to ecological efficiency is the perception of **Sustainable Development**. When the World Commission on Environment and Development presented their 1987 report, *Our Common Future*, they sought to address the problem of conflicts between environment and development goals by formulating a definition of sustainable development. It is defined as the development that aims to meet the needs and aspirations of the present without compromising the needs of future generation.

Economic activities deteriorate the ecology and create externalities. **Externalities** are defined as third party effects arising from the production and/or consumption of goods and services for which no appropriate compensation is paid. Externalities causes market failure if the price mechanism does not take into account the full social costs and social benefits of production and consumption.

Another theory linked to the degradation of environment is the theory of public good and **Common Property Resource**. Environment is considered as a **Public good**. The two main features of public good being non-excludability and non-rivalry leads to further degradation of environment. Any resource or property, whether material or non-material, used by every individual in the society for the benefit of one and all without having any characteristic of private ownership is known as common property resource. A public good acts as a common property and environment being considered as a public good leads to common ownership because of which everyone intends to use or exploit the resources according to their needs and requirements.

Weakening environmental quality can be linked to the notion of **Tragedy of Commons**, propounded by Garret Hardin. Environment is the modern equivalent of “commons”. It cannot be reduced to private ownership. When the services of these commonly used resources are provided at zero prices and there are no other restrictions on entry or use, it will be over-used and exploited which will ultimately lead to quality degradation.

Since environment is considered as a public good, the **free-rider problem** also arises. In this scenario, the individuals may well use the good, but may not be willing to contribute to the cost of production. Hence the problem of assessing the marginal valuation arises (*Eugine, 2004*). Dumping of garbage in the open space, along road sides, water bodies etc. affects the scenic beauty, provides a breeding ground for flies and insects causing severe epidemics and obstructing the welfare of the society. This occurs due to the free-rider problem.

A report titled **Limits to Growth** published in 1972 brought the message that the world was heading for disaster because of alarming population growth and industrial expansion leading to exhaustion of stocks of natural resources, environmental destruction and food scarcity (*Eugine, 2004*).

According to (*Eugine, 2004*), Environmental Economics mainly builds its theoretical foundation on **Welfare Economics**. It mainly relates to welfare of the society and deals with the interface between man's environment and his development. Welfare Economics explains the conditions for optimal allocation of resources. The Italian economist Vilfredo Pareto gave the **Pareto Optimality Criterion** which states that ‘no one can be made better off

without making someone worse off". In this context, economic development is possible only by degrading the environment to a considerable extent. Economic development and environmental deterioration acts like two sides of a same coin.

In Micro Economics, a positive network externality exists if the quantity of a good demanded by a consumer increases in response to growth in purchase of the good by other consumers. **Bandwagon effect** is a positive network externality which means the desire to be in style or fad because everyone else possesses the good. For instance, people might buy a new electronic product because of its fame, regardless of whether they really need it or can afford it. This adds to the mounting problem of e-waste as people will dump their old working electronic gadgets for the new ones causing ecological distress.

Implementation of Policies and Programmes for Environmental Fortification in Kerala

Many policies and programmes have been initiated and implemented by the State Government for various issues pertaining with respect to environment deterioration in Kerala.

With regard to management of waste, many programmes have been introduced, the most prevalent one being the **Suchitwa Mission**. The main objective of this mission is sanitation for all; overall hygienic development, comprehensive scientific waste management systems, community participation and waste reduction at source (www.sanitation.kerala.gov.in).

A campaign called **Clean Kerala Mission** started by the Kerala Government in 2003 with the aim of waste-free, hygienic and environmentally clean Kerala. It takes the notion of zero waste principle which targets waste reduction, reuse, recycling and resource recovery.

The first **Zero Waste Programme** in the nation was launched in Kerala in November 2001 at Kovalam which included the principles of effective human and material resource utilization in a manner that refresh the local economy (*Nair and Sridhar, 2005*).

Kerala Government observed one year as **Malinya Vimukhta Varsham** from 2nd October, 2011 to 30th September, 2012 to spread awareness among the public on cleanliness, disposal of waste at source and on improving facilities for waste management.

The Kochi Metro has taken a great step forward to make a sound green ecology by planting 2000 plant saplings in educational institutions and has decided to extend the green drive throughout the Metro alignment. Kochi Metro is also planning to create ‘**Metro Gardens**’ with medicinal plants and fruit bearing trees (*www.kochimetro.org*).

The **Haritha Keralam Programme** has been launched with the objective to grow one crore trees outside the forest area with the help of all the 999 Grama Panchayats of the State to minimise the harmful effects of pollution by increasing the forest cover (*www.jurionline.com*).

The **International Coastal Clean-up** day is observed every year in the month of September across 152 nations for cleansing canals, beaches and lake. In India, the campaign was held at Fort Kochi in Ernakulam district on September 20th which was organized by the Coast Guard. About two truckloads of waste were collected from the Fort Kochi beach and were transferred to the municipal dumping ground (*The Hindu, 2014*).

A Review on Environmental Movements in Kerala

Many movements have been launched for conservation of environment by environmental activists, NGOs and Adivasis in Kerala.

The construction of a dam for hydro-electric project across the **Silent Valley** in Palakkad led to protest by the local people. The dam site consisted of 8952 hectares of forests which is one of the virgin forests in the country with abundant species of flora and fauna. Environmentalists were of the opinion that the deforestation in Silent Valley would jeopardize the ecological balance and would cause climate change affecting Kerala entirely and even outside by waning rainfall. The uproar created by the public was so high that the State Government promulgated an Act – the Silent Valley Protected Area (Protection of Ecological Balance) Act, 1979 to protect the bionetwork of the area. Later, the State Government declared Silent Valley as a National Park in 1985.

The **Mullaperiyar Dam** constructed in 1895, with a life-span of only 50 years, stands in a critical situation after 111 years. This is an ongoing row between Kerala and Tamil Nadu, as there was a lease agreement between the two in 1886 to supply water to the latter for a period of 999 years. Tamil Nadu’s demand to raise the water level of the dam led to agitation by the public of Kerala of protection of the dam. The State Government has

proposed to build a new dam for water provision to Tamil Nadu and also to remove fear from the minds of Kerala public.

The **Chaliyar** agitation was raised in 1998 by the people of Kozhikode against the Gwalior Rayons factory at Mavoor which was causing air and water pollution. Under the leadership of K. A. Rahman, 7000 villagers backed him and marched to the factory gates demanding immediate closure of the plant. By 2000, the Kerala State Pollution Control Board closed the plant.

The movement against spraying of Endosulfan in Kasargod District was another environmental protest. The spraying was started in cashew plantations in 1976 by the Plantation Corporation of Kerala. The spraying continued for 25 years until it was stopped in 2001 after a tremendous public and media pressure and intervention of the courts. A study was conducted by the Centre for Science and Environment highlighting the impacts of Endosulfan poisoning and the Union Agriculture Ministry banned it in the State.

The movement against the Coca Cola plant in 2002 which was exploiting and polluting groundwater resources at Plachimada in Palakkad District was another successful ecological movement in Kerala. The plant released the effluents without treating into the groundwater creating water crisis. The movement attracted international attention and later, the plant was closed down (*www.jurionline.com*).

CONCLUSION

Economic development is very crucial for the growth of a nation. We can see that globally, economic development and environmental degradation go hand-in-hand. The growth of a nation must be in such a way that the human activities involved for the purpose must be conducive to the present and future generation. Without ecological deterioration, economic growth is not possible. The use of natural resources is necessary for the overall developmental activities. Its use must be in an effective mode propounding sustainable development. Resources must be utilized without over-exploiting it and also without wastage of resources. Hence, the conservation of natural resources and ecology is essential for a sustainable and green future.

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A TESTIMONY TO THE GANGA REJUVENATION

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ABSTRACT

The Indo-Gangetic plain has witnessed the blossoming of India's great talent. But the River Ganga which flows through it now stands exposed to various forms of degradation. To clean up river Ganga, is a Herculean task. One major pollutant factor is the sewage from the houses on the river-side villages and towns. The solution is to modernize the sewage plants and to use modern scientific routes that are available to re-cycle the water and use it for irrigation of farms. An intensive campaign should be done to persuade the villagers to plant trees as it will help to salvage our environment in many ways. And also in future, it will provide wood for funeral purposes as its scarcity is compelling the people to throw the dead body to the river Ganga and making situation terribly worse.

INTRODUCTION

The River Ganga occupies a prestigious and revered status in the cultural ethos of India. It served as the cradle of Indian culture & civilization. It is believed that the river was brought to earth from heaven by the perseverance and prayers of King Bhagirath for the salvation of his deceased ancestors. From time immemorial, the Ganges has been India's river of worship, devotion and faith. People believe its water to be sacred and treasure it as "holy water". It provides us a glimpse of blooming up of great creative talents, traditions and culture.

Rapidly escalating population, rising living standards and exponential proliferation of Industrialization & Urbanisation has exposed the water resources to variegated forms of degradation. The river of great worship has turned into a mere water body carrying a big mass of all the wastage that the human beings have contributed. It is indeed a Herculean task to clean up Ganga which is the worst hit by dreadful waste dumping.

Ganga Rejuvenation

Ganga rises in the southern slope of the Himalayan ranges, from the Gangotri glacier and flows down to Diamond Harbour, West Bengal. It has a catchment area of 8, 61,404 sq.km in India constituting 26% of the country's land mass and supporting about 43% of population. It passes through the states - Uttarakhand, U.P., Bihar, Jharkhand and W. Bengal. About 47% of the total irrigated area in India is located in the Ganga basin alone. It is also a great life support system for the Indians. The Upper portion of the River Ganges is utilized for generating hydro electricity & as it enters the plains huge stream of the flow is abstracted for irrigation and drinking purposes, industries etc. In spite of this vast consumption, what it spews is large masses of waste which ultimately makes the water taint.

Present Scenario

In the recent past there has been a swift enhancement in urban, Peri-urban or the rural areas in the fringes of river Ganga. This has transmuted it as a stream of water to a channel accepting and transporting sewages of the modern affluent society.

The industries that are flourishing swiftly on the banks of river Ganga are the major carriers of sludge loaded with chemicals. The mushrooming tanneries in this area release chemicals like chromium causes great peril to the environment. Much of the trash is not treated and they are dumped into the river. These hazardous industrial scrap endangers the mere existence of human beings, flora and fauna etc.

The domestic garbage thrown directly into the river by the household dwellings on its banks are also a major menace to the health of the river. People very often use the river for bathing washing clothes & other ritualistic activities which destroy the purity of the river big cities like Kanpur & Varanasi must be discharging hundreds of tons of untreated sewage. The pilgrims visiting the banks of Ganga worship the river as Goddess and perform 'puja' and give offerings. The river itself has the power to clean itself along with its flow. But the dumping of wastes has now reached its extreme form that the 'holy' river has become a bane rather than a boon. The vivid fact is that these urban areas are not really catching up with the infrastructural facilities to build conventional sewage networks at the required scale & pace

and contribute to piling up of wastes. Slow crawl in implementing the process of waste management makes the situation more and more vulnerable.

According to Hindu beliefs the dead body of a person should be returned to the Five Elements, soon after death. The most acceptable method is to cremate the body in the funeral pyre and the age old practice is to use mango tree wood for this. The trees on the 'Gangakinarewala' villages have all been used up. The wood have become too costly & in acute shortage. So the poor villagers give the body of their elders to the Ganga, and condone the act as a way for 'Moksha'. So the half-burnt and un-burnt human corpses thrown into the river makes the river malicious.

Moreover rampant deforestation results in top soil erosion, increasing the sludge deposits, which gives way to devastating floods in rainy season and stagnant flow in dry climates. It also paves the way for high atmospheric temperature and less oxygen in the air.

Another major pollution is from agriculture involving residues of harmful pesticides & fertilizers. Adding fuel to the situation, a plethora of irrigation projects going on the banks of the Ganga River. The untenable fact is that though these are for good causes which foster food security, yet it boomerangs into it as debris, and thus polluting the original pure form.

Government's Action Plan

Tackling this problem has been a serious headache for all the successive governments in India. Ganga Action Plan I (1986) & Ganga Action Plan II (1993) stood for the cause. Yet, River Ganga remains polluted. Sewage system also developed under Jawaharlal Nehru Urban Renewal Mission (JNNURM). Even the sewage treatment plants (STPs) built is not working because of lack of enough electricity to operate it & lack of sewage that reaches the plant for treatment. Moreover, lack of proper funds and political will has backfired in the clean Ganga mission from the part of government and the people.

Resolution Ahead

The panacea to get rid of the daunting situation lies in the hands of the government and the people who are the end users of the river. An innovative idea for controlling pollution

and to save this valuable treasure of India is essential. The old and congested cities on the banks of river Ganga needs proper planning regarding the waste management. As the saying goes, “cleanliness begins at home”, each and every person should be motivated enough to preserve their surroundings. The illiterate and poor masses should be educated through various campaigns. Stringent penalties should be materialized in action against the industries that dump wastes into the river.

Industrial units that are discharging their untreated effluents into the river should be channelized to accept zero-discharge technologies. Moreover, treated effluents will either be reused as much as possible for making their own industrial process water and irrigation requirements. The solid wastes should be recycled and can be converted in to fertilizers adding other suitable matters to it. Wet wastes can be treated and used for the purpose of irrigation. Reuse of treated waste water reduces the over- extraction from river and its ground water resources. This waste water management should be done under rigorous observation and monitoring on a regular footing. Internal conveyance system to carry wastes should be made more effective. The infrastructure and the STPs also need improvement.

Moreover, localized bio-gas plants, decentralized composting facilities street sweepers, policies to encourage door-to-door wastage collection & segregation, public awareness, complete sanitation campaign, street penalties and regulations, avoidance of plastic carry bag usages and promotion of paper & jute bags, supply of more trucks to collect wastes, health & hygiene camps etc. on the banks of river, will enable to tackle the problem to an extent. Measures to prevent inappropriate construction near the river beds in both hills and plains should be taken.

This terrible situation has reached its nadir when the visuals of corpses floating in the river became a regular sight. To keep up with the faith of poor and illiterate people living there, government should take steps to plant more mango saplings which would wipe away the shortage of wood in the near future. An intensive campaign to persuade the river-side villages to plant mango saplings is essential. Also more mango trees would mean more mangoes, lower atmospheric temperature, less evaporation, reducing the chances of drought, controls disastrous floods, more oxygen in the air, more food for the kids & birds, more wood

for funeral pyres and much cleaner 'Ganga maiyya'. This will be recorded in the Indian history, as the great Mango Revolution'.

Countries like Netherlands suggest multifarious remedial measures to clean up Ganga. Those extended hands and in the light of present-day Govt.'s keen interest could change the present deplorable condition. Union budget already announced an integrated programme for conservation of river Ganga named 'Namami Ganga'. Separate Ministry for Ganga rejuvenation also has been set up.

CONCLUSION

Ganga can be cleaned only if the towns on its bank are cleaned. Save Ganga, Save Environment and Save India should be the slogan of era. The spurt of a cleanliness drive will fund many alternate paths for waste disposal. Pedalling to sound health and safe environment is a long road ahead. Rejuvenating Ganga is a gigantic task and it should be done in a massive pace in order to save water wealth and culture for generations to come.

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**PROBLEMS AND PROSPECTS OF SUGARCANE
CULTIVATORS- A CASE STUDY OF MARAYUR GRAMA
PANCHAYATH**

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ABSTRACT

Sugarcane is an important crop plant cultivated throughout the world for its sugar – rich stalks. The western world first learnt of the existence of this plant during Alexander the Great’s conquests about two millennia ago. Since then historians have traced its extension towards North Africa, Europe and to the Americans through documentary evidence. What occurred before, that is, the evolutionary process that led to wild ancestors of sugarcane and the domestication of those wild ancestors remained observe until recently and has been actively debated.

Key words: *Sugarcane, cultivator, marayursarkkara.*

INTRODUCTION

Sarkkara is dark brown sugar balls made of condensed sugarcane juice. It is also known as Jaggery or “Gud”(Hindi). Each lump or ball of jaggery might weigh up to 1.5 kg. Sugarcane is a major crop of Marayur and Kanthaloor. In sugarcane farms, there are small jaggery factories that manufacture jaggery. The best jaggery in India is produced in Marayur. It is therefore of great demand in households across the country for the preparation of sweets and relishes.

Marayur , a rain-shadow village on the eastern slopes of the Western Ghat, is 40 km from Munnar on the Udumalapet road. It holds a lot of natures blessing to be unfolded before its visitors. Its also a unique place where tourism mets adventure. The fresh mountain air, the mist-clad hills and panoramic view make it worthy at a visit. By travelling either from

Marayur to Munnar or from Munnar to Marayur. One can feel the enchanting beauty of nature's blessing to be remembered for a life time, the enchanting beauty of Marayur offers diversity in every aspect of the land and its culture. Hamlets, rocky hills, brooks, cave temples, sugarcane fields, waterfalls, stone cocking, sandal wood and bamboo forests are all in store for the visitor. It is the only place in the state with a natural growth of sandal wood trees. The rare Neelakurinji flower is native to this region.

Objectives

- To examine the performance of sugarcane cultivation in Marayur Panchayath.
- To find out the major problems faced by the sugarcane cultivations.

METHODOLOGY

The methodology used for this study is the survey method. The data was collected from both primary and secondary source. The primary data were collected from Marayur Grama Panchayath. The study was conducted using questionnaire. For this study a sample of 15 sugarcane farmers were selected. The secondary data was taken from publications and from various websites.

REVIEW OF LITERATURE

A brief review is made on the previous work done on various constraints on sugarcane production, growth rate and shift in cropping pattern and farmers problems.

- Abbot, Elizabeth (2008) argues that in a Vignette – driven popular history. Focuses on sugar production in the Caribbean, the destruction of indigenous people and the suffering of the Africans who grew the crop.
- Aykroyd, W.R. Sweet Malefactor (1967) explains an overview of sugar plantations in the Caribbean. Written by a noted nutritionist later in his career. Offers a unique and intelligent perspective on sugar production from someone not trained as a historian.
- Deer, Noel (1947 - 1950) have argued that dated but still essential work for beginning any study of sugar. Focused on economics and production. Antiquarian in approach. Rich in evidence and detail but not very analytical.
- Eltis, David (2000) emphasized a thoroughly researched overview of the rise of slavery in the Americas and the slave trade by one of the prominent slavery specialists. A chapter on

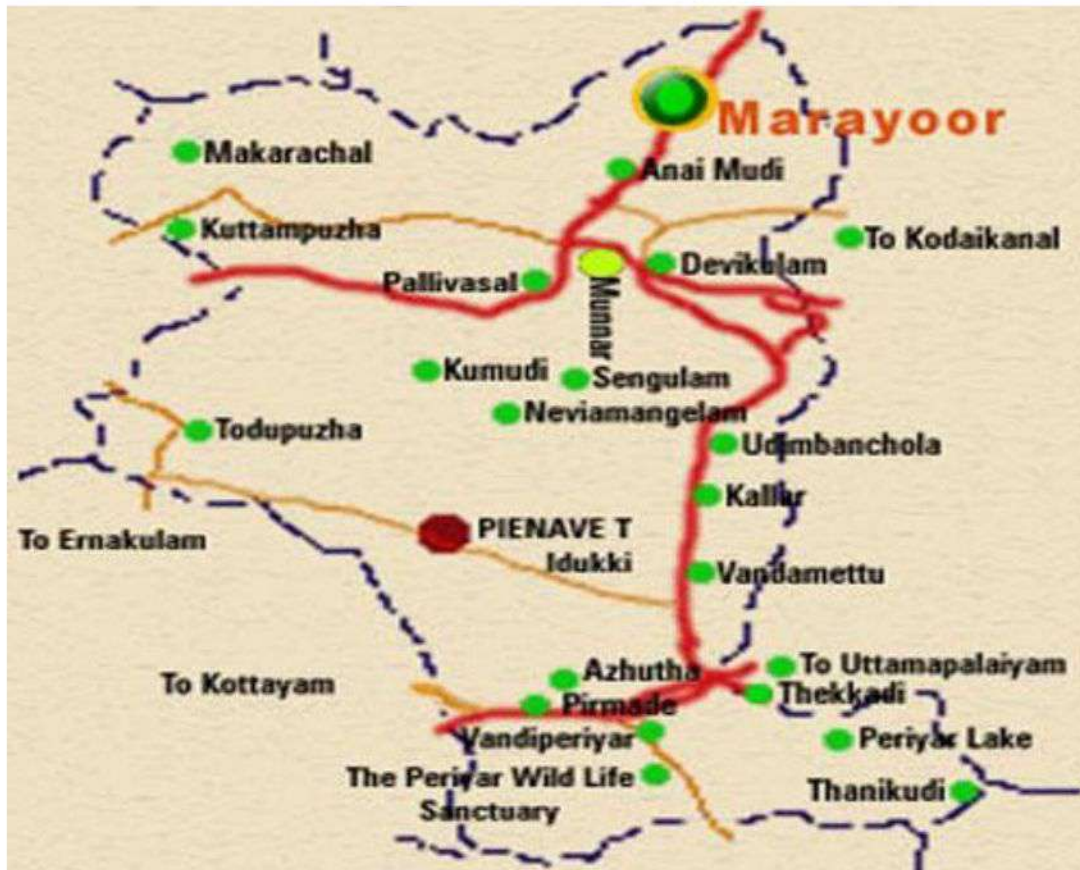
the English Caribbean offers the most accurate overview available of the movement of sugar through the English sugar islands and the reasons for its prominence on certain islands.

- Galloway, J.H. *The Sugar Cane Industry: An Historical Geography from its Origins to 1914*. Cambridge studies in Historical Geography 12. New York: Cambridge University Press, 1989. Galloway J.H conducted a study on the sugar cane industry: An historical geography from its origins to 1941, which was published in 1989 exhibits. Based on deep archival research and particularly sensitive to the environmental impact of sugar and the landscape of sugar societies. Traces the movement of sugar throughout the world but focuses on the Caribbean. Written in a direct and lucid style.

Profile of Marayur Gramma Panchayath

Panchayath	MarayurMarayur
Village	Marayur
Total Area	224.99
Block	Devikulam
District	Idukki
Taluk	Devikulam
Parliament constituency	Idukki
Population	20575 (per 1991 census)
Latitude	10° 15, North
Longitude	77° 11' Enst

The name Marayur is said to be derived form two words “mara” and “oor” in Tamil and Malayalam languages “mara” means hidden and “oor” means land. The Marayur Gramma Panchayath is situated in Devikulam Taluk which belongs to Idukki District. 42 kilometers north of Munnar through the Udumalpetta route Marayur is the only place in Kerala that has natural sandalwood forests. Ancient dolmens and rock paintings in Marayur date back to the stone age. As of 1991 Marayur had a population of 9590.



Map of Marayoor Panchayath

DATA ANALYSIS

This section provides the findings of the field survey conducted in Marayur panchayath. The main objective was to find out the extent of changes in production pattern and changes in productivity of sugarcane sector and also the problem of farmers in Marayur panchayath.

4.1 Occupational wise classification of the respondents

After the survey the collected data were processed and tabulated in accordance with the objectives of the study. The following table shows the occupation wise classification of respondents.

Table 4.1. Occupation of respondents

Sl.No	Category	Number	Percentage
1	Agriculture	12	80
2	Others	3	20
Total		15	100

Source : Sample Survey

The above table (4.3) shows that out of 15 respondents 12 respondents are engaged in sugarcane cultivation and remaining 3 respondents are engaged in other economic activities.

Table 4.2 Annual income of the cultivators

	Acres	Income	No. of Cultivators	Percentage
1	1 – 5	1 lack	2	13.3%
2	5 – 10	2 lack	4	26.6%
3	10 – 15	5 lack	7	46.6%
4	15 – 20	7 lack	2	13.3%
Total			15	100

Source : Sample Survey

From the above table it is clear that 13.3% of people have an income of Rs. 1 lack and 7 Lack form 1- 5 acres and 2- -3- acres respectively, 26.6% people have an income of Rs. 2 lack from 5 -10 acres. The most of the people have an income of the above 5 lack rupees form 10 – 20 acres.

Table 4.3. Production of sugarcane/acre

Year	Production in one acre	Percentage
2009 - 10	6200 kg	34.83
2010 - 11	6000Kg	33.70
2011 - 12	5600 kg	31.46
Total	17800	100

The table reveals the fact that, sugarcane cultivation is decreasing year by year. In the year 2009 -10 the sugarcane production of Sarkkara from an acre was 6200 kg. There was 38.90% of production in the year 2010 – 11 and only 31.46% of production in the next year.

Table 4.4. Technology followed by farmers

Technology	No. of people	Percentage
Traditional technology	2	13.3
Modern technology	13	86.6
Total	15	100

The above table draws the picture of technology followed by sugarcane cultivators in the Marayur Gramma Panchayath. There was only 13.3% of people who were following the traditional technology of cultivation. On the other hand, 86.6% of people were following the modern technology, which give more production, less cost and time.

Table 4.5 Labour rate of farmers

Year	Labour rate for a Day		Labour rate for a sack sarkkara preparing	
	Rate	Percentage	Rate	Percentage
2009 -10	180	27.69%	110	18.96%
2010 – 11	220	33.8%	190	32.75%
2011 – 12	250	38.46%	280	48.2%
Total	650	100	580	100

The above table describes that, the labour rate are increasing year by year. The rate for preparing a scale of sarkkara is increasing. The labour rate in the 2009 – 10 year was only 180 but it was increased to 220 in 2011. And again these were on increase of 30 of labour rate in 2001 – 12 period. The labour rate for preparing a sack of Sarkkara in 2009 – 10 period is 110 but it was increased to 280 in 2001 – 12 period.

Table 4.6 Availability and utilization of irrigation facility

Source	No. of People	Percentage of holding
Canal	3	20
Pond	4	26.6
River	3	20
Well	5	33.33
Total	15	100

The above table examines that the important irrigation facilities of this Panchayath are Canal, Pond, Well, River etc., about 33.33% of the respondents depends on the pond facility and the remaining are the Canal and River for the purpose of irrigation.

Table 4.7. Use of fertilizers

Fertilizer	No of People	% of using in an acre
Chemical fertilizer	9	60%
Vermin fertilizer	4	26.6%
Traditional fertilizer	2	13.33%
Total	15	100

It is clear that 60% of people are concentrated in sugarcane cultivation in the path of using chemical fertilizer like factomfos. Urea, Pottashetc., Vermi fertilizer is a recent innovation from the side of farmers and KrishiBhavan. So about 26.6% farmers are trying to follow this eco friendly fertilizers and pesticides. And the use of traditional fertilizer is very rare.

Table 4.8 Favourable climate

Seasons	No. of sugarcane sticks used for acre	Production in acre in terms of kg	Percentage
Summer	4000	3600	19.14
Winter	4000	4200	22.34
Autumn	4000	4800	25.53
Rainy	4000	6200	32.97
TOTAL		18800	100

Source: Primary data

From the data it is found that only 19.14% of production have happened in the summer season. Now, we can understand that, summer is unfavourable climate for sugarcane production. In the winter season and autumn have an average production of sugarcane. Rainy season is the favourable climate for the sugarcane cultivation which shows the 32.97% of production.

Table 4.9 Subsidy rate from government

Type Of Subsidies	Amount Given
Cultivation subsidy in an acre	20000
Fertilizer subsidy	3000-1000 in a sac
National disasters	6000

Source: Kerala sugarcane development society

The above table describes that the Govt.of Kerala, have given Rs.20,000 for sugarcane cultivators, which the fund was included in the Idukki package. It is really a blessing for the cultivators. The Central and State. Govt should try to give subsidy for fertilizers and natural disasters.

Table 4.10 Attack from wild animals

Frequency	SUMMER				WINTER				RAINY				AUTUMN			
	Elephant	Pig	Buffalo	Monkey	Elephant	Pig	Buffalo	Monkey	Elephant	Pig	Buffalo	Monkey	Elephant	Pig	Buffalo	Monkey
Frequently		✓	✓	✓	✓			✓								✓
Occasionally						✓	✓		✓				✓		✓	
Rarely										✓	✓	✓		✓		

From the above table picturize that attack from wild animals like Elephant, Pig, Bufflow, Monkey to sugarcane is frequently in summer season. In this season the farmers attack huge loss from the cultivation. Among the wild animals Elephant is the most damage causing animal. The loss from winter and autumn season is average. In rainy season that attack from wild animals were comparatively low.

Table 4.11 Variety of Seeds Used By Cultivators

Variety	No. of people	Percentage of Holding
High yielding varieties	12	80%
Traditional varieties	3	20%
Total	15	100

Source: *KrishiBhavan*

From the above tabulated data and figure shows that 80% of people in the Marayur Grama Panchayath have following the high yielding variety seeds for there cultivation by this they get more production. The balances 20% of people are following the traditional seeds. High yielding variety seeds are distributed Krishi Bhavan.

Table 4.12 Distribution of Sarkkara

District	Sakkara Kg District In a Year	Percentage
Alappuzha	30,000 kg	19.23%
Ernakulam	45,000 kg	28.84%
Idukki	38,000 kg	24.35%
Kottayam	43,000 kg	27.56%
Total	15,6000 kg	100

From the above table it was observed that Erankulam have the more sale for Marayur Sakkara, which was about 28.85% and the sale or demand for Sakkara was less in Alappuzha of about 24.35%

Table 4.13 Age of sample

Age Group	No.of People	Percentage
16 – 30	1	6.6 %
30 – 50	9	60%
50 – 60	5	33.3%
Total	15	100

Source: Sample survey

The above table explains that 60% of people are engaged in sugarcane cultivation it is between (30 – 50) age groups. The age group between 50 and 60 have a share of 33.3% of sugarcane cultivation. Only 6.6% of new generation have interest in this job.

Table 4.14 Possibility Of Multiple Cropping

Sl.No	Opinion	Total.No	%
1	Yes	5	33.33
2	No	10	66.66
		15	100

Reasons are following.

- Lack of irrigation facilities.
- Problems created by wild animals
- Lack of marketing facilities
- Low price

Table 4.15 Products from Sugarcane

Items	Percentage
Sarkkara	90%
Sugarcane Juice	8%
Sugarcane Lessy	2%
Pooled	100

The table shows that from sugarcane cultivation in Marayur Panchayath, the more producing product is Sarkkara. It should be produced about 90% . Sugarcane juice and sugarcane lessy have the contribution of 8 and 2 percentage of production. There is no sugar production.

Main Problems Faced by the Sugarcane Cultivators

The majority of the total population in our state is living in rural areas. Sugarcane cultivation is considered as the only source of primary occupation of the people in Marayur. The study shows that majority of respondents argue that, production of sugarcane cultivation is not much profitable as a result of this there have occurred many changes in the cropping of labour shift in food habit change in productivity etc. account for these changes in cropping pattern. Main problem faced by the farmers are given below.

High labour cost

There has been a phenomenal increase in the money wage rates of sugarcane workers. The exceptionally high wage rate in the initial period and the phenomenal increase in wage rate made sugarcane cultivation less attractive in area selected for the study. Wage rate

constitutes 35 – 65 percent of the total cost. Any increase in wage rate adversely affects the profitability of farmers.

Unfavourable monsoon

As high as 60% of sugarcane operations depends on seasonal rains. But in the recent years, monsoon is not favorable to the sugarcane.

Low support price

The support price of Sarkkara showed a declining trend compared to other commercial crops. Thus crops are not getting adequate support price. This shows a greater incentive to get out of the cultivation of sugarcane crops by the farmers.

Poor marketing facilities

Most of the people in Marayur Grama Panchayath are farmers. There is not enough sufficient level of marketing facility. So the farmers did not get adequate price for their crops. Thus the problem arising from the lack of marketing facility is less compared to other panchayath.

Adequate irrigation facilities

Sufficient water is not available for growing crops in all seasons. Farmers are not capable of buying pump sets or motors for proper irrigation. At the same time agricultural department is also not taking any action to supply these things. For efficient irrigation operation these are very important.

Labour inefficiency

Another problem faced by the farmers is inefficiently of labour activity. Most of the labour are not interested to do well. This also leads to problem of less quality output in this panchayath.

Lack of market information

Majority of farmers in Marayur Panchayath are selling their products at low price because they do not have capacity to know market trends on the spot.

Low investment of sugarcane development

Adopting new technology, fertilizers etc., require high level of finance. But in many cases, share of improvement of sugarcane cultivation is very less.

Lack of productivity

Lack of proper cultivation methods, use of fertilizers, pesticide etc., leads to lack of productivity.

Increasing rate of cost of production

Cost of production of sugarcane cultivation increased drastically. Many of the farmers have not carried on sugarcane sector.

Natural disaster

Natural disaster like droughts, floods, landslides etc., cause a huge damage for the farmers. By this they have lost their cultivation.

SUMMARY OF FINDINGS

Some important findings and conclusions have merge from this study. This study attempts to find out factors responsible for crisis in sugarcane sector and framers problems. This study mainly based on the empirical data obtained from the field survey held at Marayur Panchayath in Idukki district. The study reveals that is additional to certain benefits there are many problems involved in sugarcane sector. Important among them are discussed below.

FINDINGS

From the field survey and data analysis, it is observed that cultivation of sugarcane cultivation is not much profitable, when compared to other crops due to various reasons.

- High price of fertilizers and pesticides labour shortage non availability of high yield variety seeds lack of productivity of food crops etc.
- The increase in cost of production mainly due to increase in the price of all sugarcane cultivation inputs. This situation resulted in large scale conversion of cultivable land for construction of roads, resorts and other building etc.
- The enormous increase in the price of fertilizers and non availability of labour in peak season in certain location, the failure of the irrigation systems to be tackled sustain the crops.
- The attacks from wild animals like Elephants, Monkey, buffalo, pigs etc to sugarcane caused a huge loss to the cultivations.
- In recent years several unfavourable trends in Kerala agriculture farmer suicides, declining prices of Sarkkara widening disparities between sugarcane sector and non agricultural sectors and a market slow down in the rate of agricultural growth etc. generating dup sugarcane crisis in the country or state.

RECOMMENDATIONS

Based on the above findings the following suggestions could be made:

- Give priority of sugarcane security with plans local bodies.
- There is need or maintaining remunerative prices for sugarcane.
- Crop insurance policy must be implemented effectively to save the farmers from crop failures.
- Select proper farm planning techniques.
- Encourage farmers to continue the sugarcane sector for the better food sold sufficiency can be achieved.
- Ensure cost management programme.
- Spread E – agriculture.
- Integrated management of insect pest and diseases.
- Increasing land use efficiency.
- Farmers must acquire the competitive edge and use modern technology to reap quality produce with desirable attributes.
- Adopt organic farming and contract farming system.
- Adopt productivity enhancement measures.
- Schools and colleges in Marayur area should be provide sufficient training to the students to preserve and work for sugarcane cultivation land and nature.

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