

PILGRIM TOURISM AND ECOLOGICAL SUSTAINABILITY

case study of
pampa river in kerala



INTER UNIVERSITY CENTRE FOR ALTERNATIVE ECONOMICS
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Pilgrim Tourism and Ecological Sustainability: Case Study of Pampa River in Kerala

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Report submitted to
Inter University Centre for Alternative Economics
Department of Economics
University of Kerala
2017

Internship Report

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First Edition Published in February 2017

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This report “**Pilgrim Tourism and Ecological Sustainability:Case Study of Pampa River in Kerala**” is a bonafide work done by me under the supervision of Prof. Abdul Salim A and has not been previously formed the basis for award of any degree, diploma , associateship, fellowship or other similar title or recognition.

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This is to certify that this report “**Pilgrim Tourism and Ecological Sustainability: Case Study of Pampa River in Kerala**” is a record of bonafide work carried out by Dr. Anitha V, Associate Professor, Department of Economics, University of Kerala, under my supervision. No part of this report has been submitted for the award of any degree or diploma of any university.

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March 2017

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ACKNOWLEDGEMENTS

I would like to express my gratitude to many people who have been instrumental in the successful completion of this work. First of all, my thanks are due to the Inter University Centre for Alternative Economics (IUCAE), University of Kerala, for the financial assistance that had helped me to conduct this research work. I would like to express my gratitude to Prof Abdul Salim A, Director, IUCAE, for his encouragement and support to accomplish this research. My sincere thanks to Dr.Vijayamohanan Pillai, Associate Professor, CDS and the advisory member of the IUCAE research committee panel, for his comments on different stages of the study.

I remember the help rendered by the SANDEE team in developing the research concept note at the Research and Writing Workshop in Environmental and Natural Resource Economics at Kerala Agricultural University, Thrissur.

I greatly acknowledges the comments received from Prof. M. N Murty, former Professor, Institute of Economic Growth, New Delhi and Dr. Shailendar Hooda, Assistant Professor, ISID New Delhi.

I would like to acknowledge the encouragement and support of my colleagues and family members during the entire period of project work.

I also extend sincere gratitude to the technical assistant Ms. Reshma, IUCAE. Last but not the least, I would like to express special thanks to Ms. Anjali T.S., Mr. Anilkumar V, and Mr. Purushothaman B. for their hard work and dedication in eliciting relevant information from the field.

Anitha V

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Chapter 1

INTRODUCTION

1.1 Background

One of the basic supporting services in the ecosystem which provide life on earth is water. The economic and environmental impact of the water resources are undisputedly proven. The polluted water affects the human well-being and biodiversity. According to the Millennium Ecosystem Assessment (MEA) the major determinants and components of well-being are security, basic material for a good life, health, good social relations and freedom and choice. Water resources have all the ecosystem services envisaged by the MEA. Thus it plays an important role in sustainable development as well as in the formation of economic value.

Pampa river is the third largest river in Kerala. It has a length of about 176 km and a catchment area of about 2,235 sq. km. The famous place of pilgrimage, Sabarimala is situated on the hills of Pampa plateau. It is one of the most popular pilgrim centres in South India and around 50 million of the pilgrims visit the shrine especially during the winter season, starting from mid-November and ending by mid-January. The gathering of very large crowds over a short period of time every year in an ecologically sensitive area has given rise to various environmental problems. The disposal of solid waste such as dresses (as a part of spiritual belief) and plastic, untreated wastes water of the pilgrim centre Sabariamala (religious convention held on the river bed), bathing and washing of clothes by the pilgrims and local people, waste water from domestic households, hospitals and factories and using fertilizers and pesticides in agriculture land are the major sources of water pollution in the Pampa river. All these badly affects the health of the local people, downstream population, pilgrims and the flora and fauna. If we do not control the degrading activity the cost to the ecosystem will be high.

In order to protect the water resources national and international agencies introduced numerous programmes. United Nations Department of Economic and Social Affairs (UNESA) declared the period 2005-15 as International Decade for Action and the slogan is "Water for Life". The United Nations says that 2.1 million children under 5 die each year because of lack of clean water. International Network of Basin Organisations in 1994, Global Water Partnership in 1996 were created to support the Integrated Water Resource Management (IWRM) implemented by different countries. Water quality

is important determinant of physiological activities. Water pollution is the contamination of water bodies such as lakes, rivers, oceans and ground water by human activities. It occurs when pollutants are discharged directly or indirectly into water bodies without adequate treatment. Since nature and use of river water vary from place to place, we should study the problems of each one separately. Pampa *Parirakshana Samithi* (conservation council) has been working relentlessly since 1993. Pampa Action Plan was implemented since 2003. Pampa River Basin Authority Act was established in 2009. Besides these a lot of temporary programmes are implemented during the pilgrim season to protect the river basin by the Davasom Board. But all these are inadequate to control the water pollution problem in the Pampa river.

1.2 Significance of the study

Many of the environmental goods and services are provided freely. Therefore, they have zero prices because no market place exists in which their true values can be revealed through acts of buying and selling. Water is generally under-priced. Therefore, valuation is important for proper pricing. Projects and programmes cannot be ample or adequate without valuation. Valuation techniques are also applied to the more immediate human environment, such as water supply and sanitation. It is inevitable for the proper accounting of the environment and the implementation of sustainable development policy.

In 2015, the United Nation's 15 years Millennium Development Goals of 2000 has replaced as Sustainable Development Goals (SDGs), which could be materialised in 2030. Here the idea of SDGs balances the socio-economic, environmental and philosophical aspects of sustainable development. In this context Water Resource Management is more important. Drinking water shortage and water pollution is one of the major problems recently noted in Kerala. Even though we have proper monsoon and 44 rivers, the state undergoes a paradoxical situation of plenty of water with shortage of drinking water. While implementing development project we ignore sustainable development aspects. It is well known fact that sustainable development can be achieved only through maximum social and economic development with minimum adverse environmental impact.

In this regard, an important problem faced by policy makers in Kerala is how to protect the Pampa River in a sustainable manner. Here, the untreated waste water discharged by the pilgrim centre into the river affects the flora and fauna and the human wellbeing. Therefore, valuation of the river water is essential to implement proper programmes and policies. Economic valuation of natural resources has found vast application in option appraisal, design of economic instruments and in determining compensatory payments for environmental damage (Willis and Corkindale, 1995). National level environmental policies are better well-versed if economic values are known with a degree of certainty (Pearce, 1993). Sustainable management of natural resources in a tourist center like Sabarimala demands huge investment from the part of the government. Now the central govt. have sanctioned Rs. 100 crores on the basis of proposal submitted by the state government for uplifting Sabarimala as National Pilgrim Center. This will be implemented as part of the Swadesh Darshan scheme. The present system did not implement any economic valuation method to conserve the river in a sustainable manner. This study is an attempt to fill the gap. The government can collect an additional income from the pilgrims and can use it for the sustainable conservation of the river. It is expected that water quality, socio-economic and health conditions of the local people and pilgrims will improve with the introduction of a new system of water resource management.

1.3 Research problem

According to the United States Environmental Agency, one of the most important cause of water pollution is biodegradable waste such as human and animal wastes. "When biodegradable waste

enters water supply, the waste provides an energy source (organic carbon) for bacteria. Organic carbon is converted to carbon dioxide, which can cause atmospheric pollution and acid rain; this form of pollution is far more widespread and problematic than other forms of pollutants, such as radioactive waste. If there is a large supply of organic matter in the water, oxygen-consuming (aerobic) bacteria multiply quickly, consume all available oxygen, and kill all aquatic life". The pollution in the Pampa creates problems in the provisioning, regulating, supporting and cultural services of the river. Government had taken a series of steps to control pollution during the pilgrim season. But all these are inadequate in the present situation of increasing number of pilgrims. The existing sewage treatment plant is inadequate for the large group and the spill over from the plant increases the coliform bacteria in the river. The actual problem of water pollution occurs when there is no market mechanism to trade between downstream and upstream users (Tore Hundloe and Christian Crawford, 2012). This has not only created environmental damage but also affected the social, economic and mental well-being of the downstream users. It is the duty of the apex body to protect the social and economic dimensions of water use (The Shaw Committee on National Water Commission, 2016). This shows the need for an important policy change in the present system. That is, the current institutional structure or culture of water management in the country should be changed (Shripad Dharmadhikary, 2016; Vinod K Gaur, 2016).

A new system of water resource management is necessary for the pilgrim center and the state government can implement it through the newly generated income from the central government. In this context the main questions that arise here are: what are the mandates from the part of pilgrims and local people for clean river? what are the problems in the existing strategies? How can we strengthen the existing schemes to protect the Pampa River in a sustainable manner?

1.4 Objectives

In this contexts the specific research objectives of the study are

1. To estimate the demand for improvements in the water quality of the Pampa river.
2. To develop an alternative financing mechanism for the sustainable development of Pampa river

1.5 Methodology

1.5.1 Data and study area

The study is primarily empirical and both primary and secondary data are used. Even though the non-use value of the holy river Pampa is very high, the study considers only the use value, that is decision of the person directly linked with the river or current situation of the respondent (Bruno S. Frey et al; 2009). Besides, pragmatic behaviour is a perfect measure for subjective well-being. So to get a complete view on the economic value of the Pampa River, field survey was conducted among the households nearest to the river and the tourists at Sabarimala.

About 15 local panchayats of Pathanamthitta district and one municipality of Alapuzha district are situated in the river banks of Pampa. In order to know the effects of polluted water the household survey was conducted in the downstream population adjacent to the Pampa river. The Ranni taluk in Pathanamthitta district is the appropriate place for household survey, which is the one nearest to the *thriveni sagamam*, where all the pilgrims meet during their visit. Out of the nine panchayaths in Ranni Taluk three panchayats-Naranammoozhi, Perunad and Vadasserikkara were selected randomly. Three wards from each panchayath, where households have direct access to the river was selected. Then all the 160 households in the selected area were surveyed. Of these 50 from Vadasserikkara, 73 from Naranammoozhi and 37 from Perinad panchayath.

The tourists' data were collected from pilgrims who returned from *Sannidanam* at Sabarimala. The period of study is from July 2016 to February 2017. First five days (The temple is opened only these days) of every Malayalam month is used for data collection except the normal season period, November to January. Care is given to include people from different states. Since proportion of the tourist outside the state and inside the state is 60:40, the same proportion is reflected in the sample also. Moreover, the study involves only tourists having the age group 18 to 65. Altogether the sample size is fixed as 200 based on the literature related to the contingent valuation method.

1.5.2 Interview schedule

Separate interview schedule is prepared for household survey and pilgrims (see Appendix I and II). The aim of both schedules is to elicit their current level of satisfaction and their willingness to pay for the sustainable management of the Pampa River. It is important to value the water in terms of its aesthetic aspect (Guidelines for safe recreational water environments).

The aesthetic value of recreational water areas indicates freedom from visible materials, floating debris, oil, scum, and other matter, substances producing objectionable colour, odour, taste or turbidity, and substances and conditions that produce undesirable aquatic life (Department of National Health and Welfare, 1992). The questions frequently used for local management of water resource are: "Are there any wastes?, If present, where are the wastes coming from?, Are they causing aesthetic problems?, Could the aesthetic problems be responsible for economic losses in the local community?, Can the effects (if any) be stopped?, Who should control the problems?, What will it cost, and can any loss of environmental opportunity be measured?" (Philipp, 1993). In the late 19th century, water quality is widely assessed on the basis of taste and odour (Andrea M Dietrich, 2006).

Here the quality of water is mainly assessed through its aesthetic characteristics such as, transparency, odour and colour. Besides, other variables related to presence of waste and taste of water are incorporated in the questionnaire. In the case of local people the monetary values on the non-marketed commodity, water is measured on basis of willingness to accept compensation for negative externalities. While in the case of pilgrims we use direct questions to know their willingness to pay for the sustainable management of the river. Five point Likert Scale and the Cantril's Self-Anchoring Striving Scale are used to form questions related to the construct pollution and satisfaction level. A pilot study is conducted to finalise the questions.

1.5.3 Analytical tools

There are different methods to value the non-market goods, water resources. The two main methods to value the non-market goods are revealed preference (RP) and stated preference (SP). Since the context of the study is based on hypothetical situation, revealed preference method is not suitable. Therefore the widely used Contingent Valuation Method (CVM) is selected as one method. The Report of the NOAA Panel on Contingent Valuation (Arrow et al, 1993) advised CV and suggested step by step issues to be considered in building up a CVM questionnaire. The fundamental area of concern is that contingent valuation (CV) surveys have the potential to confuse or mislead respondents (Dale Whittington, 2004). The warm-glow effect (Nunes and Schokkaert, 2003) is another limitation of CVM where respondents could choose a maximum WTP because they feel they want to give just for the sake of feeling good from giving and not as a real value for the good. The respondents state their preference on the basis of the change in the benefits occurred through an improvement in the environmental quality. Here the responses are stated on the basis of the hypothetical market situation. The individuals' willingness to accept compensation or the maximum willingness to pay (WTP) can be obtained from this method.

To avoid asking for money directly for improving the water quality the study has used Life Satisfaction Approach (LSA) which comes under the subjective wellbeing approach. This approach is used by many to assess the utility losses associated with public goods (Bruno S. Frey, 2004, 2009 and Christopher L. Ambrey et al, 2012). The advantage of this method is that it does not assume hypothetical scenarios. As a result we can avoid unreliable responses and strategic behaviour. The idea behind this approach is that subjective wellbeing is an indirect method to measure the welfare of an individual.

The basic econometric model of contingent valuation method is

$$WTP_i = b_0 + b_1 A_i + b_2 E_i + b_3 Y_i + b_4 P_i + \epsilon_i, (1)$$

Where WTP_i is the maximum willingness to pay by the tourist for an improvement in the water quality, A_i and E_i are the age and education of the respondents respectively, Y_i is income and P_i is the quality of the water.

The basic econometric model of life satisfaction approach is

$$Sit = \beta_0 + \beta_1 X_{it} + \epsilon_{it} (2)$$

Where X_{it} are variables that capture socio-economic, demographic and attitude and practice for individual i at time t and S_{it} is the individual satisfaction.

In the case of the non-marketed good, water pollution, the above stated satisfaction function is written as

$$Sit = \beta_0 + \beta_1 X_{it} + \beta_2 P_{it} + \beta_3 Y_{it} + \epsilon_{it} (3)$$

Where, Y is the income indicator and P is the pollution variable. Here, expected $\beta_3 > 0$ as people receiving higher income generally report higher well-being and expected $\beta_2 < 0$ as a lower level pollution will result in higher level of self-reported satisfaction. Thus marginal rate of substitution (MRS) between income and the pollution variable can be derived as

$$MRS = (\delta S_{it} / \delta P_t) / (\delta S_{it} / \delta Y) (4)$$

$$\text{That is } MRS = -(\beta_2 / \beta_3) (5)$$

1. 6 Scope of the study

Economic valuation of environmental goods has found vast application in option appraisal, design of economic instruments and determining compensatory payments for environmental damage (Willis and Corkindale, 1995). Water quality is important determinant of physiological activities. National priorities for environmental policies are better informed if economic values are known with a degree of certainty (Pearce, 1993). Full and accurate valuation of river water is essential for decision making related to the use of the resources by the tourist and the local people. The evaluation of socio-cultural and economic value of wetlands demonstrate the contribution of wetlands to the local, national and global economy (Ramsar Technical Report 3, 2006). By establishing the value of ecosystem services of the river, which vary from river to river, more sustainable policy can be introduced. So it will be feasible if the government should develop comprehensive, participatory implementation tools for managing and developing water resources in such a way that ensures its protection for future. The implications not only concentrated to the advancement of tourist but also to the local people and the whole system. Pampa's River Basin Authority can use the result to support the development and implementation of IWRM in the future.

1.7 Organizations of the presentation

The study is divided into seven chapters. The introductory chapter includes the significance of the topic, statement of the problem, objectives, methodology, scope and organization of the study. The second chapter provides a review of theoretical context and literature. The existing water policy of the government and regulatory mechanism in Kerala is assessed in the third chapter. The fourth chapter analyses the perception and satisfaction level of the local people. The fifth chapter analyses the demand for the river water and the maximum willingness of the pilgrims to pay for its improvement. The concluding chapter includes a summary of the study and suggestions.

THEORETICAL CONTEXT AND REVIEW OF LITERATURE

This chapter reviews the concepts, methods, theories and assumptions of ecological economics and assessed the extent to which they depart from the dominant paradigm of neoclassical economics. Even though, the present study used some of the neoclassical tools, the theoretical background of the study is the perspectives of ecological economists.

2.1 Sustainable water resource management: Theoretical underpinnings

There is a debate between economic growth and environmental degradation and a few studies exist in this area. Arrow et al, 1995, in their article discussed the relation between economic growth and environmental quality, and the link between economic activity and the carrying capacity and resilience of the environment. The developments and differences in the environmental and ecological economics is discussed by many studies (Constanza, 1989; Sharon Beder, 2011;). The neoclassical principle always tried to incorporate the natural resources into the market through pricing (Sharon Beder, 2011). This can be seen from the government policies applied around the world including the use of extended cost benefit analyses, contingent valuations, environmental charges and emissions trading. However, both environmental and ecological economics cannot overcome the political and social barriers to implement effective environmental measures (Sharon Beder, 2011). Environmental economics applies the tools of neoclassical economics to ecological problems. It looks at the environment, but its aim is simply to internalize it within the economic calculus Clóvis Caval Canti(2010).

To address the problem of conflicts between environment and development goals World Council on Economic Development (WCED) in 1987 formulated a definition of sustainable development. It defined “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. The three aspects of sustainable development are Economic, social and environmental. An environmentally sustainable system must manage biodiversity, atmospheric stability, and other ecosystem functions. The interdependence between the long-term stability of the environment and the economy is the foundation of the field for sustainable development (Rachel

Emas, 2015). The tripartite goal is easier to identify unsustainability than sustainability – and the identification of unsustainability can motivate us to take necessary policy action (Jonathan M. Harris, 2000).

The concept of sustainable development does imply limits - not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and the ability of the biosphere to absorb the effects of human activities (WCED, 1987). The report states that the sustainable development can be achieved only with painful choices and political will. The concept became a serious one since the 1992 Rio Conference.

In 2015 the United Nation's 15 year Millennium Development Goals of 2000 has replaced as Sustainable Development Goals (SDGs), which could be materialised in 2030. Among the seventeen goals two are directly related to water resources and all others are indirectly related to water resources. Here the idea of SDGs balances the socio-economic, environmental and philosophical aspects of sustainable development. In this context water resource management is more important and the sixth SDGs, 'ensure availability and sustainable management of water and sanitation for all', underlines it. Besides, the advocates of SDGs stresses the importance of Integrated Water Resource Management Plans in every region of the world. Declining of ground water, drinking water shortage and water pollution are the major water related problems recently noted in Kerala. Even though we have proper monsoon and 44 rivers, the state undergoes a paradoxical situation of plenty of water with shortage of drinking water. While implementing development project we ignore sustainable development aspects. It is well known fact that sustainable development can be achieved only through maximum social and economic development with minimum adverse environmental impact.

In 2015, globally about 663 million people used unimproved water sources, 2.4 billion people are there without any water sanitation and 2 billion people are affected by water stress (UNs, 2016). The level of water stress is very high in Northern African countries (98%) and it is 48% in Southern Asia. The improvement in the quality of water influences other variables related to goals such as education, health and poverty. Since river water is a public good, it is the duty of the public sector to maintain the good for long term sustainability (Rachel Emas, 2015). It is stated that improvements in production process reduces the pollution (Porter & van der Linde, 1999). This needs huge investment to develop new and continuous management practices.

The ultimate goal of every economy whether developed or underdeveloped is to achieve sustainability. Economists have controversial views about sustainability of natural resources. To economist, the two major components of resources are natural capital and human capital. According to neoclassical economist man made capital is a substitute for natural capital, a system of weak sustainability. This is the danger of assigning monetary value to ecological goods and services, leading to the belief that natural assets can be added to human-made assets, making them substitutable (Clóvis Caval Canti, 2010). Whereas ecological economist believe that natural and man-made capital are complement rather than substitutes, a system of strong sustainability. That is ecological sustainability is the maintenance of the stock of natural capital rather than its money value. This underscores the irreversible property of natural resources.

According to neoclassicals growth is a panacea for development. The counter argument is that growth is not sustainable and the sustainable economy must stop growth at some point and it need not stop developing (Daly, 2007). Another characteristics of sustainability to neoclassicals is the maintenance of utility or well being over generation. But the critique argue that utility is an experience and not a thing (Daly, 2007). In short preservation of natural capital is the only solution for sustainable development and it is the ultimate goal of ecological economist. Ecological economist shows that there is natural limit to social and political life and the intrinsic value is non-human (Luke Martell 1994). Ecosystem is the

subsystem of ecological system and both have limits. Ecological economists address the relationship between ecosystems and economic systems in the broader sense (Costanza, 1989).

The unlimited growth path followed by the capitalist, socialist and others are not free from the problem associated with intergenerational, intragenerational, and interspecies equity and sustainability (Costanza, 1989). According to them limits to growth is solved by development of technology often called technological optimism. But the ecologist argued that resource constraints of an ecological system limits the growth of an economy, often called technological pessimism. Here comes the importance of ecological economics, i.e., a more ecological approach to economics and a more economic approach to ecology, which will be beneficial in order to maintain our life support systems and the aesthetic qualities of the environment (Costanza, 1989).

Even though economists have differences in the opinion regarding the concept of sustainability, there is consensus on the basic concept of sustainable development and on a broad strategic framework for achieving it (WEDR, 1987). The satisfaction of human needs and aspirations is the major objective of different concepts of development. Ecological economics include neoclassical environmental economics and ecological impact studies as subsets, but also encourage new ways of thinking about the linkages between ecological and economic systems (Costanza, 1989). Ecological economics tried to analyse the problems in an integrated and interactive manner. It is only through this reintegrated analysis that we are able to comprehend and solve our most pressing and complex social problems (Constanza et al, 1997).

2.2 Theories to solve market failure or externalities

It is defined that externalities occur when the actions of one economic agent affects the other and the actions are not controlled by the operations of the market. In order to reduce the damage due to economic activity, economists apply different policies by changing the incentives of people and businesses through the use of taxes, subsidies, ecolabels, deposit/refund systems, and liability, or through the use of caps, bans, and technology standards (Hackett, 1960). A brief review of major theories are explained below.

2.2.1 Command and control

This is a historical approach to environmental pollution control measure. It requires a regulator imposing a pollution reduction policy with least flexibility. Technology standard and performance standard are some of the widely practiced measures under this category. It is noted that command and control is an alternative method to control market failure in developing countries (Bruce and Ellis, 1993). The major problem associated with this is that the effects are disproportionate on income and the burden among lower income group is severe.

2.2.2 Taxes and subsidies

According to Pigou the solution to externalities is to impose an environmental-use tax on the polluters. This forces the polluters to take account of the cost they impose on the environment and they choose efficient level of degradation. Taxing polluting inputs and output is an attractive policy in developing countries, but it often lacks experience in administration and enforcement (Bruce and Ellis, 1993).

The problem of applying this theory is that, the government is not able to tax the pilgrims and it is very difficult to calculate the marginal cost and the marginal benefit among the tourists.

2.2.3 Coase theorem

The Coasian solution assigns property rights and economic agents bargain an efficient outcome. To Coase (1960), the assignment of property rights could be completely arbitrary and this would have no

effect on the final outcome of the environmental pollution. It reduces the role of the government and once the property right is assigned the optimal level of pollution is done through negotiations between the parties.

Since one party is the pilgrim, it is difficult to enforce bargains. Besides, the transaction cost may be very high.

2.2.4 Cap and trade

This is one of the valuable policy practiced worldwide, which provide the bearers right to pollute. This should result in the agreed level of pollution attained at the least cost. According to investo pedia, the cap-and-trade system is sometimes described as a market system because the market failure is in the form of perfect competition model, leaving room for a government intervention. It is against charging a cost on third party or the tax payers.

According to the ecological principle, economy is only the sub system of ecology and the development in that subsystem should be steady or sustainable. The concept of sustainable development must be economically sustainable (or efficient), socially desirable (or inclusive) and ecologically prudent (or balanced) (Ademar Ribeiro Romeiro, 2012). The developments and differences in the environmental and ecological economics is discussed by many studies (Constanza, 1989; Arrow et al, 1995; Sharon Beder, 2011 ;). Even the ecological economics do not have common view about the sustainable development (Daly, 2007). But the environmental problems are growing steadily and the solution given by the neoclassicals are ineffective (Sharon Beder, 2011). In the case of Pampa river a solution based on ecological principle is feasible.

2.3 Review related to Pampa River

The pilgrim center Sabarimala is unique because of its geographical and ecological peculiarities. The Pampa River is considered as the Dakshina Ganga (Southern Ganges) because of its association with Kerala's Largest Pilgrim Centre, Sabarimala. The river Pampa enriches the lands of Pathanamthitta district and the Kuttanad(the famous rice producing place of Kerala) area of Alapuzha district. Pampa originates at Pulachimalai hill in the Peerumedu plateau in the Western Ghats at an altitude of 1650 meters height from the sea level and flows through Ranni, Kozhenchery, Tiruvalla, Chengannur, Kuttanad, Karthikapally and Ambalappuzha Taluks and finally reaches into the Vembanad Lake. The tributary of this river are Kakkiyar, Azhuthayar, Kakkatar and Kallar. The Aranmula Vallam Kali(boat race celebration) takes place in the river and the Maramon Convention near Kozhenchery is also conducted on the banks of the Pampa river. The Sabarigiri Hydro Electric Project and two dams are constructed on the banks of this river (www.savepampa.com, 2015).

The temple is situated at a height of about 914 m. above the sea level in the dense forest, forming a part of the Periyar Tiger Reserve. Motor vehicles are allowed only up to Pampa and there after the devotees have to climb the 4 km. long steep stretch to reach the temple. Therefore, Pampa has become a base station for the pilgrimage. It is estimated that , there is 20% increase in the pilgrims each of the season(The week, January 31, 1999). The gross inadequacies, at Sabarimala, for accommodation, sanitation, transportation and communication have led to water pollution, land pollution, traffic congestion and parking congestion. The pilgrims to Sabarimala have to stay at least one day both at sannidhanam or Pampa and due to the inadequacy of the sanitary facilities, many resort to open-air defecation (Baby M.D, 2003). Large numbers of pilgrims visit the Sabarimala temple during the Mandala Pooja and Makara Vilakku festival season. Among the devotees, 40 percent hail from Kerala and the remaining 60 percent are from rest of India especially from the neighbouring States of TamilNadu, Andhra Pradesh and Karnataka (Baby M.D, 2003).

It is noted that normally the pilgrim season ends with wide spread diseases due to pollution and the scavenger flies. This affects not only the people near the Sabarimala but also the neighbouring districts. The huge solid waste created by the pilgrim and the ill-planned sewage treatment plant have created irreversible damage to the ecosystem. Newspaper reports says that, "... Severe water pollution caused the streamlets in the river in and around the 65 sq.kms. of the Sabarimala Region. The pilgrims use these water bodies for drinking and other daily needs. "The river Pampa is being polluted with filth and bio waste. Around 3000 families live down stream and are affected by the polluted Pampa." (Cited from Baby,M.D, 2003).

The water pollution problem in the Pampa river is not a new one. Therefore news papers and other Medias reported it from time to time. The State Pollution Control Board has observed that the quality of water at river Pampa is good before the Sabarimala season begins. The quality of water gets deteriorated slowly once the pilgrim season begins and gets polluted heavily when the number of pilgrims increases. The count of coliform bacteria during the pilgrim season was 95000mpn/100ml in 1996-97 has increased to 2.5 lakh in 1999-2000. This has exceeded 3.2 lakhs now (State Pollution Control Board). This is mainly due to open defecation done by pilgrims by the riverside, over flows from the pits of public latrines, the waste discharged from the hotels etc(The Hindu, 1994; 2012). The other human activities aggregated the problem. The alarming state of affairs is caused owing to large scale extraction of river sand, lowering the riverbed by 5 to 6 meters in the past 2 decades(The Hindu,26/2/2014). The paper continued that there is a rise in the communicable diseases in the river basin. The unscientific construction of a protection wall in the mid-stream of the river has already converted the river into a small canal along the Maramon stretch (The Hindu, 2/2/2012).

Another study pointed out that the contamination is due to unrestricted tourism activities and anthropogenic activities such as directing human waste and dumping of solid waste from hotels (Varghese Lata Marina, 2012). The contamination also affected the fisheries resources and biodiversity (Kumar Renjith, et al, 2011). A PhD thesis analysed water samples for 25 parameters, majority recorded to cross the limit of tolerance (Sajudeen.P.A, 2013). The study also found the threat of super chlorination, the presence of chlorination disinfection byproducts such as Trihalomethanes and Halo acetic acid, leads to cancer among human beings and adversely affect other living organisms. The large numbers of temporary latrines constructed during the peak pilgrim season has aggravated the problem. The sewage from these latrines reaches the river directly and leads to pollution (Thomas George and Shaju K. John, 2015). Another study found that sewage is the major source of dissolved organic nitrogen and the unique Sabarimala pilgrim event accounts for most of it(S. Elizabeth David and T. C. Jennerjahn, 2013).

Report shows that the pollution in the Pampa during the annual pilgrim season (Madalam-Makaravilak) causes serious health hazard to the people living in the downstream (Radhakrishnan Kuttoor, 2004). The declining annual rain fall reduces the water level in the Pampa river, which increases the pollution in the water. This is affecting the agriculture and socio-economic development of the downstream population (Mayaja, N.A. and Srinivasa, C.V., 2014). Another paper pointed out that pilgrim activities at Sabarimala led to the high ammonium and phosphate yields in the temple segment (Shilly ElizabethDavid et al 2015).

2.4 Review related to methods of economic valuation

The literature on improved services of water resources is vast and most of the studies use the method Contigent Valuation method. In Kerala, India Contigent Valuation Method is used to determine demand for piped connections (Griffin et al, 1995). The study 'Willingness to pay for improved water supply in Kathmandu Valley' (WSP, 2001) also used CV method. Gunatilake et al (2006) and Wedgewood

Alison and Kevin Sansom(2003) provides practical guidelines for undertaking CV studies. Gunatilake et al(2007), also demonstrates the usefulness of willingness-to-pay (WTP) studies in designing Water Supply and Sanitation projects. The case study was conducted to facilitate the design of public-private partnership for WSS in two service areas in Sri Lanka. They undertook another study on contingent valuation using a stratified random sample of 2083 households in rural Madhya Pradesh, with the objective of estimating the benefits of an improved electricity supply to rural households(Gunatilake et al (2012)). Gunatilake and Tachiiri (2012) investigate willingness to pay for water supply services in Khulna, using a contingent valuation method. The study shows that both willingness to pay the monthly charge and willingness to pay the connection cost are higher for richer households. Welle P et al(2011) assess Property Owners' Willingness to Pay for Water Quality Improvements by Contingent Valuation estimates in two Central Minnesota Watersheds. Another study determined the willingness to pay for the improved water quality and reliability of supply in Chobe Ward, Maun by with the help of CV techniques (Moffat. B et al. 2012). The other studies related to this area are conducted by Zhaoyi Shang et al, 2012, Brett Day and Sousana Mourato, 1998, etc.

Research by International Water Management Institute contributes towards the use of understanding the complexities of natural resource in river basin and provide framework for integrated water resource management (Bandaragoda.D.J, 2000, 2005& 2006; Dimple Roy et al, 2011; Mathew Kurien, 2004; Somarantne.P.G, et al, 2003). In order to solve the problems of one method, a combined method of Contingent Valuation and the Travel Cost are applied in the case recreational benefits of Hussain Sagar Lake(Mishra Prajna Pramita,2014).

There are a lot of studies which used CVM to find the willingness to pay for an improved water quality (Griffin et al, 1995 ; Moffat. B et al, 2012; Gunatilake et al.,2006; Gunatilake and Tachiiri ,2012; Welle P et al, 2011; Zhaoyi Shang et al, 2012, Brett Day and Sousana Mourato, 1998). This method is also used to estimate the benefits of an improved electricity supply to the rural households (Gunatilake et al.,2012) and to value a park(Luciano Pace Parascandalo, 2010). In order to solve the problems of one method, a combined method of Contingent Valuation and the Travel Cost are applied in recreational benefits of Hussain Sagar Lake(Mishra Prajna Pramita,2014). Wedgewood Alison and Kevin Sansom, 2003; provides practical guidelines for undertaking CV studies. Gunatilake et al(2007), also demonstrates the usefulness of willingness-to-pay (WTP), studies in designing Water Supply and Sanitation projects.

To get a monetary use value of the Salini National Park in Malta, Luciano Pace Parascandalo, (2010) used CV approach to people visiting the park. In China a study examined residents' awareness of the value of the river network and employed a logistic regression analysis based on the contingent valuation method to calculate the total benefit and explain the socioeconomic factors influencing the residents' willingness to pay(Zhaoyi Shang et al, 2012). The results shows that majority of respondents were willing to pay for the protection of river network.

Both revealed preference method and stated preference method are not free from limitations. The problems of revealed preference methods are stringent assumptions, crucial elements are inherently difficult to measure and non-use values cannot be captured (Bruno Frey, 2004). Whereas stated preference method leads to strategic behaviour and unreliable response. Moreover, the respondents fail to consider the effect of their budget constraints and substitutes due to the hypothetical questions (Kahneman et al. 1999b). In order to solve these problems a lot of literature used a straight forward method of evaluating public good, subjective well-being or life satisfaction data, for measuring utility(Bruno Frey, 2004). This life satisfaction approach is used to estimate utility losses caused by terrorist activities in France (Bruno S Frey, 2004). With the help of life satisfaction approach another study found the value of air quality and supplemented by hedonic property pricing (Simon Luechinger, 2007). Another study established life satisfaction approach used to measure an individual's willingness to pay for crime reduction (Christopher L. Ambrey et al, 2012).

2.5 Conclusion

Human activities includes a progressive transformation of economy and society. Unless this transformation consider the changes in the natural resources, the cost to the ecology is very large. Thus based on the theories, the following points should be kept in mind while implementing a policy to control the pollution at Pampa near the pilgrim center. Government intervention is necessary to control the pollution and the transaction cost of implementing the policy should be minimum. Cost of pollution is imposed on the polluters and as such the pilgrims should pay an amount to the government. Based on the ecological principle, it is not the price for the pollution and the government should use the fund to rejuvenate the river from pollution. Since it includes very sensitive categories such as pilgrims, environment and political factors, at most care should be given to finalise a solution.

Chapter 3

DEMAND FOR WATER AND WATER POLICIES IN KERALA

This chapter provides an overview of demand for water and water policies in Kerala and the national context. The review of the assessment includes need for market intervention, economic value of the river water and water policies.

3.1 Demand for water

Global water demand is rising faster than at any other time in human history (Sandor R, 2014). The natural resources which is already scarce with no substitute are declining due to pollution, drought and decreasing snow cover. Even though our planet's surface is covered more than 70% with water, only 2.5% is fresh water and 1% of it is available for consumption. Against these challenges, water is necessary for life sustenance and we should conserve it properly. All the economic activities are directly or indirectly linked with the water resources. About 22% of global gross domestic product (GDP) comes from regions where water is scarce, the growth-limiting concerns from water scarcity are critical. It is estimated that more than 1 billion people lack access to a safe water supply and close to 2.5 billion people lack access to proper sanitation. In developing countries, 80% of all childhood illnesses and deaths are directly or indirectly caused by unsanitary water.

India occupies 18% of world population having only 4% of renewable water resources. The spatial variations in the availability of water resources increases the water stress. Besides, rapid growth in demand for water due to population growth, urbanization and changing lifestyle pose serious challenges to water security (National Water Policy, 2012). According to Amarasinghe, the per capita availability of water in India declined from 5400m³ in 1950 to 1900m³ in 2000. Another study pointed out that the per capita water availability, assuming a total of 1,000 bcm, is thus reduced to 750 cubic metres (cm), less than half the 1,700 cm considered necessary for maintaining a modicum of human dignity (Vinod K Gaur, 2016). The paper by Amarasinghe projected the total water demand to increase from 680 BCM from the current level to 833 BCM by 2025, and to 900 BCM by 2050. In the next decade the demand in water is expected to grow by 20 percent, fuelled primarily by the industrial requirements which are projected to double from 23.2 trillion liters at present to 47 trillion liters (Pan IIT conclave, 2010).

According to a World Bank estimate, more than 100million people in India do not have access to clean drinking water, and more than 20% of endemic diseases are a direct result of this deficit.

Kerala is blessed with the water resources, which are depleting continuously. Fresh water resources in the state is lowest compared to other state with an average rainfall of about 3000mm a year. The per capita availability of water declined from 59.26 litre per day in 1901 to 11.062 litre per day in 2001 (Government of Kerala). The high dependence on ground water by the state leads to huge decline in ground water and the state occupies the third position after Tamil Nadu and Panjab. Regarding the contamination of ground water Kerala (33.74%) occupies the first whereas the national average is 11.8 % (Economic Review, 2012). According to National Water Policy, 2012, low consciousness about the scarcity of water and its life sustaining and economic value results in its mismanagement, wastage, and inefficient use, as also pollution and reduction of flows below minimum ecological needs.

3.2 Need for market intervention

Rivers of India and Kerala are highly polluted. It includes Ganga, Yamuna, Pampa, etc. The main reason for this is the anthropogenic activities by the local people or the tourists. All these badly affects the health of the local people, downstream population, pilgrims and the flora and fauna. With these challenges focussing national policies on the supply side is not fruitful (Vinod K Gaur, 2016).

The concept of 'sustainable development' has become a serious one since the 1992 Rio Conference. Economists have controversial views about the equity and efficiency aspects of this concept (Daly, 1990; Meadows et al 1992). There is also a trade-off between sustainability and present value maximising optimality. Another economic approach to defining sustainability focuses on maintaining the means which are available to society to generate well-being or consumption of resources (Hanley et al, 2007). In order to assess the sustainability of resources economists classified resources into different forms of capital (Hanley and Atkinson, 2003) such as manmade, human, natural and social. Sustainable development in this context means the non-declining stock of capital over time. When the use of particular resource is in an unsustainable manner, then it will lead to declining the stock. The ecological economists have the view that we cannot substitute the reductions in natural capital with increases in other capital (Norton and Toman, 1997). That is critical natural capital like water is either essential for human survival or not substitutable for the increases in other capital. So protecting the natural resilience of water is very important for sustainable development of an economy. Here comes the importance of inter-generational well-being. But the major trouble to achieve this strong sustainability is the widespread negative externality associated with the river water.

This negative externalities or market failure can be corrected through government intervention in terms of managing the scale and manner of economic activity and environmental impact. Generally the nature of pollution in river water in India is non-uniform mixing. So in order to control local people and the tourist government may introduce charges or standards. But in the case of different production unit, cap -and- trade mechanism is suitable.

3.3 Economic value of the river

Pampa river provides all the ecosystem services such as provisioning, regulating, supporting and cultural services. The use of water for different purposes like bathing, washing, etc. come under the category of provisioning services of the river. The major regulatory services of the river are recharge of ground water, stabilize pollution and maintain biodiversity. For example the ground water recharging capacity of the river may protect the agricultural production, properties, land values and even human lives. As a cultural service it provides aesthetics by retaining natural vegetation and spiritual value.

The total economic value of the river ecosystem services is the sum of direct use value, indirect use value, option value and existence value. Direct use values are derived from the direct use of the water resources. Direct use values include both consumptive uses and non-consumptive uses. The consumptive uses of the river resource are the direct use of the river water. The non-consumptive use of the river is for tourism purpose. Indirect use values are the indirect support and protection provided to economic activity and property by the river's natural functions or regulatory environmental services.

Option value is a type of use value because it relates to future use of the river. Option value arises because individuals may value the option to be able to use the river some time in future. Thus there is an additional 'premium' placed on preserving the river and its functions for future use. Option value may be particularly important if one is uncertain about the future value but believes it may be high and current exploitation or conversion may be irreversible. Similarly environmental regulatory functions of river ecosystem may become increasingly important over time as economic activities develop and spread in the region. A special category of option value is bequest values which result from individuals placing a high value on the conservation of the river for use of future generations. The motive is the desire to pass something on to one's descendants. Bequest value may be particularly high among the local populations currently using or inhabiting the river. They would like to pass on to their heirs and future generations their way of life and culture that has co-evolved with river.

Non use values are derived neither from current direct nor indirect use of the river. There are individuals who do not use the river but nevertheless wish to see them preserved 'in their own right'. These 'intrinsic' values are often referred to as existence values. Existence value is derived from the pure pleasure in something's existence, unrelated to whether the person concerned will ever be able to benefit directly or indirectly from it. However, several economic studies have shown that the 'existence value' of ecosystems constitute a significant percentage of total economic value.

3.4 Water policies

In order to regulate the water resources and to achieve sustainable development proper policy is necessary. National and international organizations introduce policies and programmes to protect the water resources. United Nations Department of Economic and Social Affairs (UNESA) has declared the period 2005-15 as International Decade for Action and the slogan is "Water for Life". The goal of the IWRM is the socially determined fair allocation of water across all uses and users (Sharachandra Lele, Veena Srinivasan, 2016). International Network of Basin Organisations in 1994, Global Water Partnership in 1996 were created to support the Integrated Water Resource Management (IWRM) implemented by different countries. The United Nations World Water Development Report 2017 describes how improved wastewater management is essential in transitioning towards a circular economy and to achieving the 2030 Agenda for Sustainable Development.

India established Pollution Control Board to prevent and control environmental pollution as part of the Water Act of 1974 (Amendment, 1988). According to the act polluting the water bodies is a serious offence. The objective of Environmental Protection Act, 1986 is to protect the environment of the economy. Environmental measures to regulate emissions of air and water pollution are important because of the limitations of market induced correctives. In order to govern the planning and development of water resources and their optimum utilization, the government introduced water policy in 1987, and revised in 2002, 2012, and 2016. The Shaw Committee on National Water Commission, 2016 recommended that the apex body should consider the social and ecological dimensions of water use. The report represents a very important and much-needed change in the current institutional structure of water management in the country (Shripad Dharmadhikary, 2016). This will help to create a new culture of water management structure in the country (Vinod K Gaur, 2016).

The Kerala water policy- 2008 highlights the importance of long term sub basin and river basin operations and monitoring plan and state water resource plan. It also emphasises the need for correcting the mismatch of demand and supply of water with the help of stakeholders and local self-government. The state/local self-government can play a major role in preventing waste disposal in different water resources. But the initiatives of different government in this regard is very less.

3.5 Conclusion

Regardless of these unique characteristics, water markets are like all other markets in that they can prosper only in an environment of definite property rights. Much like the institutions that were created for carbon trading, a market infrastructure is needed for water markets to exist and thrive. Monitoring, verification and product standards are necessary for the existence of a proper water market. It needs structural changes in the institutional framework that recognises policies to support property rights, power to implement standardization and verification procedures.

Chapter 4

PAMPA RIVER: VALUES AND ATTITUDES OF LOCAL HOUSEHOLDS

Estimation of values that the households place on environmental services requires the use of non-market valuation methods. There is a lot of literature now about the use of these methods for estimating the household values of environmental resources (Freeman, 1993; Mitchell and Carson, 1989; Murty and Surender Kumar, 2004). Generally the hypothetical behavioural methods comprising contingent valuation and other alternatives such as choice based approach, contingent ranking method, happiness approach, etc. can be used to measure both user and non-user benefits from environmental resources. This chapter provides an outline of the attitude and perception of the local people regarding the river.

4.1 General characteristics of the households

The survey covers households nearest to Pampa river from three panchayaths, Vadsserikkara, Naranammoozhy and Perinad. Altogether 160 sample households are collected. The details of the sample households are shown in the Table 4.1. The questions were asked to the senior members in a family. About 26.2% of the respondents are male and 73.8% of the respondents are female. About 91.9% have property directly close to the river where as 8.1% have property almost nearest to the river. The classification of households on the basis of land holding in cent is shown in the Table 4.2. The average size of the family is 4.08. Around 64.4% are Hindus and the remaining 35.6% are Christians.

Table 4.1
Classification of sample households according to the Panchayat

Sl.No.	Categories in cent	Number	Percentage
1	Vadaserikkara	50	31.2
2	Naranammoozhi	73	45.6
3	Perinad	37	23.1
Total		160	100

Source: Sample survey, 2016

Table 4.2
Classification of households on the basis of land holding

Sl.No.	Categories in cent	Number	Percentage
1	Less than 10	112	70
2	11-20	24	15
3	21-40	14	8.8
4	40-100	2	1.2
5	Greater than 100	8	5
Total		160	100

Source: Sample survey, 2016

Majority (54.4%) of the respondents comes under the age group 36-49 (Table 4.3). Education of the respondents shows that around 43% have qualified pre degree and degree. Even though 2.5% do not have any formal education, they are literate. The occupational status of the respondent's shows that majority (64.4%) of them are not an earning member in the family. Their monthly income shows that most of them (91.8%) comes under the category less than twenty thousand.

Table 4.3
Percentage distribution of household based on socio-economic characteristics

Characteristics	Number
I Age	
18-24	10(6.2)
25-35	59(36.9)
36-49	87(54.4)
50-65	4(2.5)
Total	160(100)
II. Average Monthly Income of the households	
Less than 10000	73(45.6)
10001-20000	74(46.2)
20001-40,000	9(5.6)
40001-80000	4(2.5)
Total	160(100)
III. Education	
Informal	4(2.5)
Upto tenth standard	87(54.5)
Higher secondary	59(36.9)
Degree	10(6.2)
Total	160(100)

IV.Occupation	
Casual work	6(3.8)
Regular work	51(31.9)
House wife	103(64.4)
Total	160(100)

Source: Sample survey, 2016.

Note: Figures in bracket show percentage

4.2 Perception about the river

It is noted that the river water is a necessary item in their daily life. About 40.6% of the households use the water every day (Table 4.4). About 80% of the households use the water for bathing and washing (Table 4.5). The others category includes items such as the use of water for agriculture, for washing utensils in the kitchen, etc. (Table 4.6).

For the question, the level of satisfaction associated with the river water, the whole respondents answers the lowest two category out of the five options. That is majority of them are extremely dissatisfied (73.1%) with the level of water use and 26.9% are somewhat dissatisfied with the water use. The reasons behind the poor water quality are assessed on the basis of the multiple response method (Table 4.7). There are various reasons on the part of the single respondent. As such the responses are coded and the highest response comes in the case of low water level (73.12%) followed by waste in the river water and poor quality of the water. The other category includes sand mining, presence of vegetation in the water body and the unscientific method of fishing. This bad situation of the river affects the livelihood of 90% of the households (Table 4.8).

Mrs.Thresiamma (the name is changed), 40 year, housewife, have two children and her husband working abroad, directly collects the river water and stores in overhead tank for household activities except for drinking and cooking purpose. Even though, she owns a well, the water is not sufficient for their whole purpose. For purification she use only potassium permanganate and puts it in the tank in which river water is stored. She is totally disappointed with the high pollution, low level of water and unnecessary vegetation in the river. She remembers the clean and high flow of water in the river earlier.

During summer season when the water level in the river declines, people usually cultivate vegetables in the river plateau. Recently, they found a lot of plastic wastes while preparing the land for cultivation and the yield from the land has also declined. Mrs. Ammini (the name is changed)told that both local people and tourist throws waste into the river.

Remani(the name is changed) , 65 year commented that "I used the river for bathing purpose since I was six years old. My experience is that any normal disease can be cured while bathing in the river. Recently, the pollution in the river is very high and felt itching while bathing during the peak pilgrim season. I am totally dissatisfied with this situation". However, Remani used the river for bathing except a few days in the pilgrim season. She believed that, bathing in the river keeps her healthy. But the younger generations do not have such feelings and they rarely use the river for bathing purpose.

Table 4.4
Classification of households on the basis of the use of river water

Sl.No.	Categories	Number	Percentage
1	Occasionally	39	24.4

2	A few times in a month	56	35
3	Almost everyday	65	40.6
Total		160	100

Source: Sample survey, 2016

Table 4.5
Classification of households on the basis of the purpose of use

Sl.No.	Categories	Number	Percentage
1	Swimming	6	3.8
2	Bathing and washing	128	80
3	Washing clothes	3	1.9
4	Others	23	14.4
Total		160	100

Source: Sample survey, 2016

Table 4.6
Satisfaction related to the quality of water of the respondents

Sl.No.	Categories	Number	Percentage
1	Extremely dissatisfied	117	73.1
2	Somewhat dissatisfied	43	26.9
Total		160	100

Source: Sample survey, 2016

Table 4.7
Factors which leads to the poor satisfaction level of the respondents (Multiple response method)

Sl.No.	Categories	Number	Percent of cases
1	Poor water quality	95	59.38
2	waste in the river	108	67.5
3	Low levels of water	117	73.12
4	Others	24	15

Source: Sample survey, 2016

Table 4.8
Opinion regarding poor water quality affects the livelihood of the respondents

Sl.No.	Poor quality of water affects our livelihood	Number	Percentage
1	Strongly disagree	3	1.9
2	Disagree	7	4.4

3	Neutral	5	3.1
4	Agree	59	36.9
5	Strongly agree	86	53.8
Total		160	100

Source: Sample survey

4.3 Attitude to improve the water quality of the river

About 90% of the respondents like to support the overall improvement of the water quality. But 10% are of the opinion that it is the duty of the government to protect the water resources. However, all of them are willing to accept compensation from the authority for the depletion of river water. The maximum willingness to accept compensation is Rs. 500/- and the minimum willingness to accept compensation is Rs.10/- per month. The mean of this is Rs. 51.75/- and the standard deviation is around Rs. 50/-. If we calculate the compensation value for 3000 households near the Pampa Triveni, it comes upto Rs. 155,250/ per month and Rs.1,863,000/ per year. The classification of different willingness to accept compensation is shown in the Table 4.9.

Table 4.9
Classification of maximum willingness to accept compensation for the river water pollution

Sl.No.	Category(Rs.)	Number	Percentage
1	10-20	13	8.1
2	21-40	70	43.8
3	41-60	56	35
4	61-80	6	3.8
5	Greater than 81	15	9.4
Total		160	100

Source: Sample survey, 2016

Regarding the collection of fee from the tourist for the improvement of water quality, the opinion of the respondents varies (Table 4.10). About 51.9% agree or strongly agree to charge fee from the tourist whereas 31.2% disagree or strongly disagree to charge fee from the tourist.

Table 4.10
Opinion related to collect fee from the tourists

Sl.No.	Categories	Number	Percentage
1	Strongly disagree	40	25
2	Disagree	10	6.2
3	Neutral	27	16.9
4	Agree	30	18.8
5	Strongly agree	53	33.1
Total		160	100

Source: Sample survey, 2016

In the case of attitude towards implementation of strict policy, all are answered in an affirmative way (Table 4.11). About 73.8% discoursed that it is extremely important to implement strict policy. Majority (66.2%) of the respondents have the attitude to support the development of the river basin. However, they are reluctant to give a particular amount (Rs.200) for every year.

Table 4.11
Attitude to implement strict policy

Sl.No.	Categories	Number	Percentage
1	Somewhat important	6	3.8
2	Very important	36	22.5
3	Extremely important	118	73.8
Total		160	100

Source: Sample survey, 2016

4.4 Conclusion

It is noted that the plastic waste and human waste in the Pampa river affects the living condition and the wellbeing of the downstream households. There is a trade-off between the tourist and the downstream pollution. Based on the willingness to pay and the willingness to accept compensation, it is clear that the river plays considerable role in the livelihood of the households. Theoretically polluters should compensate for the pollution created by them, as such here the duty to pay compensation rests on the tourists rather than the households. Regarding the willingness to accept compensation, households demand it only because of the pollution in the river, so by rectifying the pollution problem, the question of compensation to the local people does not emerge.

Chapter 5

PAMPA RIVER: VALUES AND ATTITUDES OF TOURISTS

Introduction

This chapter tries to comprehend the ecosystem services of Pampa River among tourists and their attitude to its depletion. The demand for improved water is assessed through two approaches CV and Life satisfaction approach. Based on these approaches economic value of the river water is developed and can be used for the sustainable management of the river.

5.1 Socio-economic characteristics of the respondents

Data are collected from 200 tourists-97.5 % (195) are male and 2.5 % (5) are female. About 39.5% belongs to Andhra Pradesh, 43.5% belongs to Kerala, 8% belongs to Tamil Nadu and 9% belongs to Karnataka. The average family size of the tourist is 4.2.

Regarding the education status nobody is illiterate and about 26% have professional education (Table 5.1). The study considers people of age between 18-65 and only 2.5% belongs to the lowest category (18-24) whereas 37.5% belongs to the highest category amongst age group of 50-65. The occupation status shows that all have occupation except 0.5% and 58.5% have regular work. The monthly income of the tourist shows that majority (67%) comes in the lower income category of less than Rs. 20,000/- (Table 5.2).

Table 5.1
Percentage distribution of respondents based on social status

Characteristics	Number
I Education	
Informal	3(1.5)
Upto tenth standard	68(34)

Higher secondary	35(17.5)
Degree	42(21)
Professional	52(26)
Total	200(100)
II. Age	
18-24	5(2.5)
25-35	51(25.5)
36-49	69(34.5)
50-65	75(37.5)
Total	200(100)
III. Occupation	
Casual work	62(31)
Regular work	117(58.5)
Self employed	20(10)
House wife	1(0.5)
Total	200(100)
IV Marital Status	
Single	22(11)
Married	166(83)
Widow/widower	129(6)
Total	200(100)

Source: Sample survey, 2016-17.

Note: Figures in bracket show percentage

Table 5.2
Percentage distribution of respondents based on economic status

Characteristics	Number
I Monthly income(in Rs.)	
Less than 10000	68(34)
10001-20000	66(33)
20001-40,000	34(17)
40001-80000	24(12)
Greater than 80000	8(4)

Total	200(100)
II. Expenditure to the visit (in Rs.)	
Less than 1000	41(20.5)
1001-1500	36(18)
1501-2500	40(20)
2501-3500	33(16.5)
3501-5000	50(25)
Total	200(100)

Source: Sample survey, 2016-17.

Note: Figures in bracket show percentage

5.2 Uses of Pampa River and opinion about water quality

It is noted that nobody uses the river water for drinking purposes. About 88.5% of the people used the water for bathing purposes and 11.5% used the water for both bathing and washing. People spend 1 hour to 9 hours in the vicinity of the river, in which about 20.5% spend more than 4 hours in the vicinity of the river. In the case waste disposal in the vicinity of the river amounts to 37% used waste bin 13% used river to dispose the wastes 20.5% used public place for the disposal of the waste and 29.5% used places nearby the existing waste bin to dispose the waste.

The water quality of the river can be assessed in many ways one is based on their previous experience and the other is based on the aesthetic property of the water. About 87% have visited the pilgrim center more than once. But majority of the previous visitors argued that compared to their previous visit the total quality of the water in the Pampa River has declined (52%). The basic argument is that the level and total structure of the water has declined. This is shown in the Table 5.3. The aesthetic characteristics considered here are overall condition of the water, transparency, odour and nature of water (Table 5.4, and 5.5).

Table 5.3
Opinion of tourists about the water quality

Sl.No.	Opinion	Number(Based on previous visit)	Number (Based on present visit)
1	Strongly disagree	4(2)	41(20.5)
2	Disagree	100(50)	51(25.5)
3	Neutral	46(23)	16(8.0)
4	Agree	29(14.5)	58(29.0)
5	Strongly agree	21(10.5)	34(17)
Total		200(100)	200(100)

Source: Primary survey, 2016-17

Note: Figures in bracket show percentage

Table 5.4
Opinion of tourists about the aesthetic characteristics of water

Sl.No.	Opinion	Water is transparent(Number)	Water is hard(Number)
1	Strongly disagree	12(6)	54(27)
2	Disagree	39(19.5)	62(31)
3	Neutral	30(15)	82(41)
4	Agree	97(48.5)	2(1)
5	Strongly agree	22(11)	0(0)
Total		200(100)	200(100)

Source: Primary survey, 2016-17

Note: Figures in bracket show percentage

Table 5.5
Opinion of tourists about the odour of the water

Sl.No.	Odour of the water is good	Number	Percentage
1	Strongly disagree	18	9
2	Disagree	39	19.5
3	Neutral	58	29
4	Agree	61	30.5
5	Strongly agree	24	12
Total		200	100

Source: Primary survey, 2016-17

5.3 Satisfaction level of the tourists

Here the level of satisfaction is measured by using 10 steps. The first step means low level satisfaction and the tenth step means maximum level of satisfaction. In the survey the level of satisfaction varies from 3 to 8. It is clear from the table that majority comes upto the level 5 (66%). The regression analysis shows that the independent variables pollution and the total expenditure incurred by the tourist are significantly related (Table 5.7). Here the construct pollution is positively related to the satisfaction but logically it is the other way. The reason behind is that divine aspect of the visit influences the satisfaction level indirectly. Most of the tourists particularly people from outside the state argued that even if the water is polluted it will not affect their future visit. As against the theoretical principle here the marginal rate of substitution between income and the pollution is positively related (13.77).

Mr. Y, 28, Professional Degree, 6th visit, remembering his first visit at the age of 10 and complained that the river and its vicinity is depleting continuously. He is willing to pay Rs. 500/ for improved condition and suggested that if the government conserve the whole natural ecosystem, he is willing to pay more than that. However, his satisfaction per visit is increased because of the divine power of the temple. Therefore, depletion of the river water would not affected their satisfaction level and next visit.

Table 5.6
Results of satisfaction derived from the river

Sl.No.	Level of satisfaction	Number	Percentage
1	3	15	7.5
2	4	59	29.5
3	5	58	29
4	6	53	26.5
5	7	14	7
6	8	1	0.5
Total		200	100

Source: Primary survey, 2016-17

Table 5.7
Result of the multiple regression-life satisfaction as the dependent variable

Model	Unstandardized coefficients		Standardised coefficient	t	Sig.
	B	Std. Error	Beta		
Constant	1.232	.143		8.609	.000
Pollution	1.303	.051	.923	25.391	.000
Total expenditure of the visitor	-7.124E-5	.000	-.086	-2.356	.019
Monthly household income*	-	-	.067	1.829	.069

Source: Field survey, R-square 0.790, Adjusted R square 0.788, F 369.81, Significance .000

Note * the result of the excluded variable

5.4 Willingness to pay of the tourists

About 84.5% are willing to pay a fee for the sustainable development of the water resources where as 15.5% do not accept such charges/fees. About 72% pay the amount for the development of the river itself whereas 28% pay for the overall sustainability of the ecosystem. The main reason for the unwillingness of the tourist is that they believe that it is the duty of the government/ Devaswam board to protect the river and its vicinity. Another reason is that the government may utilise the fund for other purpose and they do not believe in government.

Mr X, 55 year, Degree, thirty first visit to the temple, belongs to Andhra Pradesh told that the quality and level of water declined compared to the first few years of his visit. However, the quality water is improved compared to the previous two or three years of his visit. Even though, he is worried about the depletion of the holy river, he would not pay for the improved water quality. According to him as the Pampa River water have environmental and cultural services (divine power), it is the duty of the government to protect the river and vicinity. Besides, he mentioned about the Tirupathi temple, where the environment is neat and clean and everything is done by the government.

Table 5.8
Classification of maximum willingness to pay according to the native place of the tourists

Maximum willingness to pay	Native place of the respondents				Total
	Andhra Pradesh	Kerala	Tamil Nadu	Karnataka	
0	10(12.7)	15(17.2)	6(37.5)	2(11.1)	33(16.5)
5-20	23(29.1)	28(32.2)	6(37.5)	10(55.6)	67(33.5)
21-40	20(25.3)	22(25.3)	0	0	42(21)
41-60	4(5.1)	4(4.6)	0	2(11.1)	10(5)
81-100	12(15.2)	2(2.3)	4(25)	2(11.2)	20(10.0)
101 and above	10(12.7)	16(18.4)	0(0)	2(11.1)	28(14.0)
Total	79(100)	87(100)	16(100)	18(100)	200(100)

Source: Primary survey, 2016-17

Note : Figures in bracket shows percentage

Table 5.9
Classification of maximum willingness to pay according to the age of the tourists

Maximum willingness to pay	Age				Total
	18-24	25-35	36-49	50-65	
0	1(20)	13(25.5)	13(18.8)	6(8)	33(16.5)
5-20	0	14(27.5)	20(29)	33(44)	67(33.5)
21-40	0	8(15.7)	14(20.3)	20(26.7)	42(21.0)
41-60	2(40)	2(3.9)	4(5.8)	2(2.7)	10(5.0)
81-100	0	4(7.8)	10(14.5)	6(8)	20(10.0)
101 and above	2(40)	10(19.6)	8(11.6)	8(10)	28(14.0)
Total	5(100)	51(100)	69(100)	75(100)	200(100)

Note : Figures in bracket shows percentage

Source: Primary survey, 2016-17

Table:5.10
Classification of maximum willingness to pay according to the expenditure incurred by the tourists for the trip

Maximum willingness to pay	Expenditure to the visit (in Rs.)					Total
	< 1000	1001-1500	1501-2500	2501-3500	3501-5000	
0	5(12.2)	8(22.2)	6(15)	8(24.2)	6(12)	33(16.5)
5-20	14(31.4)	6(16.7)	14(35)	17(51.5)	16(32)	67(33.5)
21-40	12(29.3)	10(27.8)	6(15)	4(12.1)	10(20)	42(21.0)

41-60	2(4.9)	2(0)	0(20)	0	0	10(5.0)
81-100	2(4.9)	2(0)	0(5)	0	10(32)	16(10)
101 and above	6(14.6)	12(33.3)	4(10)	4(12.1)	2(4)	28(14.0)
<i>Total</i>	<i>41(100)</i>	<i>36(100)</i>	<i>40(100)</i>	<i>33(100)</i>	<i>50(100)</i>	<i>200(100)</i>

Source: Primary survey, 2016-17

Note : Figures in bracket shows percentage

Table:5.11
Classification of maximum willingness to pay according to the monthly income of the tourists

Maximum willing- ness to pay	Monthly income of the tourist					Total
	Less than 10000	10001- 20000	20001- 40,000	40001- 80000	Greater than 80000	
0	9(13.2)	6(9.1)	14(41.2)	4(16.7)	0	33(16.5)
5-20	27(39.7)	26(39.4)	4(11.8)	8(33.3)	2(25)	67(33.5)
21-40	24(35.3)	14(21.2)	2(5.9)	2(8.3)	0	42(21)
41-60	4(5.9)	0(0)	6(17.6)	0	0	10(5)
81-100	0(0)	10(15.2)	0	8(33.3)	2(25)	20(10)
101 and above	4(5.9)	10(15.2)	8(23.5)	2(8.3)	4(50)	28(14)
<i>Total</i>	<i>68(100)</i>	<i>66(100)</i>	<i>34(100)</i>	<i>24(100)</i>	<i>8(100)</i>	<i>200(100)</i>

Source: Primary survey, 2016-17

Note : Figures in bracket shows percentage

Table 5.12
Classification of maximum willingness to pay according to the time taken to travel by the tourists

Maximum willingness to pay	Time taken to travel by the respondents (in hrs.)				Total
	<4	5-15	16-24	>25	
0	5(21.7)	18(17.1)	2(20)	8(12.9)	33(16.5)
5-20	8(34.8)	33(31.4)	2(20)	24(38.7)	67(33.5)
21-40	4(17.4)	18(17.1)	4(40)	16(25.8)	42(21)
41-60	0	6(5.7)	0	4(6.5)	10(5)
81-100	2(8.7)	12(11.4)	0	6(9.7)	20(10)
101 and above	4(17.4)	18(17.1)	2(20)	4(6.5)	28(14)
<i>Total</i>	<i>23(100)</i>	<i>105(100)</i>	<i>10(100)</i>	<i>62(100)</i>	<i>200(100)</i>

Source: Primary survey, 2016-17

Note : Figures in bracket shows percentage

It is noted that nobody uses the river water for drinking purposes. About 88.5% of the people used the water for bathing purposes and 11.5% used the water for both bathing and washing. People spend 1 hour to 9 hours in the vicinity of the river, in which about 20.5% spend more than 4 hours in the vicinity of the river. In the case waste disposal in the vicinity of the river, 37% used waste bin, 13% used river to dispose the waste, 20.5% used public place for the disposal of the waste and 29.5% used places nearby the existing waste bin to dispose the waste.

About 52% of the previous visitors argued that the total quality of the water has declined compared to their previous visit. The basic argument of them is that the water level and total characteristics of the water has declined.

The result of the regression model is shown in the Table 5.19. The willingness to pay of the tourist is taken as the dependent variable. Since 16.5% of the tourist are not willing to pay for the improvement of the water, for analysing the factors influencing the willingness to pay the study consider only those who willing to pay(83.5%). This can be justified because the reason for their unwillingness is they thought it is the duty of the government to protect the environmental resources.(And another justification is that in the case of Kerala service sector is the booming one and any other sector cannot contribute to the development of the economy). This means that their interest is to protect the Pampa River and they have given value to the resources. The Contingent Valuation is the method which indirectly calculate the value of the natural resources through their willingness to pay. Since the tourist have the value to the river we can consider at the time of all other analysis.

Based on the Tobit model the major factors positively influencing the willingness to pay are the total hours spent in the vicinity of the river and the temple, monthly income of the tourist and size of the family.

Table 5.13
Result of Tobit model-Willingness to pay as dependent variable (Using observation 1-200)

	Coefficient	Std. Error	z	p-value
constant	10.5878	77.7819	0.1361	0.8917
Number of hours spent in the vicinity of the river	16.6482	6.40608	2.599	0.0094***
Size of the family	16.5268	9.03129	1.830	0.0673*
Monthly income of tourist	0.000781174	0.000292358	2.672	0.0075***

Note: $\sigma = 80.942 (8.43552)$, Left-censored observations: 33

Right-censored observations: 0, Chi-square 86.0311 with p-value 2.08249e-019

The minimum willingness to pay is Rs.5 and the maximum willingness to pay is the Rs.500/. The average willingness to pay by excluding those who are not willing to pay is Rs. 63.29 and the standard deviation is Rs. 86.88/. The number of visitors in a particular year differ according to different report, and it varies from 3lakhs to 5 lakhs. If we consider an average of these two, about 4 lakh people visit the place every year and the economic value of the improved water resources is Rs.25,316,000/. Since the satisfaction level and the pollution varies directly among the tourists, the collection of Rs.63.29/ does not affect the tourist. At the same time the only emerging source of state revenue is the service sector, it can be a viable for the state. Meanwhile, the government should ensure the sustainable management of the river and its vicinity.

5.5 Conclusion

Water pollution is the contamination of water bodies such as lakes, rivers, oceans and ground water by human activities. It occurs when pollutants are discharged directly or indirectly into water bodies without adequate treatment. Since nature and use of river water vary from place to place, we should study the problems of each one separately. Full and accurate valuation of river water is essential for decision making related to the use of the resources by the tourist and the local people. By establishing the value of ecosystem services of the river, which vary from river to river, more sustainable policy can be introduced. Here based on the contingent valuation method and life satisfaction approach, the researcher suggests to collect an amount of Rs63.29 as river management fund from every tourists. Even though it needs further research to implement this, the value can be used for further policies. So it will be feasible if the government should develop a comprehensive, participatory implementation tools for managing and developing water resources in such a way that ensures the protection for future. The implications not only concentrated to the advancement of tourist but also to the local people and the whole system. Pampa's River Basin Authority can use the result to support the development and implementation of IWRM in the future.

SUMMARY, MAJOR FINDINGS AND CONCLUSION

“Imprudent use of the environmental resource base may irreversibly reduce the capacity for regenerating material production in the future” (Arrow et al. 1995).

6.1 Summary

Water resources provide all the ecosystem services such as regulating, provisioning, supporting and cultural services. This is fundamental for the development of other ecosystem. The global value of ecosystem services is estimated to an average \$ 33 trillion/year in 1995 and \$145 trillion/year in 2007 (Costanza, 2014). According to the MEA, the value of wetlands is \$15 trillion in 1997. Even though, ecosystem valuation including wetlands is calculated worldwide, most of the policy makers failure to recognise it. As a result wetlands are depleting all over the world. The other reasons for depletion are the public nature of many wetlands products and services; user externalities imposed on other stakeholders and policy intervention failures (R.Kerry Turner et al, 2000). In order to strengthen the decision makers UN Environment promotes awareness of human dependence on ecosystem and its economic impact, develops and promotes knowledge products and tools to value and account for ecosystem goods and services, works with countries to build expertise on value and include natural capital in national statistics and as key criteria in policy-making.

The global trends of waste water shows that on an average, high-income countries treat about 70% of the municipal and industrial wastewater they generate, upper-middle-income countries treat 38%, lower middle income countries treat 28% and low income countries treat 8% (WWD Report, 2017). The increasing demand for quality water and the sustainable development of water resources demand treatment of the waste water system particularly in developing countries.

Sustainable water resources strategies to meet the needs of the ecological system require strong and well-coordinated planning and management. Integrated water resources and catchment planning is a key requirement towards sustainable water resources management (ADB, 2010). The two of the SDGs, goal 6: clean water and sanitation and goal 16: life below water are directly related to the management of water and most of the other goals are indirectly related to the water resource management. The United

Nations World Water Development Report 2017 describes how improved wastewater management is essential in transitioning towards a circular economy and to achieving the 2030 Agenda for Sustainable Development. India established Pollution Control Board to prevent and control environmental pollution as part of the Water Act of 1974 (Amendment, 1988). The objective of Environmental Protection Act, 1986 is to protect the environment of the economy. Environmental measures to regulate emissions of air and water pollution are important because of the limitations of market induced correctives. In order to govern the planning and development of water resources and their optimum utilization, the government introduced water policy in 1987, and revised in 2002, 2012, and 2016.

Pampa river the third longest river in Kerala having the catchment area of 2235 sq.km. The river originate from the Pulachimalai, the hilly area of Western Ghats and flows through the districts Pathanamthitta and Alappusha and reaches the Vembanad lake (In view of its rich aquatic life, the lake is declared as Ramsar site). The two river links with the Pampa are Achencovil (North) and Kakki Aar. Pampa river popularly known as Dakshin Ganga, is famous for pilgrim tourism. The Aranmula boat race and the Sabarimala are the two famous cultural activities takes place in association with Pampa river. Another religious function, Maraman Convention* is also takes place in the banks of Pampa river. Besides there are about 25 drinking water supply schemes depends the river water. The famous Lord Ayyappa temple is situated near the hilly area of Pampa plateau is one of the famous tourist place in South Asia. About three to five crore people visiting the temple every year particularly during the season starting from mid- November to February. Historically people treated Pampa as Holy River and they believe that a dip in the river wash out all the sins. The huge pilgrims in an ecological sensitive area polluted heavily the river and its vicinity. The major pollution is due to plastic wastes and human wastes. According to State Pollution Control Board the coliform bacteria is more than three lakhs per 100ml water. This is affecting about 40 lakhs downstream population and flora and fauna. Thus pollution in the Pampa River affecting the provisioning, regulating, supporting and cultural services of the river. According to the United States Environmental Agency, one of the most important water pollution is biodegradable waste such as human and animal waste and sometimes the effects of these are severe than nuclear waste.

There are a lot of programmes implemented by the Central and State government continuously to control pollution during the pilgrim season. But all these are inadequate in the present situation of increasing number of pilgrims. The existing sewage treatment plant is inadequate for the large group and the spill over from the plant increases the coliform bacteria in the river. This is not only created environmental damage but also affects the social, economic and mental well-being of the downstream users. Thus there is a trade-off between pilgrims and the downstream population. The actual problem of water pollution occurs when there is no market mechanism to trade between downstream and upstream users (Tore Hundloe and Christian Crawford, 2012). It is the duty of the apex body to protect the social and economic dimensions of water use (The Shaw Committee on National Water Commission, 2016). This shows the need for an important policy change in the present system. That is the current institutional structure or culture of water management in the country should be changed (Shripad Dharmadhikary, 2016; Vinod K Gaur, 2016). In this context, the question arise here is how can we strengthen the existing system of financing to protect the Pampa River in a sustainable manner? This stresses the need for a new system of water resources management. The specific objectives of the study are to estimate the demand for improvements in the water quality of the Pampa River and to develop an alternative policy to manage the river in a sustainable manner.

The study is primarily empirical and both primary and secondary data were used. In order to know the direct use value of the Pampa River, field survey was conducted in the households (local people) nearest to the river and the tourists visited Sabarimala. Based on the random sample method 160 households and 200 tourists were selected as samples of the study. Separate interview schedule is prepared for household survey and pilgrims (see Appendix I and II). The aim of both schedules is to

elicit their current level of satisfaction derived from the use of the river and their willingness to pay for the sustainable management of the Pampa River. In the case of local people the monetary values on the non-marketed commodity, water is measured on basis of willingness to accept compensation for the negative externalities. While in the case of pilgrims direct questions were asked to know their willingness to pay for the sustainable management of the river. Five point Likert Scale and the Cantril's Self-Anchoring Striving Scale are used to form questions related to the construct water quality and satisfaction level. A pilot study was conducted to finalise the questions.

Since the context of the study is based on hypothetical situation, Contingent Valuation method is used to measure the Willingness to Pay/Willingness to accept compensation of the respondents. To avoid directly asking the money value of an improvement in the water quality the study also used Life Satisfaction Approach (LSA) which comes under the subjective wellbeing approach. Besides, this method does not assume hypothetical scenarios. As a result we can avoid unreliable responses and strategic behavior. The idea behind this approach is that subjective wellbeing is an indirect method to measure the welfare of an individual.

The study is divided into six chapters. The introductory chapter includes the significance of the topic, statement of the problem, objectives, methodology, scope and organization of the study. The second chapter provides a review of theoretical context, the research problem and the methodology of environmental valuation adopted by different studies. The demand for water and the existing water policy of the government and regulatory mechanism in Kerala is assessed in the third chapter. The fourth chapter analyses the perception and satisfaction level of the local people. The fifth chapter analyses the demand for the river water and the maximum willingness to pay by the pilgrims. The concluding chapter includes the summary of the study, major findings, policy implications and conclusion.

6.2 Major Findings

Based on the literature the study found that the Pampa river is depleting due to human wastes and plastic wastes and one of the major causes of pollution is unrestricted tourist activities at the pilgrim center Sabarimala. Even though the authorities introduced different programmes to conserve the Pampa river during the last three decades, the pollution in the river is still continuing.

The two schools of thought associated with the protection of natural resources are neoclassical economics and ecological economics. The first one believes in the weak substitutability of resources that is manmade capital can be substituted for natural capital. The second one believes in the strong substitutability of resources that is the natural resources cannot be substituted with the manmade capital. Since ecosystem is a subsystem of ecological system and the irreversibility property of the water shows that one cannot substitute it with the other alternatives. Besides the river is associated with several cultural practices and treated it as Holy River, the sustainability of the river depends on the principle of strong substitutability.

By assessing the conventional theories in environmental economics such as command and control, Pigouvian taxes, Coasian bargaining principle and the cap and trade, one can conclude that for achieving the sustainability of natural resources we need an authority to control, the authority can charge a fee, the transaction cost of implementing the policy should be less and the authority can fix a limit to pollution. Since Pampa river pollution affects the downstream population, the tourists, agricultural practices and the flora and fauna, it is an ecological issue. But conventional method of charging a price and right to pollute is not a solution according to ecological economics. Therefore, method of pricing viable to the principle of ecological economics is the only solution. So here the principle is to charge a fee and use the amount for the sustainable management of the river. It will protect the river and the flora and fauna.

The increasing demand for water resources worldwide and the scarcity of fresh water stresses the importance of protecting the water bodies. Recently national and international programmes focus on the sustainable management of water resources. The Sustainable Development Goals is one among them. Most of this goals keep a balance among the ecology, economy and society. In order to achieve these goals, we should adopt sustainable management practices.

The sustainable development practices in water resources can be achieved only in an environment of definite property rights. The existing policies and programmes are more biased towards the supply side of the water resource management and neglect the demand side. Therefore structural changes in legal framework is necessary to support demand side of water resource management and power to implement standardization and verification procedures.

It is noted that the river water is a necessary item in the daily life of the households. About 80% of the households use the water for bathing and washing and 40.6% of the households use the water daily. Regarding the level of satisfaction associated with the river water use, majority of them are extremely dissatisfied (73.1%) and 26.9% are somewhat dissatisfied. The major factors influencing the satisfaction level of the respondent are religion, area of land, how far the poor water quality affects livelihood, attitude to support the improvement in the river basin and the size of the family. It is noted that all these variables are negatively related to the satisfaction level.

The households are not willing to pay for the protection of the Pampa river. But they are willing to accept compensation. The minimum willingness to accept compensation is Rs. 10 and the maximum willingness to accept compensation is Rs. 500/ per month. The average willingness to accept compensation and is Rs. 51.75/ and the standard deviation is Rs.50.44/. In the case of compensation value for 3000 households near the Pampa Triveni, it comes upto Rs. 155,250/ per month and Rs.1,863,000/ per year. Actually there is a trade-off between the tourists and the households. This can be solved by protecting the river water from human wastes and plastic wastes.

In the case of tourists the level of satisfaction is measured by using 10 steps. The first step means low level of satisfaction and the tenth step means maximum level of satisfaction. In the survey the level of satisfaction varies from 3 to 8. It is clear from the table that majority comes upto the level 5 (66%). The regression analysis shows that the independent variables pollution and the total expenditure incurred by the tourists are significantly related. Here the construct pollution is positively related to the satisfaction but logically it is the other way. The reason behind is that divine aspect of the visit influences the satisfaction level indirectly. Most of the tourists particularly people from outside the state argued that even if the water is polluted it will not affect their future visit. As against the theoretical principle here the marginal rate of substitution between income and the pollution is positively related (13.77).

All the tourist interviewed stresses the need for protecting the river. But 15.5% of tourists are not willing to pay for the improvement of the resources and they argued that it is the duty of the government to protect the river. Even though they are not willing to pay for the improvement of the river they have the desire to protect the river. The minimum willingness to pay is Rs.5 and the maximum willingness to pay is the Rs.500/. The average willingness to pay by excluding those who are not willing to pay is Rs. 63.29 and the standard deviation is Rs. 86.88/. The number of visitors in a particular year differ according to different report, and it varies from 3lakhs to 5 lakhs. If we consider an average of these two, about 4 lakh people visit the place every year and the economic value of the improved water resources is Rs.25,316,000/. Since the satisfaction level and the pollution varies directly among the tourists, the collection of Rs.63.29/ does not affect the happiness of tourists.

6.3 Policy Implications

The three stakeholders linked with the depletion of Pamba river are government, tourists at Sabarimala and the downstream households. Developing a policy to protect the river, without affecting any of these groups is a challenging one. Here based on the contingent valuation method and life satisfaction approach, the researcher suggests to collect an amount of Rs63.29 as river management fund from every tourist. According to the ideology of ecological economics, the ultimate aim is to protect the river. So the amount will be used for the conservation of the river. Since the marginal rate of substitution of income and pollution is positive among the tourists, the government can increase the value according to the necessity of the full river management system. Even though further discussion is needed to know the political implications of this, the value can be used for further policies. So it will be feasible if the government should develop a comprehensive, participatory implementation tool for the sustainable management of the river. The implications are not only concentrated to the advancement of tourists but also to the local people and the ecological system. Pamba's River Basin Authority can use the result to support the development and implementation of IWRM in the future.

In Kerala since the contribution of agriculture and manufacturing sector to state domestic product is declining, the service sector, particularly the tourism sector is a viable source of income. So charging an environment protection fee can be justified in this sense also.

6.4 Limitations of the study

During the last few decades, pilgrim tourism at Sabarimala has had substantial effects on the Pamba river and its ecosystem. Even though there are a lot of other factors that aggravated the degradation of Pamba river, the present study considers only the point source pollution at Sabarimala. This study assesses the status of the water resources in the Pamba river, including the households and pilgrims, as well as issues of environment, conservation and sustainability. The study employed economic value to the Pamba river and did not examine the present institutional arrangements for water resources management or water quality. On the basis of the field survey the report presents an outline framework for future water resources planning and sustainable management.

6.5 Conclusion

The rising requirements of water from the pilgrims have increased greatly and it will further aggravate if women are allowed for the visit. During pilgrim season the river already crossed many thresholds and it becomes endangering the basic structure of the river. This is not an unexpected thing and it affects the other ecosystems like soil, forest, etc. Every year the situation occurs and the study tried to find a solution through economic valuation. The concept of sustainable development integrates these issues and provides a permanent solution for this. Efforts are given more to the ecological perspective of water resource management.

One of the basic principles of ecology is that natural resources are mutually interrelated. Therefore, ecological economists are against the total value of natural resources as environmental economists price them. According to them, the value of a particular entity in the natural environment should be assessed on the basis of its contribution to the sustainability of the ecosystem as a whole. The underlying premise of ecological pricing is that by changing government policy one can correct the problems in the money economy. Therefore, collecting a fee for the sustainable development of the river can be justified. And compromising the river pollution for pilgrim tourism is not acceptable in the ecological point of view. So the government should use this fund for the preservation, enhancement and rejuvenation of the Pamba river.

APPENDIX I

Interview Schedule for Tourists

Pilgrim Tourism and Ecological Sustainability: A Case Study of Pampa River in Kerala

Sabarimala, the famous pilgrim centre in Kerala is situated near the banks of Pampa River, a holy river, under the threat of pollution due to anthropogenic activity particularly during the pilgrim season. The state and central government have constituted a number of projects for the sustainable management of the river. They are planning to undertake programs to keep the river and its surroundings clean and provide ample facility for pilgrims (As part of the National Pilgrim Centre). This survey is conducting to suggest them about the pilgrims' perception about the river and willingness to pay for the improvements of the water resources.

I Behaviour of the Sabarimala Pilgrims

1. Including this trip, how many times did you visit the Sabarimala and Pampa river within the past three years? _____
2. Name the months during which you visit _____
3. What about the quality of the water and surroundings of the river compared to the previous visit (If there are more than one)
 1. Improved
 2. Worsened
4. Where do you live (Write the state and place) _____
5. What was the travel time taken to reach Sabarimala (travel time) from your home _____ hours
6. How did you come to the place
 1. By public bus
 2. Private vehicle (Specify)
 3. By train
 4. By foot
 5. Others (specify)
7. How many hours did you spend in the vicinity of Sabarimala and Pampa river
 1. Date and time of arrival :
 2. Date and time of departure
8. Did you stay in the vicinity of the river?
 1. Yes
 2. No
9. If No, where did you travel from today _____ (Name of the place stayed)
10. If yes, where did you stay yesterday (write the place and institution)?
11. Total number of members accompanying with you: _____, Children _____ Adult _____
12. How much money in total do you spend for the trip:
13. How much money you have spent for the following categories
 1. Transportation _____
 2. Boarding _____
 3. Food _____
 4. For temple _____
 5. Others _____
14. How long do/did you plan to stay/staying at the vicinity of Pampa River _____

15. What are the activities you do in the river?
 1. Bathing 2. Washing 3. Leave dresses and other materials in the river
 4. Others(Specify)
16. Where do you put unnecessary things (waste) while you are in the vicinity of the river.
 1. Waste bin 2. River 3. Throw away 4. Others(Specify)

II Environmental Issues and Water Quality

Following are a number of statements regarding how you perceive yourself about Pampa river

17. I think the standard of water quality is good
 1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree
18. I am satisfied with the transparency of the water
 1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree
19. I feel bad smell in the water
 1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree
20. I have used the water for drinking
 1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree
21. I think that taste of the water is good enough
 1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree
22. I feel the water is hard
 1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree
23. I am satisfied with the quality of the river water(Choices varies from 1 to 10, apply satisfaction ladder)
24. The poor quality of water do not affect my visit to the temple
 1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree

III Willingness to Pay of the Pilgrims

25. In order to improve the water quality and bathing facility, if the government introduced an entry fee for the pilgrims, do you accept it.
 1. Yes 2. No
26. If no, why?
27. If the answer is Yes for question 25, what is your willingness to pay
28. If the government provide all the facilities (bathing, improved the quality of water and aesthetic view) for the pilgrims, what is your maximum willingness to pay?
29. What is the most important reason for your willingness to pay?(can enter multiple responses)
 1. For better aesthetic view 2. For better water quality
 3. For future generations 4. It is the right thing to do

5. I do not believe I will have to pay 6. I want a clean environment
 7. For better bathing 8. Others(Specify)
30. What is the most important reason for your unwillingness to pay?(can enter multiple responses)
 1. I do not believe in government 2. The environment is clean enough
 3. I do not have enough income 4. I do not know 5. Others(Specify)

IV Background Characteristics of the Pilgrims

31. Gender: 1. Male 2. Female
32. Age: _____
33. Marital status: 1. Single 2. Married 3. Widowed 4. Divorced
 5. Others(Specify)
34. Total number of family members: _____
35. Monthly income of the household(Rs./month)
36. Total earning members in the family: _____
37. Education of the pilgrim: 1. Illiterate 2. Informal 3. 1-4th standard
 4. 5-7th standard 5. 8-10th standard 6. 11-12th standard 7. Degree
 8. Professional
38. Occupation of the respondent:
39. Religion/Caste:

APPENDIX II

Interview Schedule for Households

Pilgrim Tourism and Ecological Sustainability: A Case Study of Pampa River in Kerala

This booklet should be completed by an adult member of the household. It is important that answer every question. The best answer is the one that reflects the attitude or values of the respondent. The information collected in this study is confidential and will remain anonymous.

Reports shows that the quality of water in the Pampa river is reduced and can be visible from the site also. It is noted that one of the major reasons for the pitiable situation of the water is due to the anthropogenic activities particularly during the pilgrim season. It is affecting the pilgrims and the people who live in the banks of the downstream from Sabarimala. This situation can be altered by a variety of legislation and regulations. The state and central government have constituted a number of projects for the sustainable management of the river. They are planning to undertake programs to keep the river and its surroundings clean and provide ample facility for pilgrims(As part of the National Pilgrim Centre). We would like to hear about your feelings about the quality of water and the management of the Pampa river.

I Pampa River and Behaviour of the Household

1. Do you own property on the side of the river Pampa
1. Yes 2.No
2. Nature of property
1. House 2. Coconut cultivation 3. Others(Specify)
3. Area of land_____
4. How often do you use Pampa River?
1. Rarely 2. Occasionally 3. About once a month 4. A few times a month 5. Almost every day
(If never please go to the question No.7)
5. For what purpose do you use the river?
1. Fishing 2.Swimming 3. Bathing 4.Washing 5. Others(Specify)
6. How satisfied with the quality of water while using?
1. Extremely dissatisfied 2. Somewhat dissatisfied
3. Neither dissatisfied nor satisfied 4. Somewhat satisfied 5. Extremely satisfied
(Please go to the question number 9)
7. Why don't you use the water?
8. Are you satisfied with the quality of water?
1. Extremely dissatisfied 2. Somewhat dissatisfied
3. Neither dissatisfied nor satisfied 4. Somewhat satisfied 5. Extremely satisfied
9. In your opinion what are the major problems facing the Pampa river?
10. Which of the following might improve your satisfaction with the use of the river?

(Please circle all that apply).

1. Improved water quality
2. Controlled waste to the river
3. Increased water levels
4. Others (Specify)

II Quality of the River Water

11. The poor quality of water affects our livelihood?
 1. Strongly disagree
 2. Disagree
 3. Neutral
 4. Agree
 5. Strongly agree
12. What way it affects the livelihood of your household?
13. Do you use water filter/purifier in your house?
 1. Yes
 2. No
14. If the answer is Yes, then which type of filter is using?
15. What is the actual monthly cost of water purifier?

III Health Condition: Episodes of water born disease

16. Details of water born disease affected to the households during the previous 30 days of the survey

Sl. No.	Age	Gender	Occupation	Disease/ symptoms	Cost of treatment		
					medicine+doctors' fee+lab fee)	Wages and income loss	Travel cost during treatment

IV Willingness to Pay of the Household

17. If the management program of Devaswam board/Govt. to improve the water quality of Pampa River yours would you support it?
 1. Yes
 2. No (go to 19)
18. If yes, how much is the maximum willingness to pay of the household?
19. If the answer is no for Q.17, Why you would be against the proposal?
 1. Improving the water quality impairment of the river not worth anything to my household
 2. The costs would be too difficult to pay
 3. Others, (Please explain in the space provided)
20. If the answer is yes for the Q.17 why you would support for the proposal?
 - 1 My household would have increased satisfaction from the increased recreation and other benefits of improved water quality.
 - 2 My household would get satisfaction from knowing that others are benefitting from improved water quality.
 - 3 My household would get satisfaction from knowing this river has improved water quality.
 - 4 Others, please explain in the space provided.

21. If the cost of your household was higher than the amount shown in the previous question, then, is there a higher cost and still your household would be willing to pay and favour the proposal
1. Yes, the highest cost my household would be willing to pay is Rs ___per month
 2. No, the amount shown in Q-18 is the highest amount my household would be willing to pay
22. Do you accept any compensation from the authority?
23. If yes, what is the maximum compensation you are willing to accept from the authority?

V Attitude Towards Management Option

24. Below is a list of statements related to the possible management options for Pampa river. Please tick your degree of importance to support these management options.

Statements	Not important at all(1)	Not very important(2)	Some-what important(3)	Very important(4)	Ex-tremely important(5)
Improving the overall conditions of the river					
Controlling the solid waste to the river					
Introduce strict policy to control waste disposing the river					
Charge fee from the tourist for using the river					
Charge fee only from the tourist					
Introduce strict management policy					
Charge fee for the misuse of the river					

25. Below is a list of possible land use methods for improving water quality.

Please tick the number corresponding to your degree of willingness or unwillingness to support these management options.

Different methods	Extremely Unwilling(1)	Some-what Unwill-ing(2)	Neu-tral(3)	Somewhat willing(4)	Ex-treme-ly will-ing(5)
Pay for increased participation in the improvement of the river basin					
Pay for increased participation in the management of waste					
Cleaning the river					
Pay for the restoration of original nature of the river					
Pay for the construction of additional on-site or septic-type wastewater treatment facilities					
Willing to accept compensation					

26. How effective do you believe the proposal to improve the water quality would be:
1. Mostly effective 2 Somewhat effective
 3. Not very effective 4 Not effective at all

VI Background characteristics

27. Are you: 1.Male 2.Female
28. Age
29. Education
30. Occupation
31. Number of members in the family
32. Religion/Caste
33. House hold monthly income
34. How difficult it would be for your household to pay Rs .**200** every year for the foreseeable future if this proposal passes.
- 1 Very difficult 2 Somewhat difficult
 - 3 Not too difficult 4 Not difficult at all
35. How dependent is your household's livelihood/income on Pampa river related?
- 1 Very dependent 2 Somewhat dependent
 - 3 Not very dependent 4 Not at all dependent

Thank you for participating in this survey. Your input is greatly appreciated.

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- Gandhian Economics
- Marxian Economics
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- ▶▶ Ecology, Sustainability and Tourism
- ▶▶ Interest free banking system
- ▶▶ Globalisation and Islamic finance
- ▶▶ Islamic economics vs. neo classical economics
- ▶▶ Gandhian vs mainstream economics
- ▶▶ Gandhian path and sustainable development
- ▶▶ Marxism vs. liberalism
- ▶▶ Marxian analysis of inequality
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