

## Master of Science in Geography

### Solid waste management, gender and class – The case of decentralized composting waste governance in Thiruvananthapuram, Kerala

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## Table of Contents

<b>1. INTRODUCTION</b>	<b>1</b>
1.1. THE CHALLENGE OF SOLID WASTE MANAGEMENT IN DEVELOPING COUNTRIES	1
1.2. RESEARCH RATIONALES: PERCEPTIONS, DISCOURSES & CULTURAL ISSUES	6
1.3. GENERAL RESEARCH QUESTION	12
1.3.1. THE DECENTRALIZED PROGRAM OF ALAPPUZHA AND ITS RELATIONS WITH GENDER AND CLASS INEQUALITIES	14
1.4. THEORETICAL FRAMEWORK	17
1.4.1. URBAN POLITICAL ECOLOGY	17
1.4.2. INCLUSION OF GENDER RELATIONS IN PE	20
1.5. CHOICE OF THE TOPIC, METHODOLOGY & LIMITS OF DATA COLLECTION	21
<b>2. MUNICIPAL SOLID WASTE IN THIRUVANANTHAPURAM</b>	<b>26</b>
2.1. KERALA AND THIRUVANANTHAPURAM	26
2.1.1. DEMOGRAPHIC AND SOCIO-ECONOMIC CONDITIONS IN THIRUVANANTHAPURAM	29
2.1.2. POLITICAL ALTERNATIONS AT THE STATE AND CORPORATION LEVELS	32
2.1.3. RECYCLING PROBLEMS IN KERALA AND THE COMPOSITION OF WASTE IN THE MUNICIPALITY	33
2.1.4. THE ENVIRONMENTAL AND HEALTH PROBLEMS OF SOLID WASTE IN THIRUVANANTHAPURAM	34
2.2. WASTE MANAGEMENT PROGRAMS IN THIRUVANANTHAPURAM	37
2.2.1. THE CENTRALIZED PLANT OF VILAPPILSALA	39
2.2.2. 2007- 2012: NEW MANAGEMENT, NEW TECHNOLOGIES & PERSISTENT OPPOSITION	42
2.2.3. 2012-2014: WASTE MANAGEMENT WITHOUT PLANT NOR COLLECTION SYSTEM	44
2.2.4. 2014-PRESENT: DECENTRALIZED WASTE MANAGEMENT	44
<b>3. IMPLEMENTATION OF THE DECENTRALIZED SOLID WASTE MANAGEMENT PROGRAM</b>	<b>53</b>
3.1. INAPPROPRIATE TECHNOLOGIES AND MAINTENANCE	55
3.2. SEGREGATION AT SOURCE WASTE COLLECTION SERVICES	59
3.3. SECTION CONCLUSION	62
<b>4. SOCIO-SPATIAL OUTCOMES OF DECENTRALIZED SOLID WASTE MANAGEMENT</b>	<b>64</b>
4.1. THE SITUATION OF KANJIRAMPARA AND SASTHAMANGALAM	64
4.2. INEQUITABLE WASTE MANAGEMENT	65
4.2.1. DIFFERENCES BETWEEN WARDS	65
4.2.2. DIFFERENCES BASED ON SOCIAL CLASS AND THEIR RELATION WITH LOCATION	68
4.2.3. INTERPRETING THE SPATIAL DISTRIBUTION OF WASTE PICKERS	71
4.3. THE DIFFERENT PRACTICES OF WASTE ENTERPRISES AND WASTE PICKERS	71
4.3.1. RIVERS, EMPTY LAND AND FINAL DISPOSAL	72
4.4. THE LOSS OF CONFIDENCE IN THE CORPORATION	73
4.5. SECTION CONCLUSION	75
<b>5. SOCIAL CLASS, GENDER AND POPULATION</b>	<b>77</b>
5.1. WASTE AS A RESPONSIBILITY OF MARGINALIZED PEOPLE	77
5.1.1. A DUTY FOR DIRTY PEOPLE AND A GIRLISH ACTIVITY	77
5.2. FROM A JOB OPPORTUNITY FOR WOMEN TO ADDITIONAL UNPAID ACTIVITY	81
5.3. CAPTURING INCOME-GENERATING ACTIVITIES	82

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<b>5.4. SECTION CONCLUSION</b>	<b>83</b>
<b>6. CONCLUSION</b>	<b>86</b>
<b>6.1. SYNTHESIS</b>	<b>86</b>
<b>6.2. BEYOND THIS PROJECT – POLICY RECOMMENDATIONS</b>	<b>90</b>
<b>7. REFERENCES</b>	<b>95</b>

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## List of Abreviation

CDS	Centre for Development Studies
CED	Centre for Environment and Development
CPI (M)	Communist Party (Marxist) of India
GNP	Gross National Product
LDF	Left Democratic Front
MoEF	Indian Ministry of Environment, Forest and Climate Change
MSWM	Municipal Solid Waste Management
NGO	Non Governmental Organisation
PPP	Public Private Partnership
SEWA	Self Employed Women's Association
SWM	Solid Waste Management
TMC	Thiruvananthapuram Municipal Corporation
UDF	United Democratic Front
ULB	Urban Local Bodies
UPE	Urban Political Ecology

## List of Figures

**Figure 1:** World's gender inequality – An equal population projection

**Figure 2:** Situation of the wards of Sasthamangalam and Kanjirampara in the Municipality

**Figure 3:** Location of Kerala and Keralan main cities in India

**Figure 4:** Socio-economic vulnerability of the wards in Thiruvananthapuram

**Figure 5:** Percentage of working population in Thiruvananthapuram

**Figure 6:** The situation of Vilappilsala at the east of Thiruvananthapuram

**Figure 7:** District of Thiruvananthapuram - Clean wards distribution

**Figure 8:** Biogas plant schema

**Figure 9:** Households and possession of processing plant in Kanjirampara and Sasthamangalam

**Figure 10:** Households and practices of segregation in Kanjirampara and Sasthamangalam

**Figure 11:** Households and access to waste enterprise and waste pickers in Kanjirampara and Sasthamangalam

**Figure 12:** Households of Kanjirampara and Sasthamangalam and their practices with biodegradable waste

**Figure 13:** Households of Kanjirampara and Sasthamangalam and their practices with plastic waste

**Figure 14:** Households of Kanjirampara and Sasthamangalam and their practices with glass waste

**Figure 15:** Households of Kanjirampara and Sasthamangalam and their practices with paper waste

**Figure 16:** Population of Kanjirampara and Sasthamangalam afraid – or not – by the pollutions resulting from waste

**Figure 17:** Households of different incomes in Kanjirampara and their practices with biodegradable waste

**Figure 18:** Households of different incomes in Kanjirampara and their practices with plastic waste

**Figure 19:** Households of different incomes in Kanjirampara and their practices with glass waste

**Figure 20:** Households of different incomes in Kanjirampara and their practices with paper waste

**Figure 21:** Cleanliness of the whole municipality, according to the interviewed families

**Figure 22:** Households members taking care of waste at the household level in Sasthamangalam and Kanjirampara

**Figure 23:** View on the causal feedback mechanism for SWM and Environmental Justice.

## List of Images

**Image 1:** Painting showing women working next to composting plants

**Image 2:** Finance Minister T M Isaac and Mayor V K Prasanth around a waste bin in Sasthamangalam.

**Image 3:** Two pipe plants in Alappuzha

**Image 4:** Family composting plant in the ward of Kanjirampara

**Image 5:** Main road side in Kanjirampara

## List of Tables

**Table 1:** Results and majority for the Kerala legislative assembly since 1982

**Table 2:** Results and majority for the TMC assembly in 2010 and 2015

**Table 3:** Physical characteristics of solid waste in Thiruvananthapuram

**Table 4:** Population impacted by floods in two different wards of the city

**Table 5:** Percent of population thinking that waste collection has improved compared to 5 year ago

**Table 6:** Percent of high, middle and low-income female actors thinking that waste collection has improved compared to 5 year ago



# 1. Introduction

## 1.1. The challenge of solid waste management in developing countries

As of 2008, more than half of the world population is believed to live in urban areas (UNFPA, 2007). Since the beginning of the industrial era, urbanization has experienced an exponential progression alongside demographic growth. At the beginning of the 20<sup>th</sup> century, only one in ten humans lived in a city. In the 1950s, the percentage of the world population living in cities had reached 30% and the United Nations estimates that this figure will be doubled by 2030 (UNESCO, 2014). Population growth, increase in industrial consumption and urban extension are the main factors that contribute to the increase of solid waste production on the earth's surface. The more a population is consumerist, the more it will produce waste. Cities tend to be more consumerist and are therefore big producers of rubbish. Furthermore, the removal and disposal of their waste is particularly problematic in urban areas.

An efficient management of solid waste is essential, because it often is at the root of many problems in regard to health, environment, economy, politics and social development. In developed countries, a slower rate of urbanization, which was slower than in the global South currently, allowed the development of various methods and infrastructures for the treatment of solid waste. The technologies most commonly used in developed countries to deal with solid waste management (SWM) are: storage in managed landfills, incineration, recycling and composting.

However, not all of these technologies are easily applicable in developing countries, where waste is mostly composed of organic matter (Nair & Sridhar, 2005). The significant amount of water contained in this waste makes its incineration ineffective and unprofitable (Medina, 2010). Consequently, in subtropical and tropical regions incinerators have rarely been used successfully. For example, more than 10 million dollars have been invested to install an incinerator in the Nigerian capital of Lagos. But the waste matter was so wet that fossil fuel constantly needed to be added to burn the garbage with full functionality. This considerably increases the financial costs

of such a plant (Medina, 2010). Furthermore, the combustion of the refuses is a technique increasingly disputed in Western countries. Indeed, rather than eliminating pollution it creates new ones, such as new polluted air materials (see 2.1.4.1). Moreover, the distinct material properties of waste and costs of technologies are not the only reason for non-transferability of SWM systems. Issues of good governance and population's practices of SWM are also a challenge for the correct use of these technologies.

In Indian cities, most of the solid waste is dumped in open landfill sites that escape any kind of controls. It is estimated that 50 to 90 percent of municipal solid wastes (MSW) are disposed of in uncontrolled places (Zhu & al., 2008). Apart from serious environmental and health issues, this has also led to political and social problems. For instance, landfills use a lot of space inside the cities. So when the authorities announce a new and authorized landfill project, the population's opposition is often strong (Zhu & al., 2008). Space and location are serious issues to MSW management (MSWM) policies. Indeed, the large density of population in urban districts leaves little space for communal bins (Ambat, 2003). In 2000, it was estimated that the Indian cities together were already producing around 50 million tons of waste per year (CPCB, 2000). In the near future, furthermore, the increased density of population and consumption growth will promote a further significant rise in the national waste production. The same is valid for Nepal, Bangladesh, Pakistan and Sri Lanka. This situation will probably lead to an increase in the size and number of urban landfills. For those reasons, when poorly managed, landfilling is not environmentally, socially and economically viable (Narayana, 2009).

In the year 2000, the Indian Ministry of Environment, Forest and Climate Change (MoEF) introduced new regulations on handling and managing MSW. Those new laws imply that municipalities are now responsible for the management and treatment of their own waste. Waste management experiences have been set up with various levels of success from one Indian municipality to another. However, 17 years later, still none of the municipalities in India entirely fulfills the regulations established by the MoEF (Annepu, 2012). Furthermore, new rules were established in the year 2016. They demand a new decentralized management of the municipal solid waste that extends the responsibility beyond the municipality. Notably, they provide the involvement of

households in waste management and the promotion of home composting, bio-gas generation and decentralized processing of waste at community level. Preference shall be given to decentralized processing to minimize transportation cost and environmental impacts. According to the new rules, local authorities shall arrange for door-to-door collection of segregated solid waste from all households including slums and informal settlements, commercial, institutional and other non-residential premises. Moreover, urban agglomerations, census towns, notified industrial townships, areas under the control of the Indian Railways, airports, airbases, ports and harbours, defence establishments, special economic zones, State and Central government organizations, places of pilgrimage and of religious or historical importance are now responsible for the management of their own waste. Those rules also increase responsibility for handling and managing of the waste generators, such as the plastic producers and sellers (MoEF, 2016). Those legislations have a direct impact on the management of MSW in the whole country.

The city of Thiruvananthapuram is an interesting case for MSWM, as it is, to some extent, a forerunner of the new legal framework of decentralized waste management (Ambat, 1997). It implemented the new policies before the legal provision came into force. Thus it could be interesting to learn from their experiences. In the past, Thiruvananthapuram had a centralized composting recycling infrastructure – composting is still absent in many cities of India. On June the 26<sup>th</sup> 2000, a composting facility in the nearby panchayat<sup>1</sup> of Vilappil in the village of Vilappilsala was inaugurated (CES, 2008). The plant was managed first by a private entrepreneur – from 2000 to 2007 – and then by a Research for Development Organization appointed by the city Corporation<sup>2</sup> –

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<sup>1</sup> A traditional village, caste, or tribal council in South Asia. In this case it is the lowest tier of political administration. (Similar to “commune” in Switzerland).

<sup>2</sup> The administrative divisions of India are subnational administrative units of India; they compose a nested hierarchy of country subdivisions. Kerala State has been divided into 14 district, 21 revenue divisions, 14 District Panchayats, 75 taluks, 152 CD blocks, 1453 revenue villages, 978 Gram panchayats, 5 corporations (of which: Thiruvananthapuram) and 60 municipalities. The business of the state government is transacted through the various secretariat departments based on the rules of business. Each department consists of a secretary to the state government, who is the official head of the department and



from 2008 to 2011. The plant of Vilappilsala soon ran into several problems. It was quickly criticized or boycotted by many citizens. Weary from the pollution and the health problems caused by the infrastructure, the villagers of Vilappilsala blocked the road access to the facility. The city center was thus quickly buried under uncollected waste. Finally, the Vilappilsala plant had to close in 2011 (The Hindu, 2015).

Two major emergent issues have been highlighted by this experience. It showed that a single centralized plant is not a viable solution for the MSWM of this State capital. It also showed that the involvement of the population is a requisite for a proper SWM system. Particularly, the segregation of waste needs to be done at the source to ensure an appropriate dividing and sorting of garbage, at least into compostable and non-biodegradable waste. Since households are responsible for the production of at least 60% of waste in Thiruvananthapuram (Ambat, 2003), the participation and involvement of local inhabitants is crucial for the success of MSWM. T. Narayana (2009: p.4) states: “Citizen participation would naturally lead to a decentralized approach.” Local authorities are therefore requested to implement adequate public policies to foster participation.

In view of the failure and the closing of the centralized plant of Vilappilsala and due to the ensuing anarchic garbage situation in the city, there was pressure on the Thiruvananthapuram Municipal Corporation (TMC) to come up with a new MSWM system. The TMC launched a new decentralized waste management program by the end of 2014 (The Caravan, 2017). This new municipal plan is led by new policies that promote the participation of the population to segregate waste at source. Composting stations have been set up in local markets and the City Corporation was to undertake educational programs to raise popular awareness about sorting waste. To support the project, laws against littering were devised by the High Court of Kerala in 2011 (The Times of India, 2011). Similar provision were later introduced at the all-India level through the MoEF laws of 2016 stating that “the local body shall frame by-laws and prohibit citizen from littering wastes on the streets and give strict direction to the tourists

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such other under secretaries, junior secretaries, officers and staffs subordinate to him/her. The Chief secretary superintending control over the whole secretariat and staff attached to the ministers.

not to dispose any waste such as paper, water bottles, liquor bottles, soft drink [cans], tetra packs, any other plastic or paper waste on the streets or down the hills and instead direct to deposit such waste in the litter bins that shall be placed by the local body at all tourist destinations” (MoEF, 2016). The police in Kerala seem to have enforced the regulations concerning littering established by the High Court of the State (The Hindu, 2011).

Furthermore, the new SWM plan of Thiruvananthapuram delegated duties to the wards<sup>3</sup>, which are now responsible for their own cleanliness. Finally, the project set several quantitative and qualitative targets that need to be achieved at ward level. For example, at least 80% of the households should have a tie up with a trained service team for waste treatment. Those workers, appointed by the Corporation, have to help households install and use their own waste facilities. If any household does not own a facility, the service teams should take the waste of the households to a treatment plant (Corporation of Thiruvananthapuram, 2016).

The decentralized SWM plan gives more responsibility to the population than the previous system. It can be assumed that decentralization has important effects – at the ward and household levels – that impacted most of the dwellers of Thiruvananthapuram, waste workers (sweepers, collectors, scavengers, etc.) and the relationships between the two. It may therefore be particularly interesting to analyze the way SWM has been reorganized in the households and in public spaces of the wards. At these levels, both gender and class/caste phenomena are expected to influence and to be influenced by the achievements and failures of the new SWM system. Public places are spaces of

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<sup>3</sup> The members of Indian municipalities are elected representatives for a term of five years. The town is divided into wards according to its population, and representatives are elected from each ward. The members elect a president among themselves to preside over and conduct meetings. A chief officer, along with officers like an engineer, sanitary inspector, health officer and education officer who come from the state public service are appointed by the state government to control the administrative affairs of the municipality. The TMC was divided into 24 wards in 1940. Over the years, the city corporation has grown up to 100 wards, and now the Thiruvananthapuram Corporation Council is the second largest democratically elected body in Kerala after the State Legislative Assembly. Nevertheless, wards are not only electoral circumscriptions but also the level of decentralized planning, public meetings etc.

interaction between different social classes and castes, but also between the actors of the formal and informal<sup>4</sup> sectors. Moreover, those places are living spaces, where household wastes often end up despite the legal provisions (Singh et al, 2011). Furthermore, outcomes of the decentralized SWM system can be expected to differ from a wealthy area to a poorer one, and interactions between these areas can create tensions between their various populations (Walker, 2009: 2012). Gender and caste/class phenomena are also expected to influence SWM at the scale of the households. Interaction of the family members with waste materials can create several inequalities and tensions at this level, as the waste management responsibility could not be the same for husband and wife, son and daughter or grandfather and grandmother.

This thesis therefore aims to examine the effects of perceptions and cultural factors, in particular those related to gender, caste and class, for the decentralization of MSWM in the case of Thiruvananthapuram.

## **1.2. Research rationales: perceptions, discourses & cultural issues**

According to some authors, public participation for waste segregation will not be improved if the perception of waste does not change in its semantic<sup>5</sup> and cultural roots (Nair, 2014; Moore, 2012). It is known that what is disposable for someone may be valuable to someone else. This fact is commonly used in industrial ecology and makes it

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<sup>4</sup> The informal sector, grey economy or informal economy is the untaxed part of an economy, which is mostly unregulated by the government. Most of the time, it is not included in the gross national product (GNP) of the country (Flodman Becker, 2004). This concept can be understood in a wider context by including the black market and the “System D”. Often criticized as being part of an unmanageable and troublesome market, informal actors have been increasing since the 60s in developing countries (Carr & Chen, 2002). However, the informal sector represents economic opportunities for the poor, by providing a more or less important source of revenue. Nowadays, informal waste management is a common reality in most developing countries. This informal management also happens in many wealthier countries, such as the USA (Nas & Jaffe, 2004). In Kerala, and more specifically in Thiruvananthapuram, waste management is mix of informal and formal sector activity.

<sup>5</sup> In Malayalam, the word for waste is malinyam (മാലിന്യം). Its literal translation is wide and means: blemish, contamination, dirt, fecal, filth(iness), garbage, impurity, grime, sludge, seediness.

difficult to clearly define what is waste or not (Travancore Talk, 2014).

“Waste or the idea of waste is pointed out as a behavioral or attitudinal issue. The things that one does not use become waste for one. One does not think of it as a resource and throw[s] it away thereby pollut[ing] the living environment” (Travancore Talk, 2014).

It is estimated that approximately 80% of the ‘waste’ produced in Indian urban centers could be recycled and composted (Kumar, 2012). But a precondition for recycling is the existence of a market demand. Unfortunately, this new market is difficult to introduce, as waste is culturally linked to lower class labor (Ajith, 2014). Activities relating to waste tend to be considered inappropriate in the Keralan and Indian context, except for low class/caste women and Dalits<sup>6</sup> (Nair, 2014). Mr. Shibu Nair, the director of Thanal Trust, an NGO based in Thiruvananthapuram, summarized this situation in the following terms:

“I think two aspects related to waste are very crucial where our Governments and programs for solid waste management failed to address: **Gender:** The gender divide in waste management is very evident from households to governments. The common notion is that it is the duty of women to do waste management/cleaning. Or it is womanish/girlish to do waste management. Where being womanish is not at all considered as a great thing but always looked down at. **Caste:** India was notorious for the caste system. I am not sure about other regions of the world. Certain people were classified as “low caste” and they were compelled to do scavenging, and were denied all human rights and dignity of life in the name of Gods. This centuries’ old practice though banned by law left the marks behind which still plays its part. The logic is that Cleaning/waste management is duty of lower class. In other words, those who [do] cleaning or waste management is a person from lower class“ (Nair, 2014; emphases in the original).

As my respondents were not very forthcoming on questions of caste, this work will

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<sup>6</sup> In the Indian traditional system of caste, these people are formerly known as ‘untouchables’, they are outside the varna system – outcasts.

focus on social class rather than caste. Although different concepts, social class and caste are often but not always strongly correlated. During several interviews conducted during fieldwork, it was difficult to obtain information about the caste of the interviewed dwellers. Discussions with one of my interpreter helped me to better understand this issue. Nowadays, the caste system is a taboo subject in Kerala, as this old system is supposed to be abolished since 1936. The State of Kerala officially abrogated the notion of untouchability<sup>7</sup> two decades before the rest of the country, which only did it in 1956 (Jayasree, 1989). The formal suppression of the caste system in Kerala can be explained by different reasons, among which the influence of the western system of education, the movements of social reform – particularly among lower castes – and by the presence of voluntary organizations (Jayasree, 1989). The educated elites and the communist social reformers strongly backed these measures. My interpreter expressed himself in these words: “My family is from a very low caste, but the educational system allowed me to access a good job, and thus, to a well-paid activity at CED. Nowadays, your work and the money you earn are more important than the original caste of your family.” In other words, nowadays, low caste people who have a good job have more opportunities than high caste people with no money. Therefore, the abolition of the caste system led to an increasing importance of social class in the society of Kerala.

However, the reality people of higher castes usually have easier access to higher education and so to better paid jobs (Singh, 1968). Despite the increased importance of social class, higher caste families have generally maintained their rank in society and now constitute the higher social class. Thus, the case of my interpreter, while not exceptional, is definitively not the norm.

Furthermore, caste is not the only important sociocultural marker in Kerala that strongly influences work opportunities and occupations. Field observations showed that the fishermen in Kerala were mostly converted Christians, just as a majority of the male waste pickers were Muslims. This shows that the concepts of class, caste and community

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<sup>7</sup> The quality or condition of being an untouchable ascribed in the Vedic tradition to persons of low caste or to persons excluded from the caste system. Mahatma Gandhi stated: “Untouchability I hold is a custom, not an integral part of Hinduism.”

are strongly connected. Moreover, during a train trip from Thiruvananthapuram to Alappuzha, a man I was chatting with ordered me some food. But when I offered to share my meal, he refused by saying that the cooks were dirty people. When I asked him for further explanation, I understood that he did not mean that the food was dirty or infected, but only that the people that made it were not of “clean origins”. These few examples show that the Hindu concept of impurity is still predominant in Kerala. Therefore, this concept still influences many issues regarding waste management.

The cultural perceptions, attitudes and habits can be a disincentive for private investors to work in the recycling business. It may also partially explain the different reactions and behaviors towards waste management between lower and higher classes in Thiruvananthapuram. This Master’s thesis seeks to contribute to a better understanding of the socio-cultural conditions that are linked with the successes or failures of the implementation of the new decentralized MSWM program in the municipality of Thiruvananthapuram.

Many researchers have addressed the links between class and SWM. These have been analyzed with different theoretical frameworks and in various fields. These studies notably concern the production of environmental injustices and the progressive deterioration of the living conditions of both marginalized people living in impoverished areas and waste pickers involved in the SWM chain (Bullard, 1990; Walker, 2009; 2012; Nair, 2014; Pellow, 2000). For example, Bullard showed that the areas where a marginalized population lives are facing more environmental injustices. Notably because the low-income dwellers have less political power and thus they met more difficulties in mobilizing not-in-my-backyard (NIMBY) protests than a wealthier population (see section 1.4) (Bullard, 1990). Pellow demonstrated how waste pickers in Chicago suffer from bad considerations and unhealthy work conditions, as they frequently hurt themselves while collecting waste. In his study, some of the waste pickers worked without correct protection; they notably said that they were frequently accidentally stuck by hypodermic needles. They have therefore to make the choice between a dangerous job and their health (Pellow, 2000).

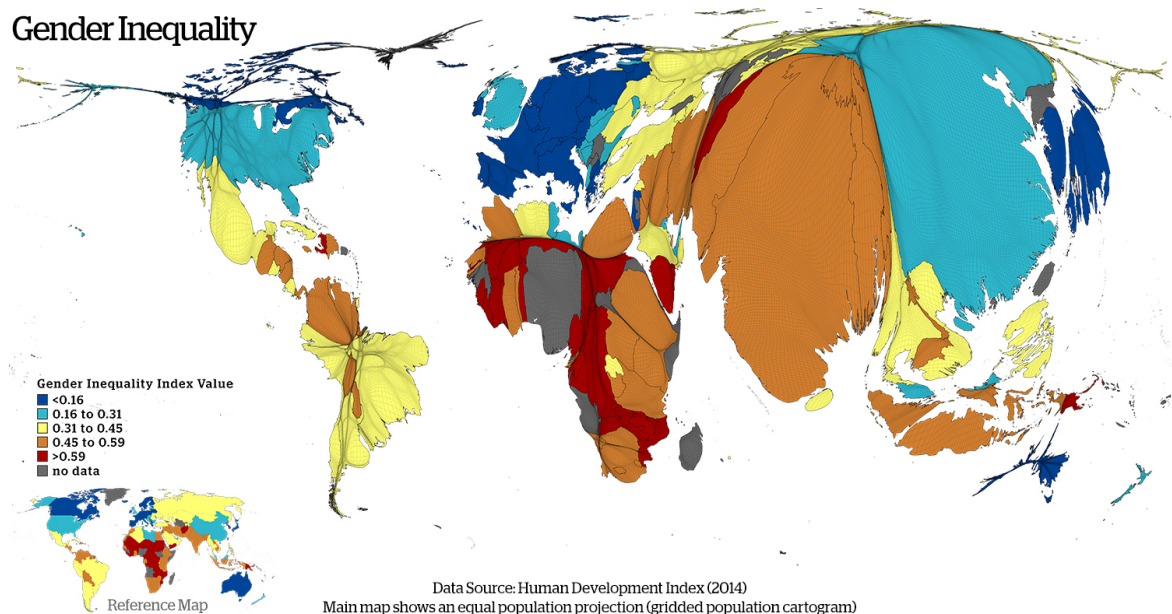
Links between class and SWM can also address the differences in the production

and the treatment of waste by high, middle and low-class populations (Mawdlsey, 2004). Mawdley demonstrated that the high and middle class population (which is increasing in India) is more consumerist than the lowest one and, thus, produces more waste. However, this high and middle class also seems to be more concerned about the correct management of waste, just as its public health awareness is raising (Annepu, 2012: Mawdlsey, 2004).

Apart from caste, community and social class, gender relations are a key factor of SWM (Scheinberg, Muller, & Tasheva, 1999). Figure 1 below shows a ranking of the world gender inequality index by country with an equal population projection. It demonstrates the magnitude of the gender inequality in India. According to Amartya Sen, “gender inequality is not one homogeneous phenomenon, but a collection of disparate and interlinked problems” (2001: p. 466). In the academic literature, the topics of development, ecology and gender have increasingly converged since the 1990s (Rocheleau, Thomas-Slayter & Wangari, 1996). Indeed, similar political or/and economic pressures occur both in the production of gender inequalities and environmental degradation.

**Figure 1:** World gender inequality – An equal population projection

–Source: viewsoftheworld.net–



In India, the presence of women in the informal sector is so prominent that the most powerful union of workers in the country is the Self Employed Women's Association (SEWA), most members of which work in the informal sector (Gill et al, 2009). In the State of Kerala, the Kudumbashree – a female oriented community group working for empowerment – is also very active. In addition, informal groups of women have had a significant impact on the development of the MSWM system in India, as they represent an important proportion of the informal waste collection and disposal workers (Gill et al, 2009). Waste management programs in Kerala often use informal associations of women, like the Kudumbashree. For example, this seems to be the case for the new waste management strategy of the railway station of Thiruvananthapuram. The sector that deals with waste recycling seems to be mostly composed by marginalized members of society<sup>8</sup>. These populations often come from poor areas in the cities' peripheries; their activities are very dangerous to their health and preclude respect of basic human rights.

Different researchers addressed the links between gender and SWM in their studies. Analyzing different fieldworks in developing countries (Mexico, India, Cambodia, Thailand, etc.), Madsen presents waste picking as an opportunity for women and children in impoverished communities. She explains that the growth of the sector of waste management in developing countries is beneficial for waste pickers, who are mainly constituted of women and children of lowest class. The appropriation of this resource represents an opportunity of income for these marginalized populations and can thus allow their empowerment (Madsen, 2006). Nevertheless, some authors criticize this naive vision. They claim that if this resource can represent a livelihood opportunity for some marginalized urban people, it does certainly not empower them. It rather confines

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<sup>8</sup> Nevertheless, the so-called 'developed' countries like Switzerland also have gender issues that still persist in waste management. As a matter of fact, if the interest of Swiss men for childcare duties is rising, women are still much more involved in domestic chores (OFS, 2013). Swiss mothers spend more than 6.5 hours per week cleaning their households, whereas fathers only spent 1.7 hours (OFS, 2013). Public institutions act the same, as the people who are employed to clean the University of Lausanne are mostly low-income women of foreign origins. This can of course have some strong effects on the waste management into the whole country.



these marginalized population in this (informal) activity (Beall, 1997). Another bias linking gender and waste management is the idea that women are more concerned with environment than men. It is often said that women have a ‘natural’ affinity with the environment (Mies, 1986) and with the community management (Moser, 1993).

While studying SWM in South Africa, Poswa demonstrated the importance of the household level phenomena in any of these programmes. At this level of analysis, the gender relations must be taken in account. He explained: “The solid waste planners should always consider the effect of demographics of the households as an integral part of planning when designing a domestic waste management system. Particular attention should be given to the effect of gender on the choice of a collection system and the design of equipment” (2004: p.1). Scheinberg, Muller, & Tasheva claim that the analysis of gender phenomena should not be perceived as an issue or as a burden on policymakers and SWM program planners. It should rather be seen as a tool for the management of any solid waste projects, just as it can be a mean of improvement for the program outcomes (Scheinberg, Muller, & Tasheva, 1999).

### **1.3. General research question**

The general aim of this work is to examine the effects of the implementation of the current waste management program in the city of Thiruvananthapuram and its relations with gender and class issues. This master thesis will address the following general research question: **What are the relations between class, gender and decentralized solid waste management in Thiruvananthapuram?**

The causal relation can be analyzed in both directions, as gender and class inequalities can influence the SWM programs, just as the SWM system can influence the gender and class issues. According to the existing literature on the question of waste management in Indian cities, the gender and social classes phenomena have significant relations with the development of any MSWM programs. Whereas differences in social classes can be observed at the scale of the city wards, questions related to gender analysis can take the investigation to the household level (Poswa, 2004; Gill et al., 2009; Scheinberg, Muller, & Tasheva, 1999; Rocheleau, Thomas-Slayter & Wangari, 1996).

In order to address the above-mentioned general research question, it is divided in

three specific sub-questions that will also organize the structure of the core empirical chapters of the thesis – chapters 3, 4 & 5.

**1. To what degree is the decentralized SWM program implemented in Thiruvananthapuram?**

Analyzing the different degrees of achievements of the decentralized MWSM implementation is a requisite for answering the general research question. The thesis also attempts to assess the outcome of the decentralized SWM in different parts or wards of the city. The implementation of decentralized SWM depends on the installation of decentralized composting plants by the TMC and the population, their technologies, use and maintenances. More, chapter 3 also looks at the practices of waste enterprises, waste pickers and more generally of all waste workers as these can have repercussions on the SWM system.

**2. Are the preexisting socio-spatial inequalities reduced or reinforced through the new decentralized SWM?** According to the interviews and observations conducted in Thiruvananthapuram, the city does not have slums, unlike most cities in other States of India. Nonetheless, from one ward to another, the populations can be more or less wealthy. These socioeconomic and spatial variations among the various city wards are important to observe and analyze. Since the new MSWM is planned at the scale of the wards, of which there are 100 in the city, it is likely that the success of the programme differs between high, middle or low-income areas. This could explain some of the inequalities that the decentralization of waste management produces between social classes. Moreover, the socio-economic characteristics of a ward may also influence the local presence of waste collectors. As more waste is produced in richer areas, those wards are expected to be more lucrative spaces for waste pickers. If this last point may be true for any SWM systems, it may be reinforced in a participatory and decentralized plan. Indeed, as the waste management is now the responsibility of every household of the municipality, they can decide if they want to pay or not for waste workers services. Moreover, the majority of the waste pickers of the previous centralized MSWM system were all Kudumbashree

groups employed by the municipality. In the decentralized system, many new entrepreneurs of waste appeared and most of the Kudumbashree groups lost their preexisting job. For these reasons, preexisting and current differences between wards are to be investigated.

3. **What are the gender and class dimensions of MSWM; how do they interact with MSWM in Thiruvananthapuram? How have the household responsibilities changed with decentralized SWM?** As stated earlier in this introductory chapter, cultural roots and their resulting discourses have an important impact on the implementation of any MSWM. It can partially explain the achievements or the failures of different projects. Habits related to waste management can be very variable from a wealthy population to a poorer one. Furthermore, this variation can also be observed between male and female family members at the household level. Intersectionalities of gender and class phenomena can give rise to various levels of inequality regarding waste management. The position of a wealthy female family member in regard to SWM is likely to be different than that of a poorer woman. Moreover, household habits concerning waste management can indicate the different perceptions that surround garbage.

### **1.3.1. The decentralized program of Alappuzha and its relations with gender and class inequalities**

The case of the decentralized program of Alappuzha is of interest for the study of the new MSWM in Thiruvananthapuram, as it started off earlier than in the capital of the State of Kerala. Moreover, this decentralized program inspired the one of the TMC. Alappuzha has a population of 174'000, a number that is approximately five times smaller than in Thiruvananthapuram (Census of India, 2011). As the program is now implanted for more than five years, it is thus relevant to learn about its achievements, notably in terms of its relations with the gender and class phenomena. This subsection stands here to specify the general research question and the specific sub-questions of this master thesis. The example of the decentralized SWM system in Alappuzha and its relations with gender and class phenomena can hypothesize the outcomes of the SWM program in Thiruvananthapuram.

In September 2012, the city of Alappuzha started off the first decentralized project of SWM in Kerala, which is called “clean home, clean city”. The program comprises two main possibilities for the population to manage biodegradable waste at the household level. The first is the implementation of composting plants within the city households. The second concerns families that are not able to install such technologies – by lack of space or lack of money. These households are asked to bring their segregated waste to composting plants installed in different parts throughout the city (Venugopal, st). Many biodegradable treatment plants have thus been installed at the ward level. The dwellers have to come during the opening hours to dispose of their composting waste under the supervision of male workers. This has led to the correct use<sup>9</sup> of the plants. The Alappuzha experiment of its decentralized SWM was praised throughout India for its achievements (The Caravan, 2017).

However, the testimonies I received from the inhabitants of Alappuzha and my observations show that there is still a lot of public littering in this municipality, especially in the canals. An interviewed guesthouse owner in the periphery of the city expressed his dissatisfaction about the current situation: “Here we have no treatment plants around. For this reason, I am littering the waste in the city streets, which is very stupid because the pollution of the city is worse than ten years ago, especially in the canals. But the Corporation is making no efforts for us.”

My interviews with members of the city Corporation showed that the local politicians do not share this viewpoint. I asked a politician at the Health Inspector's Office about the job loss of many waste collectors due to the new decentralized program. He answered: “Most of the waste pickers have kept their jobs, now they are working to maintain the decentralized units.” Then, when I asked him about the creation of a new type of unpaid jobs for many female actors, he replied: “You know, the people that come to dispose of their waste are composed of half women and half men.” Nevertheless, quick observations allowed me to notice that the people who came to bring their waste in

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<sup>9</sup> In the case of composting, the correct use of the plants means that the inserted waste should be correctly segregated at source. If other materials than biodegradable enter the plant, it will pollute the created compost.

these plants were mostly women. Moreover, wall paintings situated next to the composting plants lead to the conclusion that this activity is supposed to be done by women (see image 1). This unpaid activity may require a lot of effort, as some of the plants are situated far away from the households' locations. It affects especially female family members of poor household, as the wealthier households have usually more space in their yard to install a household-level treatment facility.

The decentralized SWM project of Alappuzha seems to have produced great achievements regarding the treatment of biodegradable wastes. This can explain the recognition that the city received at the national level (The Caravan, 2017). However, some inhabitants are unhappy about the new programme, especially the ones living in the city periphery. Moreover, it seem that this MSWM is creating new kind of unpaid activities, which especially concern female actors of poor origins. This example is revealing the relations that can exist between decentralized SWM, class and gender. Notably, it demonstrates that the implementation of the program is not completed in all parts of the city, especially in the periphery areas. One can thus argue that the decentralized SWM program reinforces the socio-spatial inequalities. Furthermore, the gender inequalities seem to be reinforced at the household level, as many female family members have to spend time in a new unpaid activity.



**Image 1:** Painting showing women working next to composting plants

## **1.4. Theoretical framework**

### **1.4.1. Urban Political Ecology**

This research requires an analysis of the relationships between the different actors involved in the MSWM programme in the city of Thiruvananthapuram. To do so, the approach should not be only technical; it has to take into account the political, social and economic factors that are linked with it. Thus, the theoretical framework that is used in this work is Urban Political Ecology (UPE). This theoretical approach is a sub-branch of Political Ecology, which analyses the relationship between nature and society with an emphasis on the power relations existing between them, as well as the creation of the different discourses concerning them (Escobar, 1996; Heynen et al 2006; Zimmer, 2012). This theoretical approach enables one to observe the existing links between socio-environmental sciences and political and economic fields (Peet & Watts, 1996). This framework also criticizes the urban policies that separate social, economic and political issues from environmental ones (Harvey, 1993). UPE points to the responsibility of economic and political domains on the production of social and economic inequalities; the same is valid for the production of environmental injustices.

Good SWM governance is not only linked to political institutions but also to socioeconomic factors. If waste is considered a resource, the natural territory that contains them does not necessarily overlap with the institutional territory that manages them. Moreover, the various organizations, institutions and groups of interest that manage this resource and recycle it do not always communicate with each other (Srivastava et al., 2005). Furthermore, in many parts of the globe and especially in urban centers, large parts of the formal and informal sectors have monopolized the management of these solid materials. It was the case for the formal sector in 1991 in Lagos, when the Lagos State Waste Management Authority revoked the license of private waste entrepreneurs and assumed a monopoly on the SWM service and delivery (Ogu, 2000). This monopolization did not help the public waste disposal issues in the Nigerian capital, as in 1994 more than 30 percent of the population still had no access to waste services (Ogu, 2000). The same is valid in a large part of Italy, especially in the city of Napoli, where informal monopolization of waste management has been

implemented by mafia organizations, which do not respect health and environmental standards from Italian or European legislations (Giuliani, 2009).

Thus, this conceptual approach is useful to analyze the issues concerning management of urban waste, as it could help to demonstrate the interest and power games that gravitate around the issues of waste management (Yates and Gutberlet, 2011). Moreover, UPE has not yet been much used in the analysis of MSWM (in India). This issue is too often approached with less integrated approaches focusing on an analysis that separates the environmental, economical, technical, social and political domains. From a UPE perspective, refuse is no longer seen only as economic externalities, but also as levers for political action, especially by marginalized populations (Giuliani, 2009; Moore, 2009). The case study of the Mexican city of Oaxaca is an excellent example of this statement. Indeed, to express their dissatisfaction against authorities, people have used rubbish as a mean of political pressure (Moore, 2009). In 2000, the population living in a *colonias* nearby a dump in Oaxaca used the tactic of blocking the access road to the site, so that the waste trucks were not able to access to the dump anymore. The politics in charge of the municipality had to ask the whole city population to keep their waste in households, which occurred an important dissatisfaction from the citizens. Finally, the city officers had to negotiate with the people of the *colonia* and to listen to their political demands. The consecutives blockades of the dump access allowed the small community to obtain concessions; the building of a meeting center in 2001; access to electricity and a medical center for the *colonia* in 2003 (Moore, 2009).

In other cases, it is the leaders who use waste as a mean of pressure on people to ensure their elections or to serve their political agendas, as it was the case in some cities of West Bengal in 2014 (Cornea et al, 2017). For example, in one municipality, an official asks his staff to clean the city from garbage one day before the elections. In another city, a municipal that was recently elected mapped a program to clean some specific visible main roads, which were objects of popular complaints (Cornea et al, 2017). In Thiruvananthapuram, the politicization of SWM is also important, mainly because of the failure and closure of the centralized SWM plant of Vilappilsala.

If the impacts of politics seem essential to understand the power relations of any SWM projects, UPE is also relevant to analyze the impacts of the socioeconomic factors that can be linked to the development of such programmes. This theoretical framework is able to demonstrate how environmental services are influenced by political economy, and that these produce spatial (class related) inequalities. Harvey demonstrated the differences that exist between rich and poor regarding environmental quality by arguing that: “the rich are unlikely to give up an amenity at any price, whereas the poor who are least able to sustain the loss are likely to sacrifice it for a trifling sum”(Harvey, 1973: 81). The valuation of money is therefore a process that is defining space, time, environment and place (Harvey, 1996: 11).

For example, in the case of the United States city of Milwaukee, Heynen, Perkins and Roy analyzed the impact of political economy on race and ethnicity in the production of environmental inequality (Heynen, Perkins and Roy, 2006). They observed a discriminatory distribution of the urban canopy-cover in different parts of the city. They state that: “Political-economic factors (such as the household income level) play a key role in producing urban environments, including where urban trees are planted and/or allowed to grow” (Heynen, Perkins and Roy, 2006: 10). In this case study, it is thus demonstrated that the investment for urban trees are beneficial to wealthy residential areas rather than to poorer ones.

According to Bullard (1990), the environmental spatial discrimination facing by marginalized black populations in the US is notably resulting from the inability of these communities to mobilize enough power in ‘not-in-my-backyard’ (NIMBY) politics. He states that the “public officials and private industry have in many cases responded to the NIMBY phenomenon by using the place-in-blacks'-backyard (PIBBY) principle” (Bullard, 1990: 5). In many case, the marginalized population have to make a choice between health hazards and unemployment, a situation described as an “environmental blackmail” by the author.

However, Swyngedouw and Heynen explained that when most of the spatial and social process can be attributed to the socioeconomic disparity of income, the metabolism of physical, biological or chemical components also predicated the socio-



spatial processes (Swyngedouw & Heynen 2003). In other words, Spirn says: “To deny the dynamic reality of the nonhuman world is also misleading and potentially destructive” (1996: 116).

UPE seem thus to be an adequate theoretical framework to analyze the spatial inequalities (at the ward level) that can result from political economy effects in the case of the decentralized management of solid waste in the city of Thiruvananthapuram. Indeed, from a wealthy area to a marginalized one, the distribution of garbage and its ensuing environmental injustices shall differ.

#### **1.4.2. Inclusion of gender relations in PE**

For the purpose of this Master thesis that concentrates on community and household level analysis, it is relevant to consider gender relations as part of environment and development studies. Researchers like Dianne Rocheleau insist on the importance of gendered connections in political ecology to improve the analysis of power relations (Rocheleau, 2008). As a matter of fact, gender relations, connected with other axes of power such as class, can explain the appropriation of a resource by dominating actors (Sundberg, 2017). Indeed, including gender relations in PE allows analyzing the structures that produce the environmental and social injustices and their relations with other intersectionalities such as class, caste and race. It is thus relevant to question the gendered relations of ecologies, economies and politics within various paradigms and societies.

The analysis of gender phenomena can be useful in many different empirical fields, such as the analysis of conditions of rubber tappers in the rainforest of Brazil or the analysis of activists groups fighting against environmental racism in New York City (Rocheleau, Thomas-Slayter & Wangari, 2013). In Thiruvananthapuram, the inclusion of gender phenomena in the analysis of the decentralized SWM plan is essential, as the context of gender inequalities is still a huge issue in India – as shown in figure 1. It allows observing the intersectionalities of gender and class, and their relations with the decentralized SWM program. As said in last subchapter, any program of waste management can influence the gender and class phenomena, just as the class and gender issues can impact the setup of a new management plan.

In the rural areas of South Africa, Shackleton and Shackleton (2004) demonstrate that the appropriation of a resource by marginalized female actors can help to their empowerment. Indeed, the fermentation and brewing of the marula fruit – a local non-timber forest products (NTFPs) – is done by women of poor origins to sell marula beer on local markets. The appropriations of this resource by marginalized female actors allow them to gain new revenues (Shackleton & Shackleton, 2004). These new incomes represent an opportunity of development and empowerment for marginalized rural actors. The same can be valid in Thiruvananthapuram, where waste-picking service is partially appropriate by poor female actors. Nevertheless, as explained before, confining a duty such as waste management to a marginalized population can reinforce the existing inequalities (Beall, 1997).

Furthermore, gender considerations in political ecology studies also add new scales of analysis, such as the household level where inequalities do exist between various family members (Elmhirst, 2011). Indeed, most of the time political ecology stops its analysis at the level of the communities. As argued by Truelove (2011, p.1): “(Gender analysis) is well positioned to complement and deepen urban political ecology work through attending to everyday practices and micro politics within communities”. This is notably relevant for analyzing the micro-power relationships between households and waste workers. It is thus relevant to observe waste management at the household level in the TMC; this allows a comprehension of the inequalities that waste can produce within the family and between its members.

## **1.5. Choice of the topic, methodology & limits of data collection**

The choice of the topic and the methodology of this work were designed in three major steps that have been consolidated during a period of three years. My interest for Marxist theories in the field of the development studies were a starting point that led me to choose a general research question and a theoretical framework that focused on social classes and gender inequities.

Certain authors, such as Escobar, Heynen, Peet, Watts, Swyngedouw, Zimmer, Rocheleau, Scheinberg and Muller were of great inspiration for the construction of this

work. The first step was to gather enough information on the subject of waste management in the city of Thiruvananthapuram to formulate an adequate framework, which would enable me to find links with the main chosen theoretical framework that is UPE. Due to the existing literature on the subject, it was relatively easy to group data from scientific research, politics and local media. The next step was fieldwork, which took place from January 20 to April 20, 2017. Finally, the last and probably the most important procedure were the analysis and the synthesis of the collected data that occur during the writing of this master thesis.

Thanks to the hospitality of the Center for Environment and Development (CED) of Thiruvananthapuram, a local Research for Development Organization that provided me with the best conditions to accomplish this investigation, I was able to be in contact with the local population, researchers and politicians.

The first two weeks of fieldwork were useful to gather grey literature, to get acclimated to the city and to meet most of my new colleagues at the CED. If a lot of material can be acquired in books and from resources available on the internet, a lot of grey literature can only be obtained in the field. Many laws and technical reports can exclusively be found in Kerala. For this reason among others, the CED was an essential source of help for this thesis.

Many interviews were conducted to collect data. Fourteen semi-structured interviews were carried out with key informants, mainly in the city of Thiruvananthapuram, but also in Alappuzha and Kochi, where other kinds of waste management projects exist. These semi-structured interviews were conducted with members of the CED, urban local bodies (ULBs) of the Corporations of Thiruvananthapuram, Kochi and Alappuzha, a researcher of the Center for Development Studies, members of the Suchitwa Mission and the NGO Thanal Trust, a journalist specialized in waste management working at the Times of India, private entrepreneurs such as the Clean Kerala Company, the VCare Company, the Pelican Foundations and two members of the Kudumbashree. The latter two interviews helped me gain a better understanding of the implication of waste management on women.

These semi-structured interviews helped me choose two different wards to design

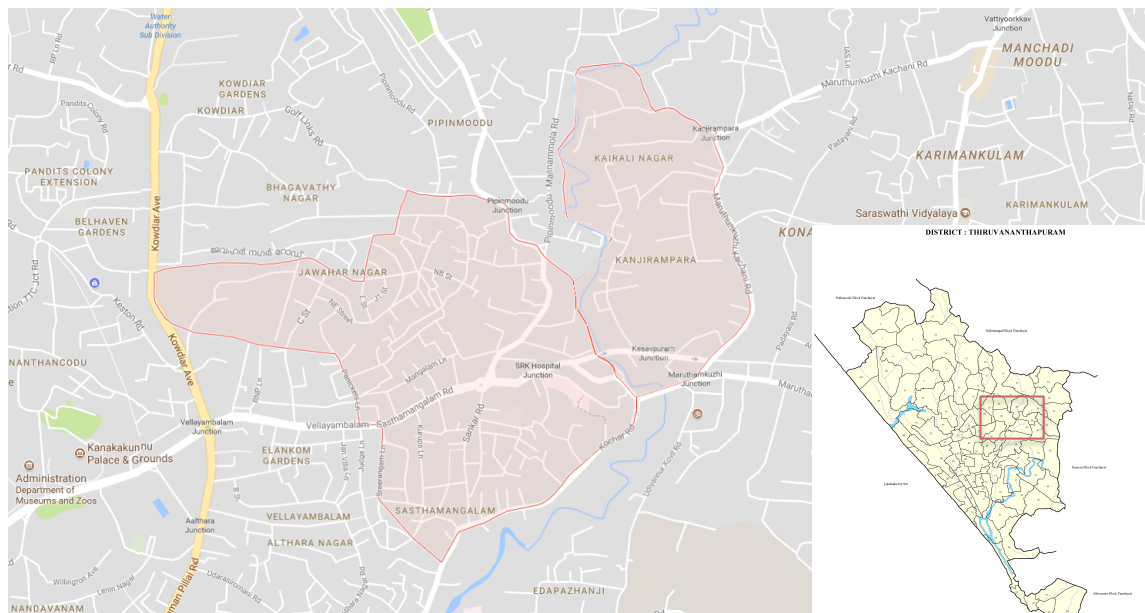
and conduct a household questionnaire survey. Sixty interviews were carried out in order to have a better understanding and interpretation of what was happening at the scale of the households, but they are of course not a statistically representative sample for the whole city (or even for the whole population of the two wards). This survey, made of thirty open and closed questions, was tested and reevaluated during the fieldwork.

The selection of the studied wards was based on two criteria. First, the two wards had to differ in socioeconomics characteristics. This first criterion allowed gaining better understanding of the interaction of class, gender and waste management and their repercussion on different level of wealth. Second, it was important to select a ward that had been declared clean by the new program of waste management and one that had not. The second criterion has been chosen for understanding if a population is advantaged by any political decision of the TMC. It can also reveal if the SWM practices of the wards declared clean or not are influenced by the socioeconomic conditions of their population or if it only depends on their spatial location in the city.

After selecting several wards of the municipality that fit the two criteria. The slightly peripheral wards of Sasthamangalam – declared clean – and the ward of Kanjirampara were retained for two reasons. The first is that those two areas are adjacent, only separated by a river (where waste often ended up). Moreover, it allowed me to have information about the views of the population of one ward on the neighboring population of a different social class. The second reason is more practical;

**Figure 2: Situation of the wards of Sasthamangalam and Kanjirampara in the Municipality**

–Source: Google Maps–



they were chosen for their proximity to my location and to the office where I was working, which allowed me to make several daily observations.

Still, my field research was met with several obstacles. The first and probably the most important restriction was the language barrier. English is not my first language, or the first language of the population of Thiruvananthapuram, who mostly speak Malayalam. If most of the ULB and high-income dwellers were well educated and spoke fluent English, it was not the case for the majority of the interviewed inhabitants living in low-income areas. This explains some of the difficulties in comprehension and interpretation of the answers acquired during fieldwork. Furthermore, despite the goodwill of my translators Arun and Radhakrishnan, I have to assume that some of the information was lost or misunderstood. Besides, as they were working for the CED, they already had their own interpretations on the question of MSWM in Thiruvananthapuram, which may have sometimes led them to take shortcuts with some of the questions and answers. During the first interviews, one of the translators presented us as appointed by CED, which led to further bias the responses. Luckily, none of the firsts interviewed people knew about the CED and their past and current involvement in SWM. Moreover, as most of the inhabitants of the selected wards were working during daytime, the interviews had to take place during the evening or on Sunday, during the free time of Arun and Radhakrishnan. Thus, it was sometimes difficult to schedule the interviews.

Focusing on waste in general was another issue, since different kinds of waste have different cycles. Indeed, compostable, plastic, glass or paper are treated in different manners. Their cycle, from their production to their destruction, vary a lot from one product to another. Moreover, their problematic is not the same. Focusing on plastic waste would be interesting for future work, as its production and consumption is growing particularly fast in this State of India. Moreover, they surely represent one of the most dangerous products when it comes to the pollution they produce and the effects they have on human health. Furthermore, they probably represent one of the most lucrative products to recycle.

Only three waste pickers were approached during this fieldwork, but a deeper analysis of their conditions must be carried out. In addition, to completely understand

the cycle of different types of waste collected in the city, it would be necessary to follow them until the place of their final disposal. This last point would need a lot of preparation, as it seems particularly difficult to access the landfills and treatment sites – and even to learn about their situation.

Another issue was the presence of culturally sensitive questions in my household survey. The most flagrant example was a question about conflicts between neighbors regarding waste management. Only three persons on a panel of sixty households talked about conflicts in their neighborhood, as most of the interviewed people were embarrassed with this question. Moreover, among the well-educated dwellers, people wanted to give me the best vision of the society of Kerala. Thus, knowing about the western idea of gender equality, some of the respondents were probably not completely honest in their answers. For example, during an interview with a wife and her husband in one household of Sasthamangalam, the woman added changes to some of her answers when her husband left the house, because she told me she did not want to lie to me. It could have thus been of interest to conduct focus group with women – but this would have been difficult to organize because many women work during the day.

Finally, being able to stay for more than three months would have helped me gain more precise information and a better understanding of the subject.

Despite the several factors limiting collection of data, the information obtained during this fieldwork seemed sufficient to analyze the relationships between waste management, social class and gender. Indeed, the results of this fieldwork revealed some interesting data, which would need further research work and analysis. This work answers some of the questions that surround waste management in Thiruvananthapuram and its relation with gender and social class issues. But it also revealed other issues, such as the lack of appropriate technologies and proper maintenance, or the importance of corruption and of cultural habits. Moreover, the lack of responsibility for waste management by the waste producers and distributors should be seriously analyzed, since it is likely to be intimately linked to corruption.

## **2. Municipal solid waste in Thiruvananthapuram**

### **2.1. Kerala and Thiruvananthapuram**

For the subject of this master thesis, the country of India, the State of Kerala and the city of Thiruvananthapuram were not chosen by chance. Indeed, many cities of the world could have been interesting to study for their municipal management of solid waste. The choice fell on India mainly because of the affinities and knowledge I already had for this region of the world. Moreover, the various personal interests for this subcontinent of Asia, the social geography studies and the subject of MSWM also explain the choice of the supervisor of this Master thesis.

The choice of the region of Kerala was originally made because this work was supposed to be part of a bigger project entitled “Challenges of municipal solid waste management: Learning from governance experiments in South Asia”, led by the Prof. René Véron and to be funded by the Swiss Program for Research on Global Issues for Development<sup>10</sup>.

Multiple factors characterize Kerala as a particular State within the Union of India with many specificities: a high level of education; an elevated rate of literacy for both women and men, respectively 92% and 96% (Buisson 2009; Census of India, 2011); a high life expectancy; a high average population density (860/km<sup>2</sup>; Census of India, 2011); a unique caste and social-class systems due to the large number of non-Hindus (Census of India, 2011); the importance of the Communist Party of India – Marxist – (CPI(M)) within the local authorities, and the decentralized planning and devolution of 40% of the State budget to the panchayats and municipalities (Véron, 2001).

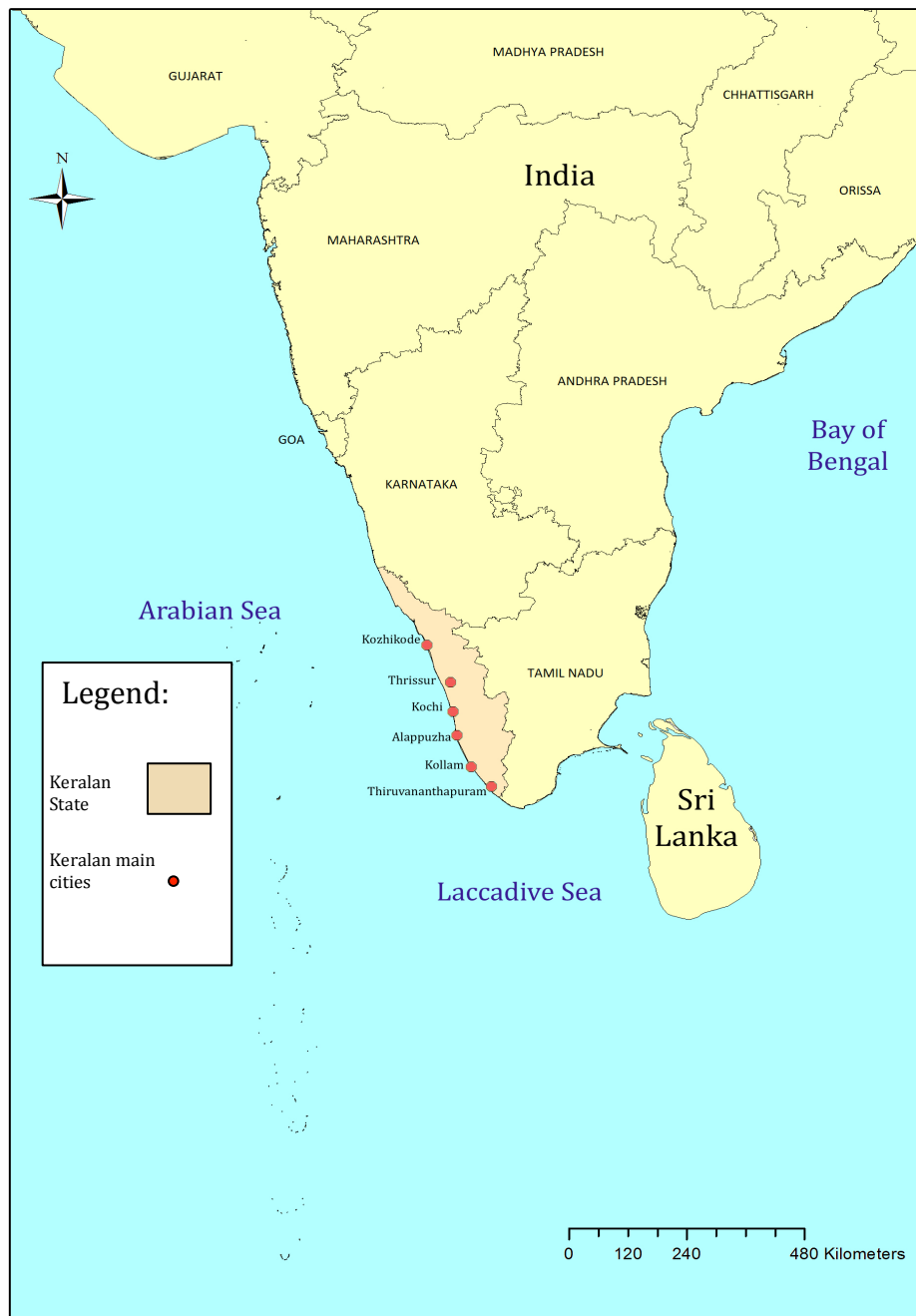
In addition, in some cities of the State of Kerala, policies and programs of waste

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<sup>10</sup> The first objective of that proposed project was to analyze the waste chain and waste governance in three secondary cities and their urban area in Bangladesh, Sri Lanka and Kerala, with particular attention to the political and sociocultural factors at the household, neighborhood and municipal levels (Véron, 2015). The Kerala part of the proposed project planned to analyze MSWM in three different cities (Véron, 2015), including Thiruvananthapuram (pop. 0.957 million) and Alappuzha (Corporation of Thiruvananthapuram, 2016). However, the project did eventually not receive funding.

management at the level of municipalities appeared earlier than the MSWM rules issued in 2000 by MoEF. In fact, the city Corporation of Thiruvananthapuram was the first to devise a plan for MSWM back in 1997 (Ambat, 1997) and one of the first to devise a decentralized SWM programme (see subsection 1.3.1). Moreover, Kerala has one of the farthest-reaching decentralization in general. If decentralized SWM fails here, it is hard to imagine that it could succeed elsewhere. This last affirmation is another justification for the choice of this case study, Kerala is not a typical case for India or the global South, as the chance for decentralized SWM are more favorable than elsewhere.

**Figure 3:** Location of Kerala and Keralan main cities in India





During the last decade, the State has experienced rapid urbanization. Indeed, while the level of urbanization of the whole country increased from 28.81% to 32.16% between 2001 and 2011, in Kerala it respectively increased from 25.96% to 47.77%. The population growth of the municipalities of the State of Kerala has increased by 93% during the same period (Census of India, 2011). The effects of migration can partially explain the spurt in the population growth in urban areas, such as the natural increase of the cities. But the major explanation for the fast urbanization rate is the rurbanization<sup>11</sup> that occurred by the inclusion of new areas like panchayats within the urban regions. As a matter of fact, the rural population of Kerala has declined by 26% during the same period (Census of India, 2011).

Nowadays, following the rules established by the MoEF, most of the cities of Kerala have established a MSWM system, more or less centralized or decentralized, and with varying success. Lately, decentralized MSWM systems tend to be more popular due to the achievements of a new MSWM program in Alappuzha (see subsection 1.3.1) (The Hindu, 2015).

The TMC, too, launched a new decentralized and participatory plan for waste management in the year 2014 in response to the recent failure and closure of its centralized waste treatment plant in 2011 (see subsection 2.2) (The Caravan, 2017; Corporation of Thiruvananthapuram, 2016).

Moreover, the recent increase in population in the State capital presents further challenges for the efficiency of the new system of MSWM. Indeed, the last national census of India in 2011 reckoned a population of 7.43 lakhs<sup>12</sup> for an area of 140.94 km<sup>2</sup> (Census of India, 2011). But in the year 2015, the inclusion of fourteen new wards in the Corporation has changed the demographic situation. The population is now estimated to be 9.57 lakhs for an area of 214.86 km<sup>2</sup> (Corporation of Thiruvananthapuram, 2016).

The new decentralized and participatory plan for MSWM of the TMC makes this

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<sup>11</sup> “Rurbanization” in Kerala (and in Sri Lanka) is a word describing the particular, very dense but rural settlement pattern.

<sup>12</sup> A lakh is a unit in the Indian numbering system equal to one hundred thousand – 1 lakh = 100'000 units

city particularly interesting as a case study. Moreover, the fact that this city has had waste management plans for 20 years (Ambat, 1997) offers the possibility to compare the previous, more centralized SWM approach with the more decentralized and participatory system and to assess the impacts of the shift, not just in terms of governance, but especially in terms of gender and class relations.

### **2.1.1. Demographic and socio-economic conditions in Thiruvananthapuram**

The TMC is the largest municipality in Kerala having an average density of 3808 persons/km<sup>2</sup> (Census of India, 2011). To understand the demographic situation of the city, it is relevant to view the population size from a broader perspective. The number of people in Kerala is accounting for 2.76% of the country's population, while the Kerala state is representing only 1% of the whole area of the country. Moreover, the district of Thiruvananthapuram accounts for less than 6% of the area of the state, but comprises 10% of its population. The density of this region is therefore particularly high, not only at the scale of the country, but also at the scale of Kerala. Within the municipality, the population is more concentrated in the coastal area towards south of airport and the density is lower in the wards of the city center (Census of India, 2011).

The sex ratio of Thiruvananthapuram is 51.29% female and 48.71% male. An average of four people lives in every household, the national average being 4.9. The literacy rate (95.1%) is higher than the one of the state, which is already very high for India. The female literacy rate is 93.78% and the one of men is of 96.51% (Census of India, 2011). The scheduled caste (SC)<sup>13</sup> and the scheduled tribes (ST)<sup>14</sup> account for 9.01% or 0.44%, respectively, of the total population of the municipality (Census of India, 2011). Hinduism is the predominant religion with 61.58% followers. Christianity is the second religion of the city with 16.79% adepts. Muslims account for 13.77%.

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<sup>13</sup>Any of the historically disadvantaged Indian castes of low rank, now under government protection.

<sup>14</sup>For centuries, tribes in India had been called "aboriginals," "hill tribes," "forest tribes," "animists," "backward Hindus," "criminal tribes," "primitive tribes," "backward tribes," and "depressed classes." They generally spoke their own languages, observed their own political and cultural patterns, lived in isolated areas, and were regarded as economically and socially "backward."

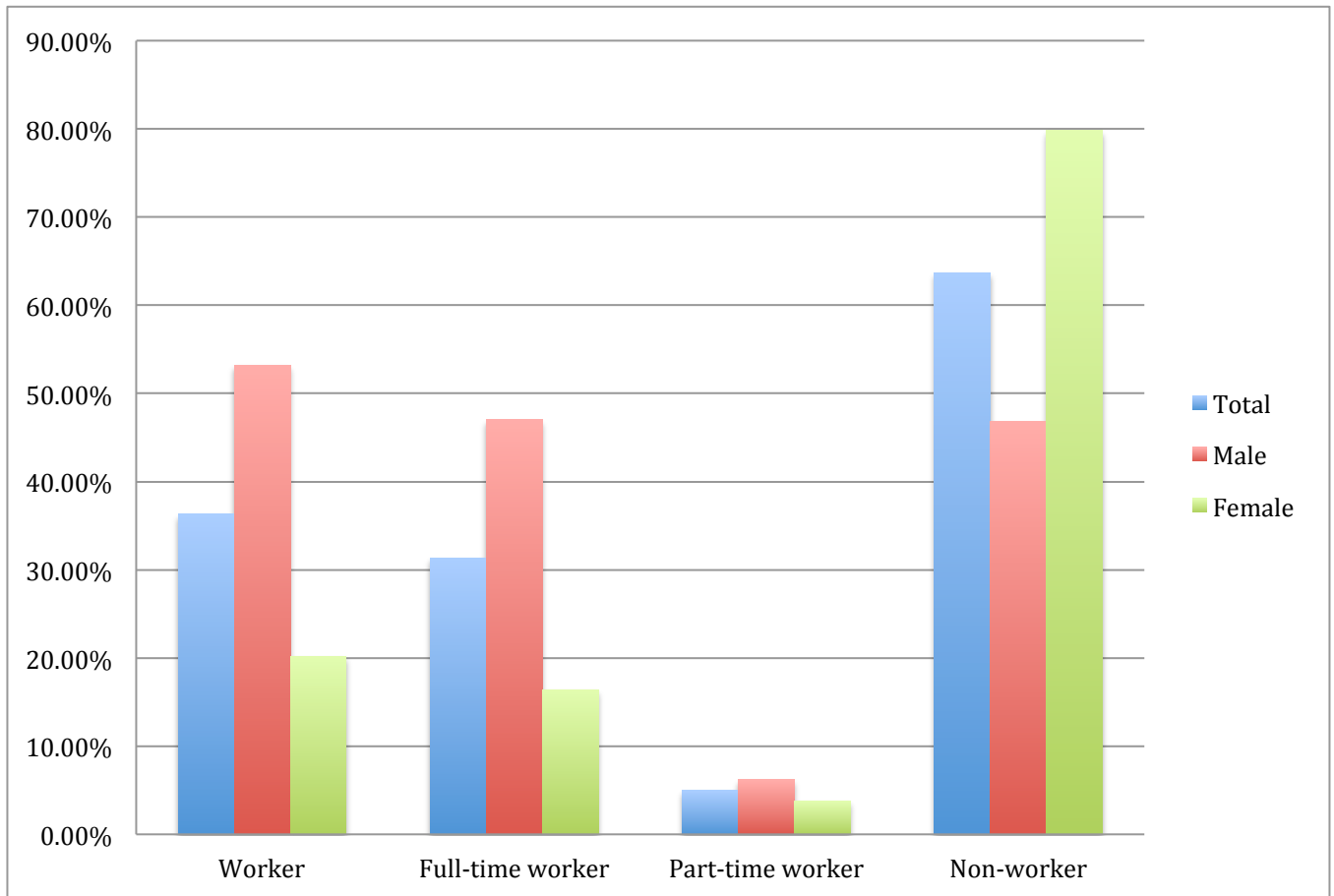


wards that face the biggest socio-economic vulnerabilities are situated at the periphery of the city. As the data date from the year 2011, some of information are missing for the new wards recently included in the municipality (Census of India, 2011). In this figure, the situation of the two selected wards of this study is moderate in terms of vulnerability. It can be explained because some of the wards borders have changed since 2011. Moreover, half of the interviews in Kanjirampara were conducted in an especially vulnerable community. On the opposite, all the interviews in the ward of Sasthamangalam were conducted next to the main road, a particularly rich area.

In the municipality, the average of workers, neither in full-time and part-time jobs, is 36% – 53% of male and 20% of female are working population. For women, 16% are full-time workers while 4% have a part-time jobs (Census of India, 2011).

**Figure 5:** Percentage of working population in Thiruvananthapuram

–Source: Census of India, 2011–



### 2.1.2. Political alternations at the State and Corporation levels

The two major political coalitions in Kerala are The Left Democratic Front (LDF), led by the CPI (M), and the United Democratic Front (UDF), led by the Indian National Congress (INC) Party. The two principal coalitions of political parties have alternated in the Government since the early 1980s, with neither Front being able to win a re-election for a second term (Kerala Assembly elections database, 2017). As no political party is able to keep the majority in the Legislative Assembly for more than five years, it can be very difficult to formulate political programs for the long term. This has also repercussions for the management of municipal solid waste. The political alternations in Kerala have strong influences on the whole State and therefore on the city of Thiruvananthapuram.

**Table 1:** Results and majority for the Kerala legislative assembly since 1982.

–Source: Kerala Assembly elections database, 2017–

Year	UDF	LDF	Others	Government majority
1982	77	63	0	UDF (14)
1987	61	78	1	LDF (16)
1991	90	48	2	UDF (40)
1996	59	80	1	LDF (20)
2001	99	40	1	UDF (59)
2006	42	98	0	LDF (56)
2011	72	68	0	UDF (4)
2016	47	91	2	LDF (44)

At the level of the Corporation of Thiruvananthapuram, alternations of the political parties in power have also had an influence on the waste management. In particular, the party in opposition often discredits the waste management strategies of the elected municipal government. During the three months of this fieldwork, two general strikes organized by political parties occurred, that implied the closure of the shops and the cessation of services such as public transports for one day each.

**Table 2:** Results and majority for the TMC assembly in 2010 and 2015.

–Source: Corporation of Thiruvananthapuram, 2016–

Year	UDF	LDF	Others (BJP and independents)	Government majority	Elected mayor
2010	40	51	9 (6 and 3)	LDF (11)	K Chandrika CPI (M)
2015	21	43	36 (35 and 1)	LDF (16)	VK Prasanth CPI (M)

For more than 15 years, the mayors of Thiruvananthapuram are members of the CPI (M) party, which has held the government majority in the city. It can be a problem when the party in power at the state level is not the same as that at the TMC level. As a matter of fact, programs of development, just as the one of MSWM, can either receiving help or facing oppositions coming from the State authorities. It may thus be assumed that the decentralized program in Thiruvananthapuram should get better support since 2016, as the leader party of the Kerala Legislative assembly is the same that the one of the municipality (LDF).

### 2.1.3. Recycling problems in Kerala and the composition of waste in the Municipality

Nowadays, many local enterprises are involved in the management of the MSW, however most of their treatment and recycling still does not take place in Kerala. There is a lack of recycling technologies and units in this region of India (Ajith, 2014). This is especially true for all the non-biodegradable waste, such as plastics. The lack of interest for the management of paper, plastic and glass is often defended by the fact that a huge majority of the waste produced in Thiruvananthapuram is still composed of organic materials. They represent more than fifty percent of the total, while paper, glass and plastic account for 10.5%, 2.4% and 7.6%, respectively (Nair & Sridhar, 2005) (Narayana, 2009). However, the absolute numbers for these wastes are very high and could make recycling business profitable, the more so as there is a high population density and thus reduced costs for transportation. Moreover, with the growth in consumption of industrial products, the treatment of such materials will probably be of increasing importance in the years to come (Suresh Kumar, 2003).

**Table 3:** Physical characteristics of solid waste in Thiruvananthapuram.

–Source: Nair &amp; Sridhar, 2005–

Type of solid waste	Tones per day	Percent of total
<b>Organic waste</b>	151.6	50.5
<b>Paper</b>	31.6	10.5
<b>Glass</b>	7.2	2.4
<b>Textile</b>	7.7	2.6
<b>Plastic</b>	22.8	7.6
<b>Metal</b>	6.5	2.2
<b>Ash</b>	11.4	3.8
<b>Sand</b>	32.6	10.8
<b>Miscellaneous</b>	25.2	8.4
<b>Total</b>	300	100

The specific socio-political situation of Kerala can be a factor that explains the lack of recycling infrastructures in this region of the subcontinent. Economic growth was very slow during the 1980s (George, 1999) and the State went through a period of economic recession. Nowadays, the leading source of growth is the tertiary sector, in particular tourism, trade, transportation, hotels and restaurants (Pushpangadan, 2003). The primary and secondary sectors are thus not very well developed in this region of India (George, 1999). The high level of education in the State has had effects on the manpower of Kerala, which is particularly skilled and exports itself to different States of India and in the Gulf countries (Pushpangadan, 2003). Therefore, the low development of the primary and secondary sectors may explain why the recycling of waste is mainly done in the State of Tamil Nadu, where manpower is cheaper. Nevertheless, waste could become an interesting new market for Keralan investors. Using appropriate technologies, waste can be transformed in useful and lucrative materials (Shukla, Harad & Jawale, 2009).

#### **2.1.4. The environmental and health problems of solid waste in Thiruvananthapuram**

Improper procedure of MSWM can lead to several kinds of environmental issues that can have more or less impacts on the quality of the citizens' life. These include all strata of the urban dwellers' environment: the air, the water and the soil. Indeed, the dumping and burning of waste lead to serious atmospheric pollutions and olfactory

nuisances. However, the authorities have recommended this practice by the beginning of the year 2012, as they had no other solution to suggest to their citizens (see subsection 2.3.3) (Times of India, 2012). Moreover, open dumps and inappropriate habits of littering have some serious effects on the degradation of water and soils through leachates (Vasanthi et al., 2008). The degraded quality of the drinking water and the increase of mosquitoes due to waterlogging can be presented as two examples of the negative effects that result from an inappropriate landfilling strategy. In most cases, the urban poor seem to be the first population affected by the environmental degradations (UN Habitat, 2010).

Environmental impacts connected to an overload of waste can have other indirect effects that are closely correlated with the health of the population. The existence of non-composted organic waste on the public streets can be linked to an increase of the appearance of stray dogs and rats. Their bites provoke serious injuries and are significant factors in contagions, such as the spread of rabies. Furthermore, the continuous increase in the frequency of floods in Thiruvananthapuram is also caused in part by the proliferation of public waste on the roads of the capital and to the mixing of water and waste (SEOC, 2015).

#### **2.1.4.1. Air pollution & the effects of burning**

When no options to get rid of big amounts of waste exist, the main benefit of open incineration is to reduce its volume. Unfortunately, the pollution resulting from the burning of waste has important impacts on many spheres of the environment and on public health (Gupta et al., 1998). Indeed, the combustion of the refuses is an increasingly disputed activity, instead of reducing pollution it creates new ones. The high temperatures are transforming solid materials into new liquids and gases that are often more harmful and especially more mobile than their old chemical forms. The incineration of solid waste generates new refuses such as dioxins, furans, nitrogen and sulfur oxides, which are released into nature through the resulting cinders and fumes (PNUE, 2008). Moreover, burning of waste is also increasing greenhouse gas emissions, as it is estimated that the incineration of 1 mg of MSW is releasing 0.7-1.2 mg of CO<sup>2</sup> (IPCC, 2001).



The effects of the created chemical substances are having serious health issues for the population. Nowadays, it is estimated that a quarter of the diseases in Kerala are the consequence of the environmental pollution (Vasuki, 2015). Children and elderly people are particularly vulnerable to respiratory conditions caused by the atmospheric pollution, including those from the burning of the waste. The diseases caused by air pollution include asthma, bronchitis, cancer, alterations in the development of cells and impairment of the endocrine or immune systems (Vasuki, 2015). Olfactory nuisances do also result from burning of waste, especially in the urban area of Kerala where the density of the population is particularly high.

#### 2.1.4.2. An increase in floods

For the past years, the city of Thiruvananthapuram has been facing an increase in floods during the monsoon season. Many reasons can be linked to this augmentation, such as improper construction of pavements and roads. The dumping of public waste is another reason (SEOC, 2015). Indeed, the waste thrown in the river areas and on the sides of roads avoids the natural flow of water. Flooding can lead to the intrusion of sewage into potable water, increasing epidemics in the city. Moreover, many electrocutions were reported in the city, as electric lines were submerged during the monsoon season (SEOC, 2015).

In 2015, the excess of water in the municipality affected most of the areas of the city with variable effects on the populations from one ward to another. In the two selected wards of this research, the percentage of dwellers exposed to flooding is very variable. In Kanjiramapara 28.6% of the population was exposed to those phenomena while in the ward of Sasthamangalam only 15% had to deal with it. At the scale of the whole city, 17.9% of the dwellers were affected by the inundations (SEOC, 2015).

**Table 4:** Population impacted by floods in two different wards of the city

–Source: SEOC, 2015–

Ward Name	Ward population	Flood prone area (km <sup>2</sup> )	Population exposed
<b>Kanjiramapara</b>	10'004	0.47	2'865
<b>Sasthamangalam</b>	10'490	0.11	1'579
<b>Thiruvananthapuram</b>	881'064	39.9	156'476

### **2.1.4.3. The threat of stray dogs**

The abundance of composting-waste upon the streets of the city wards that results from the new decentralized MSWM leads to an increase of the presence of stray dogs in Thiruvananthapuram. Indeed, the number of hounds had nearly doubled from the year 2015 to 2016. Their population rose from 5'380 to 9'250 (Kumar, 2016). Since 2001, the Supreme High Court of India has adopted laws against the culling of those wild animals. Unfortunately, this legislation is often defied by the State of Kerala and its population to "fight against the rabies' expansion" (Prasad, 2016). However, the killing of dogs seems to be inefficient and fighting against the causes of their development, such as the presence of waste upon the streets, will certainly be more effective. Many dog bites happen in the city and they can be seen as the result of the mismanagement of MSW. In the year 2016, more than 53'000 cases of biting have been reported in Thiruvananthapuram. The diseases are not the only problem caused by those animals' bites. Indeed, on the 21<sup>st</sup> of May 2017, a fifty years old fisherman succumbed from his injuries after being attacked by many dogs at night (Indian Express, 2017).

On walks between the wards of Kanjirampara and Vattiyoorkavu, where I resided, I saw stray dogs in the streets every night. They ate the public waste disposed of on the sides of the main street. Most people walked at a good distance from them and lot of people asked me to be careful of their bites. On the other side, in the main street of Sasthamangalam, where there was much less waste in the streets, I never saw any stray dogs.

At the scale of the State of Kerala, The number of dog bites also increased with 62,280 cases in 2013, 119,191 in 2014 and 125,385 in 2015. However, Thiruvananthapuram district leads the number of attacks with 88,124 dog bites cases in the last three years (Deccan Chronicle, 2016). Unfortunately, it is complicate to obtain information concerning the presence of stray dogs before the year 2014, in a way to understand what was the situation before the new SWM was launched.

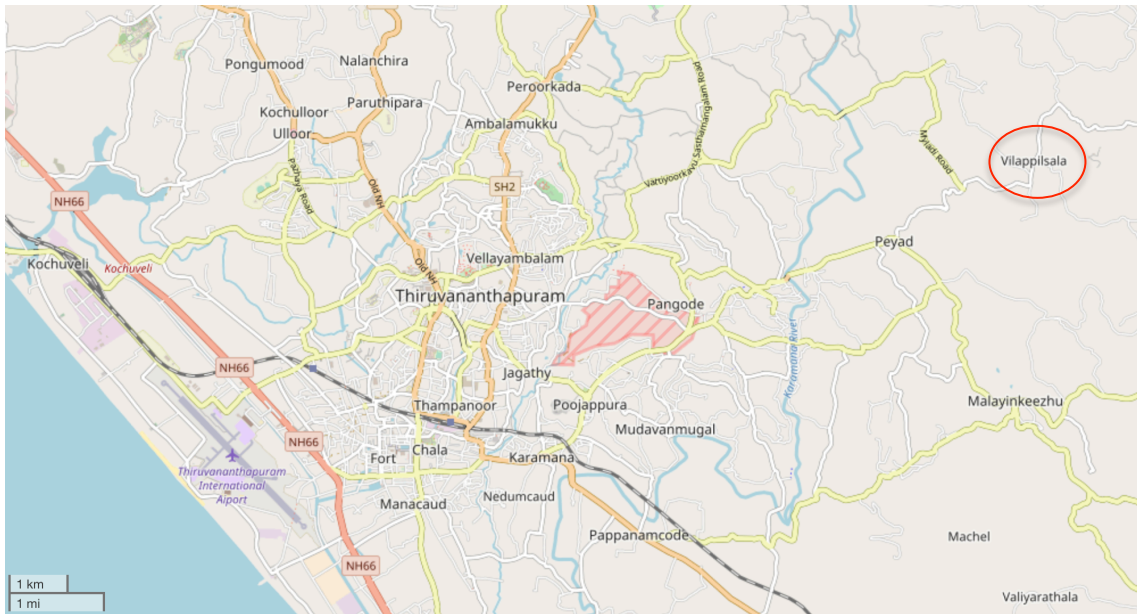
## **2.2. Waste management programs in Thiruvananthapuram**

This subchapter is designed to introduce the context of the two consecutive programs of waste management: their rationales, their laws, their effects, their

achievements and their failures. But also some of the discourses and rhetoric that constitute them. Moreover, it will present some of the actors involved in the different MSW programs. Unfortunately, the uses and practices of private firms, the population, the associations and the organizations do are not always in sync. This can create tensions between the different kinds of stakeholders that are involved in this market.

As mentioned earlier, the TMC was one of the first in the whole India to develop a plan for SWM at the municipal scale in 1997 (Ambat, 1997). Since then, two major schemes of waste management have been established. Each program has been handled and administrated in different ways over time. As stated in the introductory part of the last chapter, the first plan for the waste management was a centralized program. Centralization of the city's biodegradable waste was envisaged within a small panchayat located about 18 kilometers from the city center.

**Figure 6:** The situation of Vilappilsala at the east of Thiruvananthapuram  
– Source: Open Street Map –



The plant of the village of Vilappilsala was designed with the intent of managing the biodegradable waste of the whole capital. The non-degradable and degradable wastes were supposed to be segregated in households before their arrival in the village. Nevertheless, after more than one decade of existence, strong oppositions to this

treatment schedule gave no options to the city authorities other than closing the installation of Vilappilsala (The Hindu, 2015). This closure led to a mismanagement of the MSW for about two years, during which the ULB were unable to propose any alternative solutions. At the end of 2014, city authorities finally implemented new waste management solutions. Once again, Thiruvananthapuram and Kerala were ahead of the whole country by introducing decentralized waste management. Established at the end of 2014, the decentralized approach is now one of the keystones of the new set of rules on the handling and managing of MSW (MoEF, 2016).

### **2.2.1. The centralized plant of Vilappilsala**

A piece of land measuring 2.1 acres was acquired by the TMC at Vilappilsala in the panchayat of Vilappil. After an evaluation of four different tenders from private entrepreneurs, the proposition given by the M/s Poabs firm was retained in 1999. Agreement between the TMC and the enterprise were signed on December the 22<sup>nd</sup> 1999. They contained the following points (CES consortium, 2008):

- *TMC will hand over 4 hectares of land at Vilappilsala on lease for a period of 30 years.*
- *M/s Poabs will established a MSW treatment unit with a capacity of 300 metric tons (MT) which will convert MSW into compost*
- *The city corporation will hand over an assured quantity of 300 +/- 5 MTs of unsegregated MSW at the receiving point at Vilappilsala compost plant every day. In case TMC fails to deliver the assured quantity for a period of over 10 days they are liable to pay M/s Poabs compensation at the rate of Rs 49 000/- . per day as shortfall compensation.*
- *M/s Poabs will pay the TMC royalty at the rate of 2% of the sale of compost.*
- *M/s Poabs will also pay the TMC lease rent at the rate of Rs 1/- . per m<sup>2</sup>.*
- *The factory will be run on a BOOM (Build Own Operate Maintain) basis for a period of 30 years.*
- *M/s Poabs will have the right to mortgage the land to get financial assistance from*

*Banks/Public financial institutions/HUDCO.*

- *M/s Poabs will hand over vacant possession of the land in case of failure to discharge its obligations.*

Despite the strong opposition from the population of Vilappilsala to the building of the installation, the plant was inaugurated on June the 26<sup>th</sup> of 2000 (CES consortium, 2008).

Unsegregated waste – composed of biodegradable and imperishable non-biodegradable – were collected by the Corporation lorries<sup>15</sup> in the dumping yards of the whole TMC and transported to the village of Vilappilsala (Shyjan, Mohan & Surjit, 2005). At their arrival in the village, the local waste workers of the plant had to segregate these. The biodegradable should be compost in the plant and all other kinds of waste were disposed of in an open dump.

The installation of Vilappilsala rapidly ran into several problems, notably as a consequence of the non-respect of some of the above-mentioned clauses of the PPP contract by both parties. For instance, the TMC was not able to provide the daily quantity of 300 MTs of waste. During the first seven years of existence of the plant, there was not a single day where the Corporation was able to deliver the agreed quantity (CES consortium, 2008). In any case, however, the plant built and operated by M/s Poabs seemed to have only a capacity to treat less than a 100 MT per day (CES consortium, 2008). The over-capacity led to the stoppage of the plant on several instances.

Moreover, the Poabs enterprise had problems to sell the compost that was produced in its installation. Indeed, as mentioned by the PPP agreements, the waste was not segregated before its arrival at the plant. When it is not segregated at source level, it is very complicate to separate such an amount of waste (however, one could at least control that it is properly done). Most of the compost plants built in India are not used

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<sup>15</sup> The TMC had to transport the waste to Vilappilsala. Municipal workers were recollecting and transporting these wastes. Many complaints concerned the lorries because they littered waste on the roads, as a tarpaulin did not cover them.

correctly and do not function as they should (Annepu, 2012). Organic refuses are, in most cases, mixed with other kinds of waste before their arrival at composting plants because of improper at-source segregation. The resulting compost thus contains significant amounts of pollutants, including heavy metals (Cu, Cd, Cr, Ni, Pb and Zn), and can therefore not be sold and used as fertilizer (Narayana, 2008; Saha, Panwar & Singh, 2009). Consequently, the compost created can represent an additional cost, as it needs to be stored or further treated. These problems of polluted compost can be part of the explanation as to the difficulties experienced by M/s Poabs to sell their final product. Another part of the explanation is that there is little demand for compost soil in Kerala, since it is not a rare commodity in the region, particularly for farmers. Most of the time, household compost is of better quality because of its easier segregation – as the amount of waste is lower – and it is used for the fruit trees that are present in many family yards.

Furthermore, the PPP agreements did not clearly define how to manage the residues – non-biodegradable waste – and their stockage/treatment. This led to a continuous pollution of the panchayat area and to an increase of the oppositions by the population of the Vilappilsala village. Moreover, the residual garbage – which result from the sorting before composting – was dumped in the open landfill site within the panchayat. The environmental issues resulting from the presence of this dump were many, as it polluted air and soils and created unpleasant odors. But the worst seems to be the presence of leachates resulting from both the composting plant and the dump, which led to the degradation of a small stream that flows through the village. Indeed, the analysis of its sediments revealed the presence of heavy metals such as cadmium<sup>16</sup> (The Hindu, 2012), which can cause many health issues for the inhabitants of the nearby area.

In 2007, after seven years of problems in Vilappilsala, the new LDF Government of Kerala decided that the Poabs enterprise had to abandon the operation of the plant.

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<sup>16</sup> Cadmium (Cd), a by-product of zinc production, is one of the most toxic elements to which man can be exposed at work or in the environment. Once absorbed, Cd is efficiently retained in the human body, in which it accumulates throughout life. Cd is primarily toxic to the kidney, especially to the proximal tubular cells, the main site of accumulation. Cd can also cause bone demineralization, either through direct bone damage or indirectly as a result of renal dysfunction. In the industry, excessive exposures to airborne Cd may impair lung function and increase the risk of lung cancer.

The PPP came to an end with disagreements between the enterprise and the city authorities. After many negotiations, conducted by the Government of Kerala, M/s Poabs agreed to leave the land and the factory to the TMC. No compensation was sanctioned on any side but the Poabs enterprise had to cede their plant to the TMC, mainly because the ownership was not clearly defined. As a matter of fact, the TMC did not pay any compensation for its incapacity to provide enough waste, as the plant was not in the capacity to receive the expected quantity of composting detritus (CES consortium, 2008).

### **2.2.2. 2007- 2012: New management, new technologies & persistent opposition**

After the abortion of the PPP mentioned above, the plant of Vilappilsala was taken over by the TMC. The Center for Environment and Development (CED) has been selected by the city authorities to manage the project and to implement the modifications that were required to complete the existing installation. As the capacity of the plant and the presence of leachates were the main issues of the M/s Poabs installation, technologies to suppress those problems were planned. New disposal systems for the landfill were designed: a geo-membrane, drainage layer, clay bentonite layer and the collection and treatment of the leachates (CES consortium, 2008). Speed regulation – such as the one obtain with temperature augmentation and  $O^2$  regulation – was proposed in the composting process to attain a capacity up to 250 MTs per day. A new pelletisation plant – production of fuel pellets – was also proposed to help the digestion of the organic and paper wastes and to give new revenue to the program by the selling of the pellets (CES consortium, 2008).

However the CED also suggested non-technical modifications. An awareness campaign was conducted for the reduction of the city waste, its reuse, its recycling and the recovery of the resource. Material facilitating the implementation of these preventive measures was distributed in the city and meetings with residents' associations were made. At the household level, two buckets were distributed to encourage the segregation of waste at their sources; one was for degradable waste and the other for non-biodegradable. A door-to-door waste collection scheme was planned, to be conducted mainly by the program of poverty eradication and empowerment of the

Kudumbashree<sup>17</sup>. More than 1000 sanitation workers and 1500 community workers were involved in this new management (CES consortium, 2008).

Despite the improved technologies used in the upgraded treatment infrastructure, many complaints were still made by the population of the panchayat. Moreover, there were conflicts over what constituted a correct functioning of the plant. While the city authorities seemed convinced by the effectiveness of this facility, local activists and especially the panchayat's population did not believe so. The residents of the village of Vilappilsala complained about odors coming from the infrastructure, which still did not have the ability to receive and treat all the waste of the city. Another issue was the mixture of organic materials with other waste that was still happening before their arrival at the plant. Indeed, the door-to-door collection system seemed to be ineffective mainly because of the lack of segregation at the household level (CES consortium, 2008).

Before CED accomplished all these above-mentioned ameliorations of the plant, people in Vilappilsala expressed their dissatisfaction. Worn out by the pollution, the continuous issues due to leachates and the health problems caused by the infrastructure, the villagers of Vilappilsala blocked the road access to the facility. As a consequence, the heart of the city was quickly buried under waste. Finally, the Vilappilsala plant was closed in December 2011. The adjudicator of this final decision was the Government of Kerala.

B.R.P Bhaskar, a journalist and a socio-environmental activist, criticized the initiative in the following terms: "Not all waste generated in a household can be treated there. That is why we require an integrated method of decentralized and centralized facility. The Vilappilsala plant can be reopened as a centralized plant, but only after the

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<sup>17</sup> Kudumbashree is the poverty eradication and women empowerment programme implemented by the State Poverty Eradication Mission (SPEM) of the Government of Kerala. The name Kudumbashree in Malayalam language means 'prosperity of the family'. The name represents 'Kudumbashree Mission' or SPEM as well as the Kudumbashree Community Network. What is commonly referred to as 'Kudumbashree' could mean either the Kudumbashree Community Network, or the Kudumbashree Mission, or both.



authorities convince the people there and assure them that the plant will henceforth be properly managed without endangering their health or environment” (Bhaskar, 2012).

### **2.2.3. 2012-2014: Waste management without plant nor collection system**

After the closure of the plant in Vilappilsala, the city authorities had no other option than to rapidly propose a new decentralized waste management system. Before the TMC was able to formulate a coherent MSWM plan, their recommendations were very dangerous for environment and thus for the population. The first proposals from the ULB were to bury the waste in pits or to burn it (Times of India, 2012). Waste management in Thiruvananthapuram then became the responsibility of every household, shop and hospital. Therefore, the city was quickly full of garbage and the solution adopted by the households was mainly the burning of waste on public roads (Kumar GP, 2012). Furthermore, with the closure of the centralized structure, most of the Kudumbashree waste pickers employed in this project lost their jobs. As every household had to take care of their own waste, the work of the Kudumbashree was no longer necessary. Moreover, the still active waste pickers had no other solutions than throwing or burning the collected waste in public places, including parks and rivers. Dr. Sreejith, the president of the Indian Medical Association warned the authorities about such a management policy: "The idea proposed by the civic authorities to dig pits and bury the waste in it or to burn the waste in public places will have serious consequences. Burying of waste could contaminate the ground water, especially in a city like Thiruvananthapuram. The burning of waste too is not recommended because the fumes that are produced could be toxic" (Times of India, 2012).

Since that period, most of the citizens of Thiruvananthapuram have been concerned with the issues of waste management; so it is an important theme for the electors. This affirmation is especially true since the closure of the plant at Vilappilsala. Indeed, the large presence of this subject in the local medias and the changes in the inhabitants' quality of life made this topic a major issue in regional politics.

### **2.2.4. 2014-present: Decentralized waste management**

By the end of 2014, the TMC decided to launch a new waste management program

(The Caravan, 2017), more than two years after the closure of the Vilappilsala plant and the mismanagement of waste in most of the city. This new municipal plan is called «Ente Nagaram, Sundara Nagaram» in Malayalam, which means «My City, Beautiful City» (Corporation of Thiruvananthapuram, 2016). It is led by new policies that promote the segregation of waste at source, its treatment at the household level or its transport to different decentralized infrastructures.

#### **2.2.4.1. Bylaws and rules**

Composting stations must be implanted in local markets and the TMC should also undertake educational programs to sensitize the populations to sorting. For T.M. Isaac, a local State politician of the CPM who participated in the implementation of decentralized SWM project in Alappuzha and encouraged the current program of Thiruvananthapuram, raising awareness is the key to the success of the new treatment centers (The Hindu, 2014). To support the project, laws against littering have been introduced. In Kerala, since 2011, the police seem to have enforced the regulations concerning littering established by the High Court of the State. For example, the burning of waste in public is thus prohibited in Thiruvananthapuram and leads to a fine (The Hindu, 2011). However, I saw many people burning their waste next to police officers during fieldwork without being purchased or constrained to pay fines. In most of the cases, people have no opportunity to do differently. However, if burning is not punished, the littering of waste is prohibited in the municipality.

To achieve the objectives of the new plan, each ward has been made responsible for its own cleanliness. The project contains several quantitative and qualitative targets at the ward level. These targets can be summarized as follows (Corporation of Thiruvananthapuram, 2016):

- At least 60% of the neighborhood's households should own a waste treatment facility for organic waste.
- At least 80% of the households of a ward should have a tie up with trained service team for waste treatment. Those workers, appointed by the Corporation, have to help households to install and use their waste facility. If any household does not own a facility, the service teams should also take and carry the waste of the

households to a treatment plant.

- A common treatment facility should be installed in every ward. This measure also includes the installation of an adequate number of waste disposal systems, such as biogas plants or aerobic bins, in the city.
- The public institutions have to support and participate in this campaign. For example, by promoting the at-source segregation with different types of advertisements.

The wards that fulfill these criteria have been declared «clean wards» by the end of 2014 and during the year 2015 (see introduction of chapter 3). The new management, its rules and its legislations gives more responsibilities not only to the city wards, but also to the residence associations, hotels, hospitals, restaurants, shops and to every household. But the TMC keeps, in the view of the MoEF's laws of 2000 and 2016, the principal responsibility for the city cleanliness.

#### **2.2.4.2. An increase of the waste contractors**

Today, the residents of the wards declared as clean have access to waste management through the services of different enterprises and various kinds of waste collectors. Waste in Thiruvananthapuram is now collected by at least four different agencies, which are formally accredited by the Corporation. This represents a new type of PPP. These agencies are the Haritha Gramam Company (Green Village Company), the Haritha Nagaram Company (Green City Company), the VCare Company, and the Pelican Foundation. Each agency has its own waste collection practices. The VCare Company, for example, not only collects biodegradable waste but also plastics. As explained by its director S. Subeesh: “The VCare Company distributes two waste bins to the households; the first is used for biodegradables and the second for all non-biodegradables”.

According to the interviews carried out at the Health Inspector Office, the different companies do not work in the same areas. The decision of choosing a ward for a company belongs to the Corporation. In other words, the TMC decides in which wards the agencies can or cannot work. In Sasthamangalam, for example, the Pelican

Foundation received the contract to collect the plastic waste of the households. However, household in this ward can access other collectors, such as independent waste pickers or Kudumbashree groups that will also take care of their biodegradables against a fee.

In most cases, agencies do not employ waste collectors in a formal manner. Rather, the waste pickers receive money directly from the households from where they collect the garbage. This can lead to several problems, mostly because the waste pickers do have no incentive to throw the detritus in an official and managed disposal place. Moreover, during this field research it was very impossible to identify a final disposal and treatment plant for non-biodegradable waste. It was said that the treatment installations would be mainly located in the neighboring State of Tamil Nadu.

#### **2.2.4.3. New competition between different associations and organizations**

Non-governmental organizations and associations play an increasing role in the management of waste in Thiruvananthapuram. They can support the current program in different manners, from the technical aspects to the socio-cultural ones. Their visions are not always converging and sometimes they are completely opposite. Some of the organizations are appointed by the TMC while others are not, which can also lead to tensions and disputes. Among the interviewed associations, misunderstandings were very common. While most of the organizations claim that decentralized management is the best solution for the city, a few of them are of the opinion that the main issue remains the lack of proper technologies and that a centralized infrastructure is the solution. While some are concerned about gender equity in the context of waste management, others are trying to find the best technical solutions to the problems.

Therefore, my interviews with different organizations and associations of waste management in Thiruvananthapuram revealed relationships of cooperation and trust as well as animosity and distrust. As waste management is an increasingly important subject in the municipality, conflicts of interest are common between organizations. For example, the Suchitwa Mission<sup>18</sup> and the CED, both of which are mandated by the TMC

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<sup>18</sup> Suchitwa Mission is a society registered under the Travancore Cochin Literacy Scientific and Charitable Societies Registration Act (Act 12 of 1955). It is an organization of Government of Kerala, under the

and the State of Kerala, are facing criticisms from members of the Thanal Trust NGO, as expressed in the following terms: “CED members are responsible for the mismanagement at Vilappilsala, their responsibility is as important as the one of Poabs enterprise.” Their views are notably not the same regarding the solutions that can be proposed for the management of solid waste. While the CED focuses on the importance of the use of proper technologies and claims that a mix of centralized and decentralized infrastructure is a must, the Thanal Trust postulates that decentralization is the only solution for waste management. On the other hand, the Suchitwa Mission insists on the concept of Zero Waste and stipulates that open burning of waste is one of the worst issues in the city. These tensions and differences in judgment have a serious influence on the decisions and behavior of the public authorities. The influence, just as the interest for the topic of waste management, is bigger for the Suchitwa Mission and the CED than for the Thanal Trust, mainly because they are mandated by the TMC.

#### **2.2.4.4. Waste as instruments for political campaigning**

Nowadays, waste management is a matter addressed by most of the politicians during their electoral campaign. This fact can partially explain the early achievements by the new program of waste management by the end of 2014 – when four wards were declared clean – and during the first months of 2015 – as six new wards enter the list of clean wards (The Hindu, 01/2015; The Hindu, 02/2015; NDTV, 2015). In fact, elections for the ULB of the city were held in 2015 and positive results of waste management were a requisite to gain some credibility in the eyes of the voters. This can also explain why the first positive results were rapidly questioned and criticized by the population of the clean wards (Deccan Chronicle, 2016). Indeed, the wards that were declared to be clean, did not achieving most of the objectives of “My city, beautiful city“ program. These results can be linked with the UPE theoretical framework (on politics) and particularly with the observations of the work of Cornea in West Bengal, where

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Local Self Government Department responsible for evolving implementation strategy, providing policy in the sectors of sanitation and various solid and liquid waste management issues, providing technical inputs for sanitation and waste management projects and has been functioning as the nodal agency for assisting Cities, Municipalities and Panchayats in sanitation and waste management aspects.

politicians used the SWM in the purpose of their elections campaigns (Cornea et al., 2017)(see section 1.4.1). This tends to show the importance of the political agenda on any SWM projects.

My interviews with the Mayor V.K. Prasanth and with the staff of the Health Inspector Office highlighted that the authorities present the decentralization program as a well-planned solution. Based on the example of the nearby city of Alappuzha, decentralization is often shown as a great and efficient solution for waste management. However, ordinary people I interviewed seem to regret the closure of the plant of Vilappilsala. As explained earlier, such a decision was not a real choice given the strong local opposition. And the sudden closure of the centralized installation left the city with no solution other than proposing a management at the scale of the wards and, more precisely, at the level of the households.



**Image 2:** Finance Minister T M Isaac (center) and Mayor V K Prasanth (second from the right) around a waste bin in Sasthamangalam.

–The new Indian Express, 2017–

The experts gave two different arguments that make it necessary for the authorities to opt for a decentralized program. Most of the time, it was claimed that the density of

the state of Kerala is so high that it is impossible to find a place for the installation of a big composting plant (Ambat, 2003; Census of India, 2011). Indeed, it is not that the whole of Kerala is urbanized, but there is a diffuse rural population. However, this established fact is not sufficient to explain the absence of a new centralized plant. A more reflective interpretation is that Keralan society is very (party-) politicized and therefore people would mobilize quickly against plans to build a nearby plant. Therefore, the explanation is the NIMBY (not-in-my-backyard) effect, notably resulting from the mismanagement of waste in the panchayat of Vilappil. The pollution produced by the plant led to a loss of confidence, among the population of Thiruvananthapuram and its surrounding panchayats in the authorities' ability to implement a working waste management program. Most of the people I interviewed knew about the pollution of Vilappilsala, as this issue was often commented in the media during the protests of 2011.

There was thus an urgent pressure to find a solution and no time to build a new plant. At the same time there was an alternative available: the Alappuzha model.

#### **2.2.4.5. Real restrictions or Corporation's propaganda?**

The increase in waste production and the growth in consumption create new challenges to the Corporation authorities. The producers and distributors, such as shopkeepers, distribute more and more products in the city. This is directly connected to an increase in plastic waste in Thiruvananthapuram and more generally in Kerala. In 2003, the per capita consumption of plastics in Kerala was already more than 38 Kg while the national average was of 1.76 Kg (Suresh Kumar, 2003). The new MoEF rules on the handling and management of MSW (2016: p.21) stipulate that "all waste generators shall pay such user fee or charge as may be specified in the [bylaws] of the local bodies for plastic waste management such as waste collection or operation of the facility thereof, etc." But so far, it seems that the waste distributors, such as big malls do not pay such a fee. As explained by a worker of the Health Inspector Office at the TMC "fees for waste management are not yet paid by the waste producers and distributors. But it shall be the case soon." Nevertheless, the TMC applied the MoEF rule, which stipulates that "carry bags made of virgin or recycled plastic, shall not be less than fifty microns in thickness." Moreover, on March the 1<sup>st</sup> 2017, all plastics bags were banned in

the city of Thiruvananthapuram and replaced by cotton or paper bags (Times of India, 2017).

However, the source of most of the plastic waste remains the packaging of products. Packaging does not respect the regional or national bylaws, as most of the products are foreign imports. For this reason, the rules applied by the TMC seem to be more “for show” than a real measure against the increase in plastic waste.

#### **2.2.4.6. Blaming the population**

Another issue that has been addressed by the TMC key informants is the need for the population to be more responsible for waste management. Indeed, for the Corporation, one of the main reasons for the closure of the Vilappilsala plant was the lack of segregation at source level.

This recurrent discourse appeared in the interviews with the Corporations' officers in Thiruvananthapuram and Alappuzha. They blamed the lack of responsibility of the population for the closure of the centralized plants in both cities. This argument was also brought up by some waste treatment enterprises and organizations. Indeed, arguments concerning the closure of the Vilappilsala plant always focused on the lack of proper segregation of waste at the source. A worker from the Health Inspector Office expressed this point in the following terms: “With the decentralized plan, the population must finally face its responsibility toward waste management.”

Nevertheless, this discourse is potentially misleading as it hides other realities. As the poorer wards were the more unclean ones, the populations blamed for this situation were mostly the lower income ones. But a dirty neighborhood is not the same as a neighborhood creating environmental degradation. These populations are just not able to externalize the pollution. Moreover, some waste pickers are frequently dumping waste from other wards in their neighborhoods (see subsection 4.3). Consequently, the poor can hardly be blamed for the environmental degradations in the city.

#### **2.2.4.7. Corruption as an impediment to development**

Among the interviews and open discussions conducted during fieldwork, most of the actors talked about the problem of “political corruption” in waste management,



without further specifying what was meant with this term. As a matter of fact, even the officers of the Health Inspector Office have addressed this issue. Corruption is not a new issue in waste management (Giuliani, 2009), just as it is not new in the political sphere of India (Transparency International, 2017).

Nevertheless, it is difficult to know if this recurrent subject has become a hackneyed excuse to justify the waste mismanagement in Thiruvananthapuram, or if it is a major issue, which needs to be more deeply analyzed. In any case, it would have been nearly impossible to understand the implication of corruption in waste management during a fieldwork of three months only.

### 3. Implementation of the decentralized solid waste management program

The following chapter intends to address the first specific question of the research: **To what degree is the decentralized SWM project implemented in Thiruvananthapuram?**

As stated in subsection 2.2.4.4, the end of 2014 observed the first positive results of the new MSWM, which coincides with the launch of the decentralized SWM program and the Corporation elections of 2015<sup>19</sup>. In December 2014, four wards were declared clean by the TMC (The Hindu, 01/2015). One month later, six more wards were awarded the same status, and added to the list (The Hindu, 02/2015). The wards of the city proclaimed clean were<sup>20</sup>: Palayam, Nedumkad, Kowdiar, Muttada, Jagathy, Kuravankonam, Pattom, Ulloor, Edavakkode and Sreekanteswaram (The Hindu, 01/2015; The Hindu, 02/2015). This progress led to the recognition of the city of Thiruvananthapuram by the Government of India. The municipality was ranked the 8th cleanest of the country, according to the Swachh Bharat Mission<sup>21</sup>. This ranking comprised 476 Indian cities; the first-ranked was Mysore (NDTV, 2015). In Kerala State, the best-ranked city was Alappuzha, where MSWM is decentralized.

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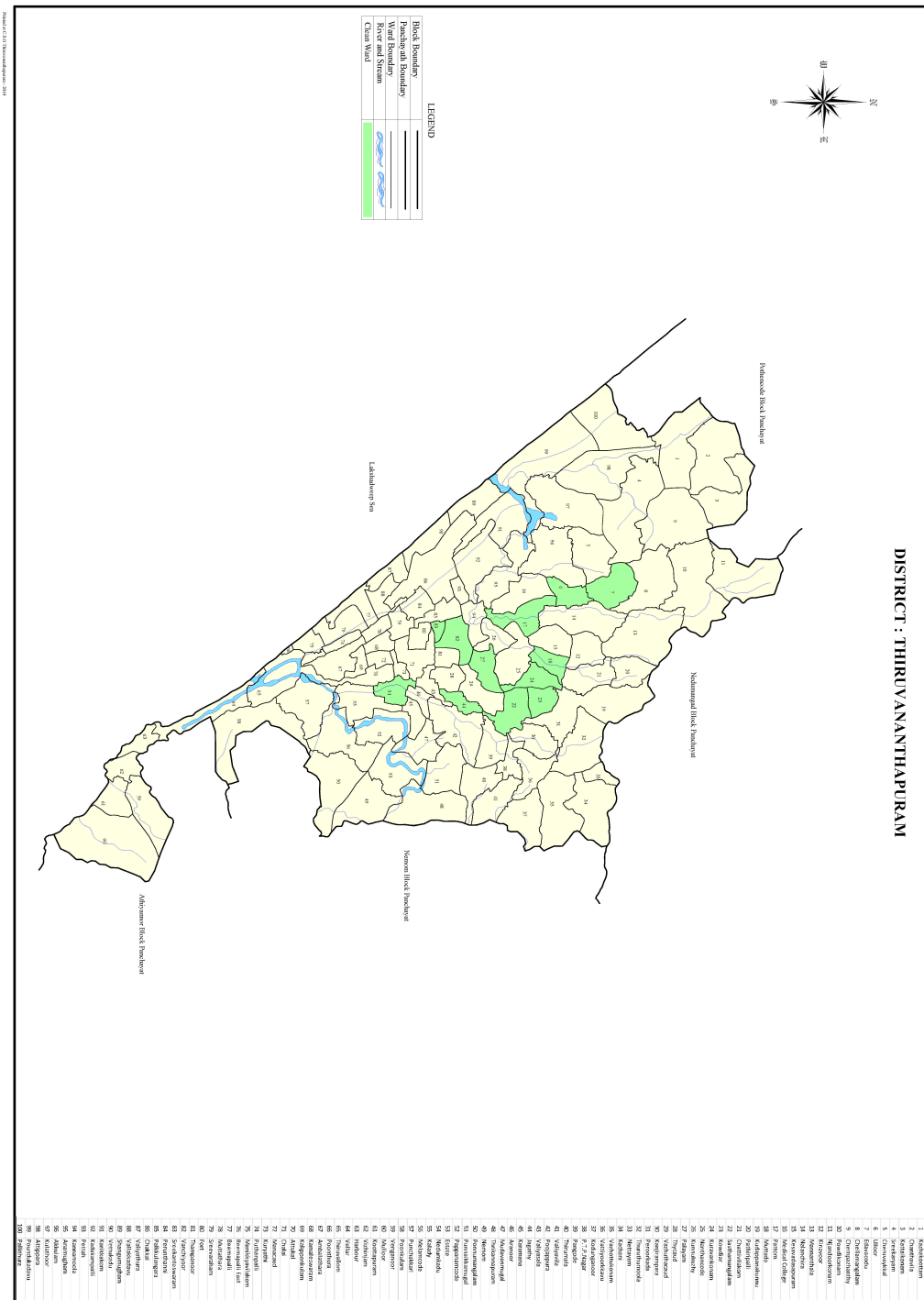
<sup>19</sup> As explained in subsection 2.2.4.4, these quick results were probably needed for the election purpose of 2015. Otherwise, it is complicated to explain the positive outcomes of a program that just starts.

<sup>20</sup> No more recent information on the exact number of clean wards in Thiruvananthapuram has been found during and after fieldwork. Neither key informant could tell me the exact number of clean wards or give me a list of them. A list of clean wards has perhaps never compiled or no other clean ward was declared after this campaign. I noticed that most of the key informants had no interest in obtaining this information. In fact, it seems that the true objective is to clean the wards visited by tourists and those where the resident population is better off, since these have a larger political weight. In the end, the only source I found for this data was the press. Key informants only told me that Sasthamangalam was also considered clean.

<sup>21</sup> This ranking is made on the basis of the achievements of the following points: Elimination of open defecation; eradication of manual scavenging; modern and scientific municipal solid waste management; to effect behavioral change regarding healthy sanitation practices; to generate awareness about sanitation and its linkage with public health; capacity augmentation for ULB; to create an enabling environment for private sector participation in Capex (capital expenditure) and Opex (operation and maintenance).

Despite the positive declarations by the TMC and by the Union of India, many complaints persist and mostly come from the population of the so called clean wards (Deccan Chronicle, 2016). These dwellers affirm that the problem is the non-respect of the MSWM plan; a result of the presence of “unorganized workers and agencies“ not appointed by the Corporation (Deccan Chronicle, 2016). These informal workers are accused of collecting waste in the households and to litter them on the streets. Given the deterioration of the situation, most of the wards mentioned above cannot be considered “clean” anymore.

**Figure 7: District of Thiruvananthapuram and clean wards distribution**  
 –Source: Corporation of Thiruvananthapuram–



It can be observed that the clean wards in the previous figure are central and can thus be put in relation with the wards with the better socio-economic conditions in figure 4.

Another issue that the «My City, Beautiful City» program faces is the refusal of the households to install treatment plants, such as kitchen-aero-bins in their houses. For instance, only 300 families in the municipality accepted a treatment bin for compostable waste in their dwelling, whereas more than a thousand households already rejected the use of such a technology (Deccan Chronicle, 2016). In 2016, only one ward of the TMC, the central and touristic ward Vanchiyoor, seemed to respect and to accept the first objective of the new MSWM program. That is to say, at least 80% of its population fulfills the source-level management requirement proposed by the TMC (Deccan Chronicle, 2016). This raises many questions concerning the socio-spatial effects of the new MSWM plan, such as: is there a relation between the achievements of clean wards and the socio-economic characteristics of these wards.

Technologies were proposed to the households, such as pipe compost, biogas bins and vermicomposting plants, but so far, these options seem to have, according to newspaper reports, generated more complaints than successful adoptions (Deccan Chronicle, 2016).

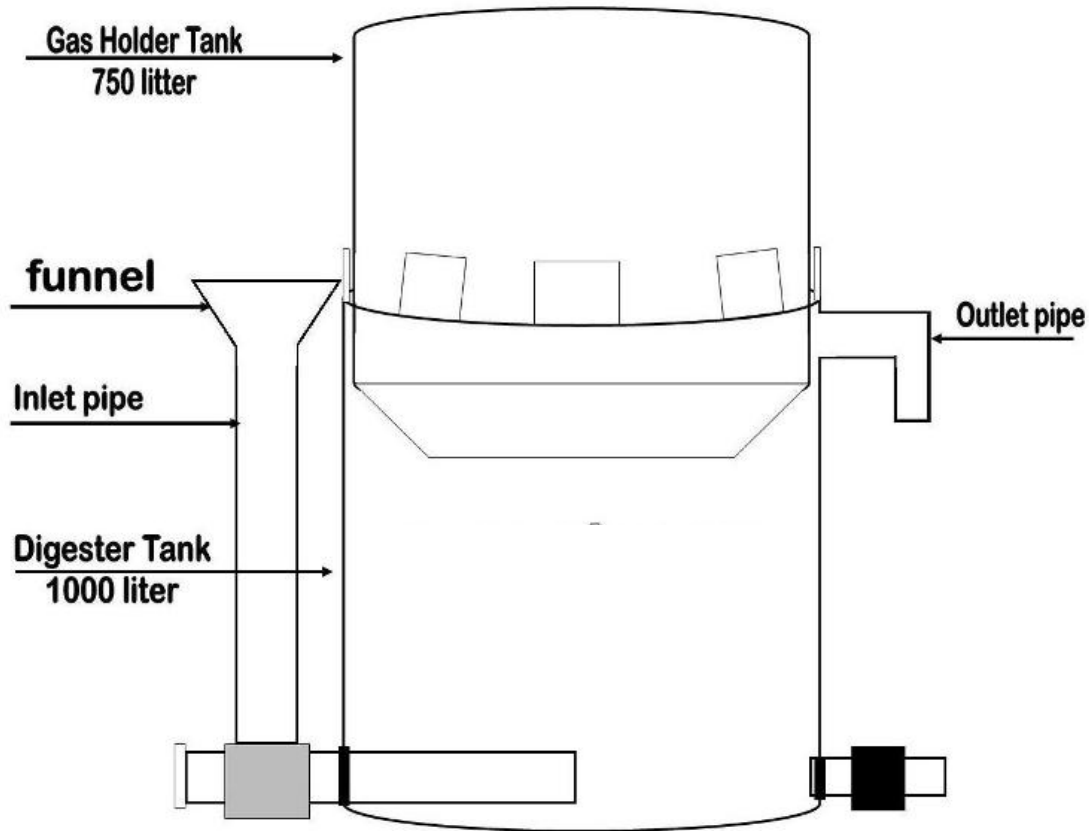
### **3.1. Inappropriate technologies and maintenance**

Two households composting technologies were found during this fieldwork: Pipe composting plants and biogas plants. The first, which is particularly cheap, is composed of a PVC tube of a length of 1.5m and a wall of 4mm thickness. About 30cm of the tube is stuck in the soil. Aerobic digestion is a requisite for correct transformation of waste into manure, and thus the air should be in contact with biodegradable waste inside the plant (The Hindu, 2013). The second, slightly more expensive, technology is the household biogas plant. Composting waste is put in the inlet pipe and is stocked in a digester tank of about a thousand liters. Gas produced in the process of the decomposition of waste is moving up in a gasholder tank with a capacity of approximately 750 liters. Then, the household can use the gas for cooking. The basic costs are between Rs.800 (12 CHF) and Rs.1700 (26 CHF) for pipe compost and around

Rs.15000 (230 CHF) for biogas plant. In addition, the State government and the TMC are helping the families by paying 90% (respectively 75% and 15%) of these installations with public subsidies (Suchitwa Mission, 2017). The interviewed owner of such plants in the wards of Sasthamangalam and Kanjirampara confirmed that they received these subsidies

**Figure 8:** Biogas plant schema

-Source: paksc.org-

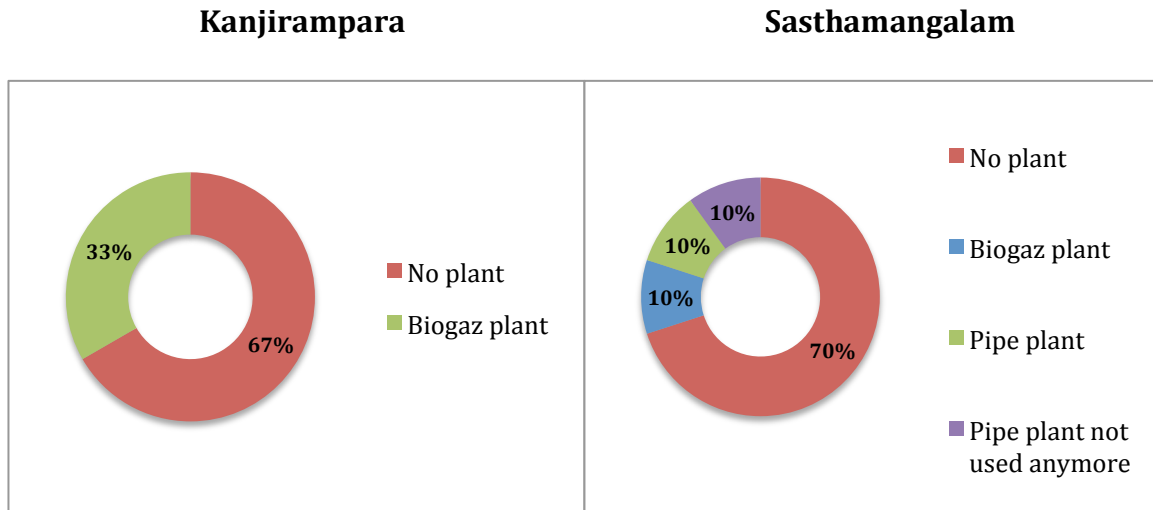


As explained in the last subchapter, most of the quantitative and qualitative conditions of the new MSWM system, which need to be applied at the scale of the wards, are not fully respected (yet). For instance, the installations set up in markets or households are rarely properly maintained, although the decentralized waste management program stipulates that workers must be trained in helping the population to use the composting units correctly.

My field research showed that no such workers are employed in the program yet. In the two selected wards, the objectives regarding ownership of household composting

plants were not achieved (see figure 9).

**Figure 9:** Households and possession of processing plant in Kanjirampara and Sasthamangalam. –Source: household survey



While the ward of Sasthamangalam is declared clean, the Kanjirampara ward has never been declared as such. Nevertheless, figure 9 shows that Sasthamangalam does not achieve some of the objectives of the program, which stipulates that at least 60% of the households should possess a processing plant or have access to one. Interestingly, there is hardly any difference in access to a plant between the two wards. Furthermore, 10% of the households stopped using their pipe composting plant in Sasthamangalam. The interviewed families expressed that these plants were not functioning properly. A retired biology professor living in the ward complained: “As no air can enter in the pipe plant, the transformation of the waste into compost is not happening. The technology is not good.”<sup>22</sup> Precedent figure shows that half of the families owning a pipe composting facility did not know how to use this technology correctly. Moreover, many private companies have started to sell different kinds of biogas and pipe composting units directly to the population, as they see a business opportunity in this situation. Unfortunately, some of these companies sell very cheap products – so as to maximize

<sup>22</sup> Indeed, I observed that the pipe composting plants used in Sasthamangalam possess no holes to let the air in. In image 3 below, one can observe the holes in a plant in Alappuzha. The variety of enterprises selling pipe plant can explain this difference, as the prices differ, so are the qualities of the sold technologies.

their profits – that tend to be ineffective.

In the low class colony of Kanjirampara, a mutual support between the inhabitants was observed. Indeed, four families used the biogas plant that of one of their neighbor shared with them.

Another issue with the technologies employed in the decentralized program of MSWM is the improper use of the composting units in the local markets. Observations made near to the heart of the city – in the fish market of Palayam, another clean ward – showed that the installed composting units were not used and that a huge *ad-hoc* open landfill site was created next to them. The few merchants interviewed about their practices revealed one major reason for the non-adoption of the composting technology. As a local merchant put it: “Nobody has ever told us how to use these plants”. The inability of the merchants to use the plants in a proper manner led to a rapid degradation of the installations.



**Image 3:** Two pipe plants in Alappuzha



The above-mentioned point about the Palayam market shows that the lack of trained workers, who according to the program are to be appointed by the TMC to explain the use of the composting technologies, is a crucial issue. When questioned about this situation, a TMC deputy of the Health Inspector's Office said simply: “There are no workers appointed by the Corporation yet, but it should be the case soon.”



**Image 4:** Family composting plant in the ward of Kanjirampara

© MJ

### **3.2. Segregation at source waste collection services**

As explained in the last chapter, one reason for the malfunctioning of the centralized plant was the lack of at-source segregation of waste. The key informants still accuse the inhabitants to be responsible for the mismanagement of waste in Vilappilsala.

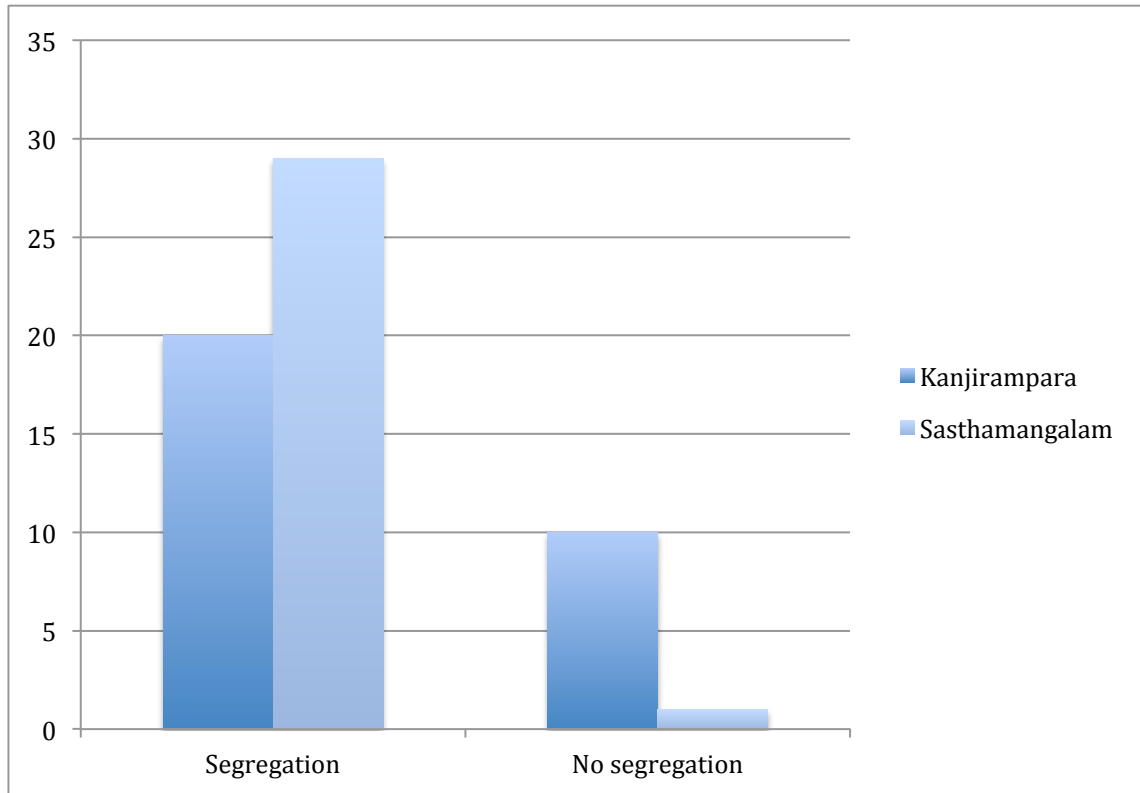
It was thus of interest to ask residents of the two wards of Sasthamangalam and Kanjirampara about their practices of waste segregation. As shown in the following



figure, most of the dwellers were segregating their waste (i.e., 97% in Sasthamangalam and 67%) in Kanjirampara, respectively).

**Figure 10:** Households and practices of segregation in Kanjirampara and Sasthamangalam.

Source: household survey

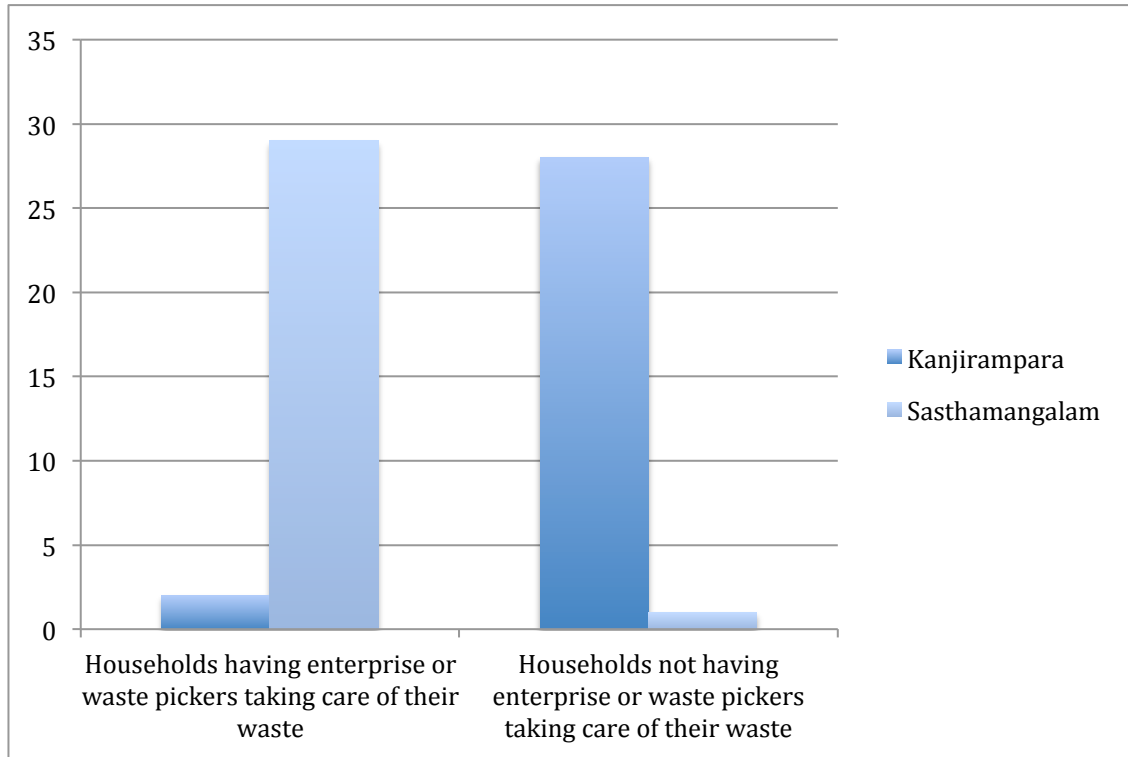


These differences between the wards can be explained with unequal access to the service of waste enterprise and waste pickers. Figure 11 shows that the household in Sasthamangalam that is not having access to waste collection services is the only one that is not segregating. This shows that the practice of the households for the sorting of waste is notably depending to their access to the service of waste pickers – especially for the high income families (see subsections 4.2.2 & 4.2.3).

Thus, in Sasthamangalam 97% of the interviewed households pay for an access to waste pickers services, while only 6% do the same in Kanjirampara.

**Figure 11:** Households and access to waste enterprise and waste pickers in Kanjirampara and Sasthamangalam.

Source: household survey



As explained in the subsection 2.2.4.2, the Corporation allots the waste enterprises to particular wards<sup>23</sup>. For instance, the ward of Sasthamangalam has access to the service of the Pelican Foundation, which take care of the plastic waste of its population. Moreover, they can have access to other informal waste pickers for their biodegradable, paper and glass waste. By contrast, there is no formal service of waste management appointed by the TMC in Kanjirampara. This can partially explain the different practices of the wards population with regard to waste segregation. However, if someone is ready

<sup>23</sup> According to key informants in Health Office and in two of these enterprises, the Corporation is the only decision maker. The enterprises offer their services to the TMC and are allotted areas of action. These areas are in most cases wards that are considered clean by the SWM program. One could argue that the system is not decentralized enough, otherwise the wards themselves would appoint waste collection companies.

to pay for waste services in Kanjirampara, it can make contacts with informal waste pickers services. This is the case of two households in Kanjirampara, which is particularly low.

However, the waste pickers have more interest for Sasthamangalam than for Kanjirampara, as the population of this ward is better off (see subsection 4.2.3). However, one should assume that the project is not fully implemented in terms of decentralized composting and segregation at source. The decentralization of the services is incomplete and biased, notably because the Corporation is deciding in which wards one enterprise can work or not. Ironically, it was between 2012 and 2014, when the SWM was without neither plant nor collection system, that the management was the more decentralized (see subsection 2.2.3).

### **3.3. Section conclusion**

The implementation of the new decentralized program is organized in the wealthier and more developed parts of the city. The declared “clean wards” are mostly situated in the richer areas of the city, where tourists visit and a relatively better-off population lives. However, household-level composting plants are equally present in the studied poorer and richer households. Yet, the waste management technologies used at the ward and household level are not always appropriate and equipment is not correctly used and maintained. Therefore, the segregation of waste continues to depend on the presence (or absence) of local waste pickers services. This partly depends on the decision of the Corporation Health officers, as it employs (private) waste management enterprises only in selected areas. Moreover, informal waste pickers tend to conglomerate in richer areas for economic reasons.

First results of the new decentralized program matched with its launch. Less than one month was requisite to declare four wards as ‘clean’. According to the UPE analysis of politics and waste management, these results can be interpreted as a political mean of gaining credibility in the eyes of the voters. Indeed, supported by the LDF, the program was claimed to create positive outcomes just before the city elections of 2015. An election hardly won by the LDF (as the BJP importance is increasing in the city). As explained earlier, Cornea observed the same kind of political strategies in several

Bangladesh municipalities (Cornea et al. 2017).

Moreover, the location of the ‘clean’ wards seems not to be only depending on a correct management of waste. According to the recurrent critics of these wards inhabitants (notably in the press), the situation seems not to be as successful as it is claimed by the ULB. This can explain why some of the declared ‘clean’ wards are not considered as such anymore. Here again, UPE can help us to understand that the selection of these wards can be a political strategy. As a matter of fact, most of these wards are central and inhabited by high class populations. Bullard observed that low class dwellers have less political power and thus mobilized less protests than a wealthier population can do (Bullard, 1990). Declaring rich populated wards as ‘clean’ can therefore be seen as a political strategy to avoid criticisms from the most influent citizens.

Finally, regarding the households and markets technologies for waste management, two major issues were observed. First, the increase of the enterprises that sell the technologies for waste management makes it difficult for households to opt for the correct plant. As observed in Sasthamangalam, some enterprises sell unfinished pipe plants that the population is not using in a proper way. Second, according to the program: At least 80% of the households of a ward should have a tie up with trained service team for waste treatment. However, the key informant of the TMC said that this point is often not respected. It seems thus that the TMC is not involved much in the maintenance of the plants, as it was observed in the Palayam market. According to Asnani and Zurbrugg, maintenance is one of the keys to process to a correct waste management (Asnani & Zurbrugg, 2007). Therefore, the TMC should involved workers for the maintenance of both markets and households’ biodegradable waste treatment technologies in a way to avoid some of the issues presented before.

## 4. Socio-spatial outcomes of decentralized solid waste management

The following chapter intends to address the second specific question of the research: **Are the preexisting socio-spatial inequalities reduced or reinforced through the new decentralized SWM?** Stated otherwise, this chapter wants to identify the consequences of the current program of waste management in a ward that the TMC considers as a success of decentralized SWM, and another one that is not.

### 4.1. The situation of Kanjirampara and Sasthamangalam

The waste management situation is very variable for the hundred municipal wards of Thiruvananthapuram (The Hindu, 01/2015; Deccan Chronicle, 2016). Since 2014 only a few wards have been declared clean (see chapter 3). Moreover, declarations are often dubious, as several conditions for a clean ward were frequently not entirely met (see conditions in subsection 2.2.4.1) (Deccan Chronicle, 2016). A key informant stated that: “There is still a lot to do, because most of the wards declared as such are not totally “clean”. Yet these “clean” wards still have comparatively better SWM.



**Image 5:** Main road side in Kanjirampara

As mentioned above, the results of this Master thesis are mainly based on the analysis of the two wards of Kanjirampara and Sasthamangalam. In the former, the majority of the interviewed residents was of low and middle-low income. However, a few families were wealthier condition. These qualitative observations are based on the occupation of the interviewed inhabitants, their activities, and their caste – when it was possible to obtain information about it – and on the quality of their dwelling. In the “clean” ward of Sasthamangalam, the population was generally wealthy and many dwellers worked or had worked for the local government, which partially explains the efforts made for this ward to be considered clean. A decentralized system offers more opportunities for lobbying, as the government employees in Sasthamangalam were able to move the bureaucracy through their (informal) networks. When interviewed in Sasthamangalam, a local inhabitant said that he has many contacts in the Corporation and would make calls if he had been unhappy with the waste management in his neighborhood. This system can thus reinforce socio-spatial inequalities.

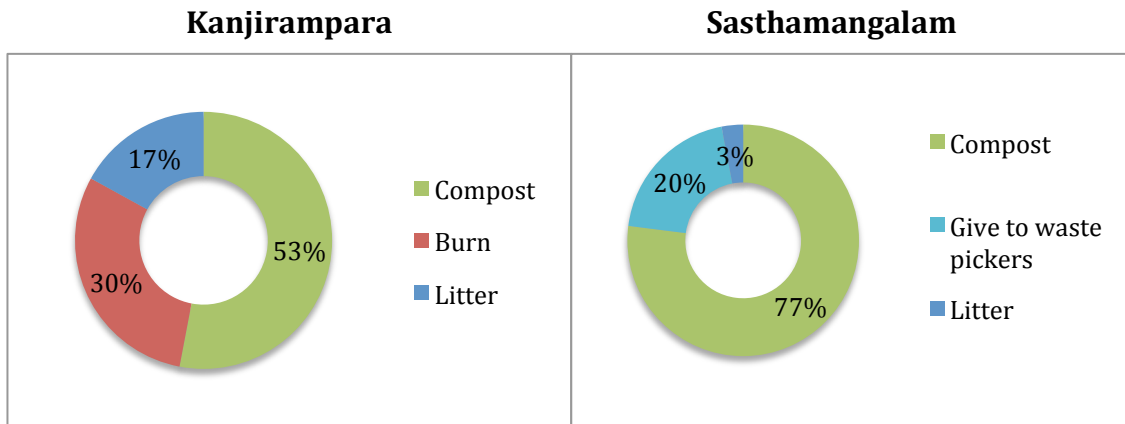
## **4.2. Inequitable waste management**

MSWM is unequal among the different populations of Thiruvananthapuram. Notably, inequalities exist between the different wards and between the populations of high, medium and low class. The questionnaire designed for the wards of Kanjirampara and Sasthamangalam revealed strong inequities of access to the collection of waste. The accessibility of a household to this service seems to differ not only for the collection of composting waste, but also for plastic, paper and glass.

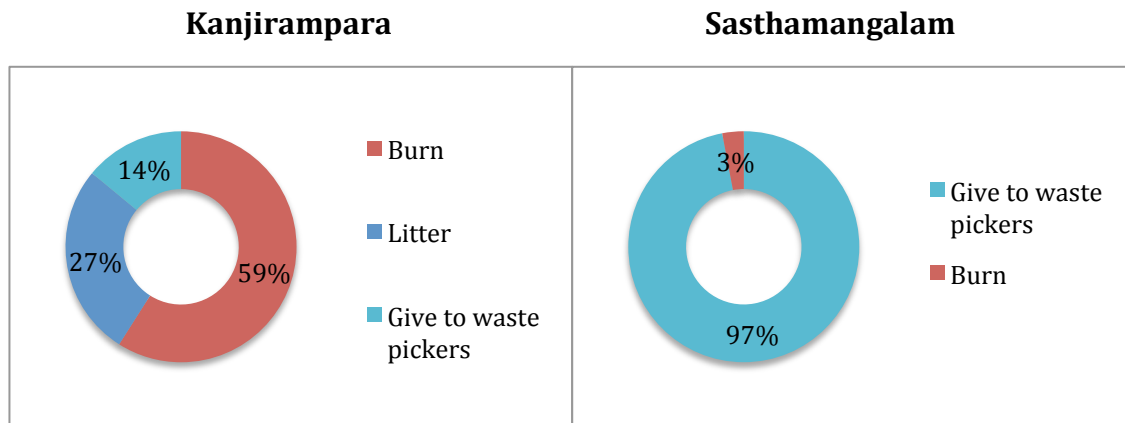
### **4.2.1. Differences between wards**

Waste management in the “clean” ward of Sasthamangalam is indeed better than that in Kanjirampara (see figures 12-14).

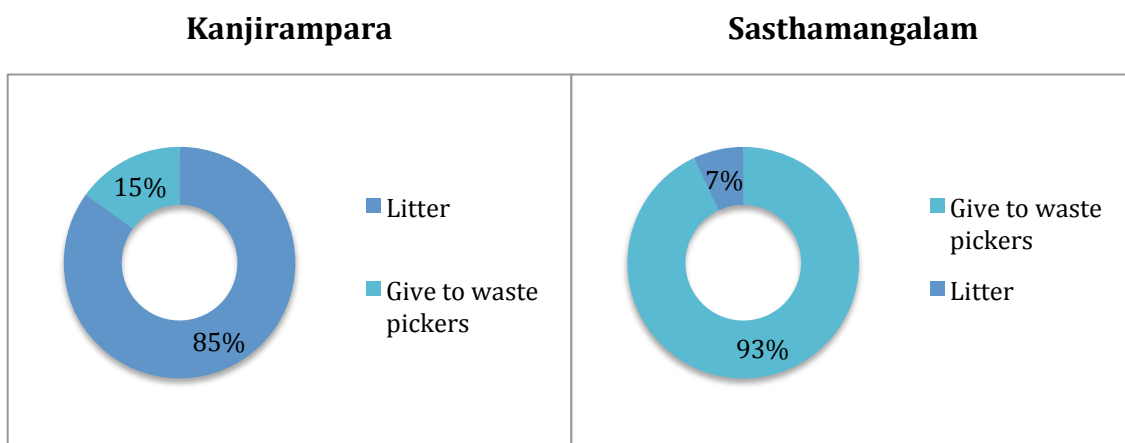
**Figure 12:** Households of Kanjirampara and Sasthamangalam and their practices with biodegradable waste. – Source: household survey



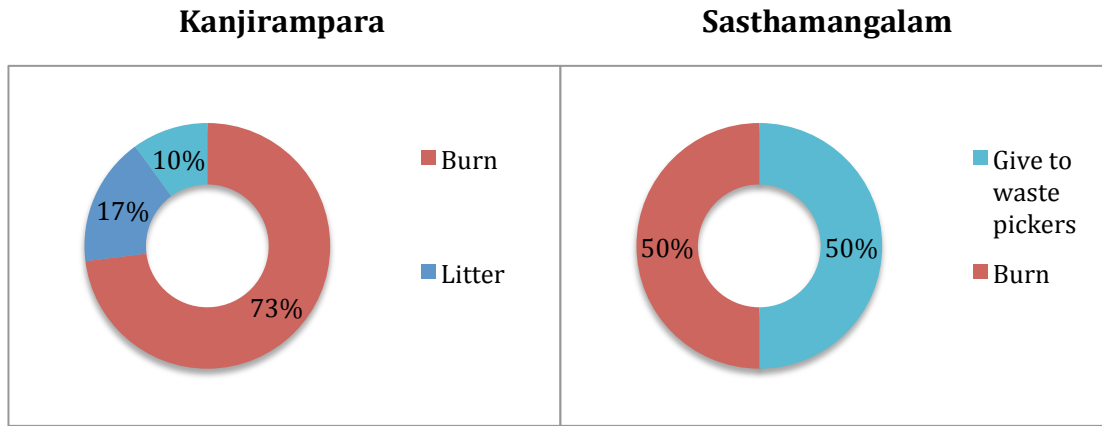
**Figure 13:** Households of Kanjirampara and Sasthamangalam and their practices with plastic waste. – Source: household survey



**Figure 14:** Households of Kanjirampara and Sasthamangalam and their practices with glass waste. – Source: household survey

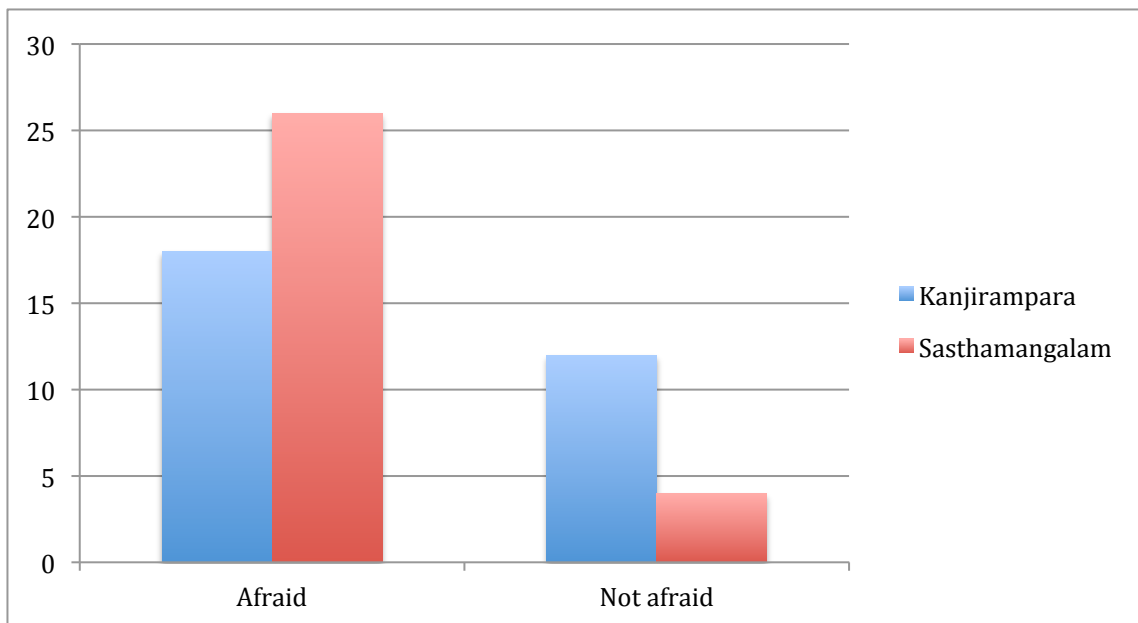


**Figure 15:** Households of Kanjirampara and Sasthamangalam and their practices with paper waste. – Source: household survey



The results show in the four figures highlight sizable distinctions in the management of MSW in the two wards. First, the composting of waste is more important in Sasthamangalam, even if the households possess fewer composting plants than in the ward of Kanjirampara. This is mainly explained by that fact that in this richer ward, most families own a bigger yard and they can use that space for composting without a plant. An alternative explanation can be the differences in environmental awareness of the populations. However in both wards, most of the dwellers expressed their fear for the pollution that result from the mismanagement of waste, even if this result is more pronounced in Sasthamangalam.

**Figure 16:** Population of Kanjirampara and Sasthamangalam afraid – or not – by the pollutions resulting from waste. – Source: household survey





Second, most of the households are able to pay for the services from formal or informal waste pickers in Sasthamangalam, which explains the amount of garbage that is picked up. Moreover, as mentioned in chapter 3, in Sasthamangalam, the availability of waste enterprises and waste pickers contracted by the TMC seems to make a difference. The two families that have access to waste pickers services in Kanjirampara are of higher class than the rest of the ward's population. A relatively well-off colleague living in Sasthamangalam was surprised by the results concerning the burning of paper in Kanjirampara. He expressed his astonishment by saying that: "The results for paper waste should be wrong in Kanjirampara, because in my house we sell most of the paper to waste pickers. For the families of low-income, it must be of (even bigger) interest to sell papers". This paradox is explained by the socio-spatial disparities of the two wards, which are notably defining the areas of interest for waste pickers (see subsection 4.2.2 and 4.2.3)

Finally the proportion of burning and littering of waste in Kanjirampara represents a serious health issue for its population. As example, the littering may partly explain the percentage of population that is impacted by floods in this area – 28.6% in Kanjirampara and 15% in Sasthamangalam (SEOC, 2015) – since the detritus accumulated on the streets ends up blocking water drainage. Observing the main roads of the two wards shows these differences in waste management. Burning of waste happens almost every night in Kanjirampara and the presence of stray dogs, attracted by garbage, is much more significant than in Sasthamangalam.

#### **4.2.2. Differences based on social class and their relation with location**

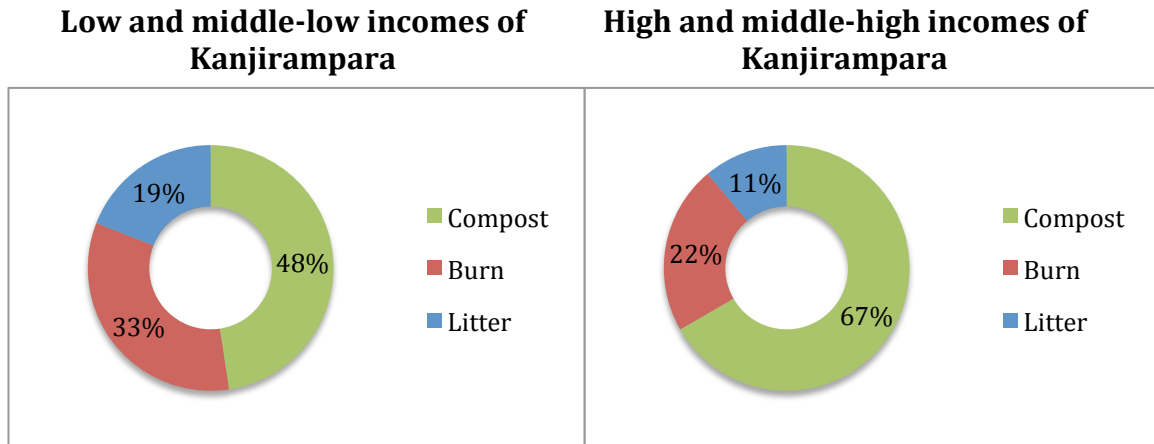
The previous classification of the practices regarding waste treatment is also relevant when put in relation to the different levels of the families' incomes. Whereas the majority of the interviewed households in Sasthamangalam were of high (19) and middle-high (11) income, the income levels in Kanjirampara were more diverse<sup>24</sup>. So the previous classification of waste management can also be presented in the perspective of

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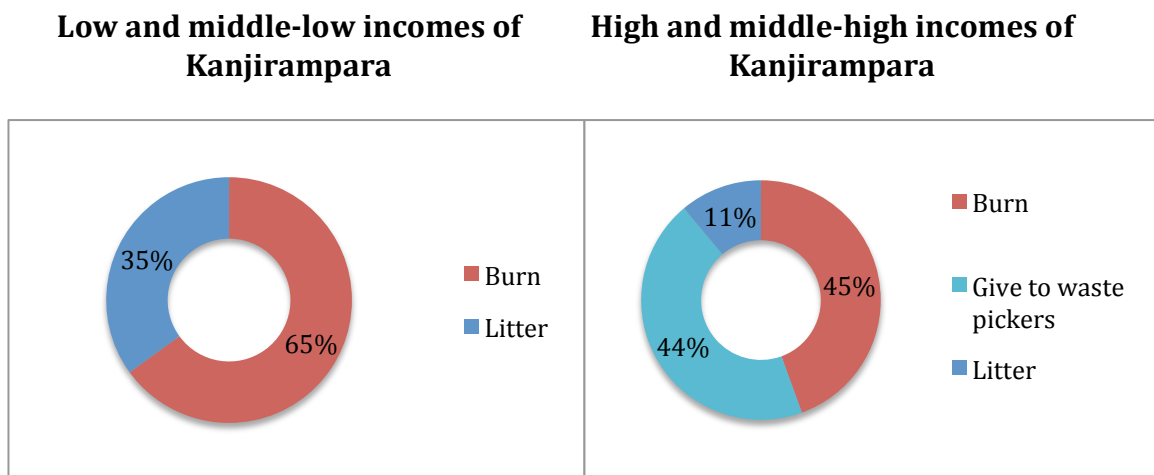
<sup>24</sup> High (1), high-middle (8), low-middle (3), low (18). The criteria for this classification are based on the job and the number of family member employed, the quality of the house and the caste (when it was possible to learn about it) of the households.

income levels in Kanjirampara, instead of ward distribution.

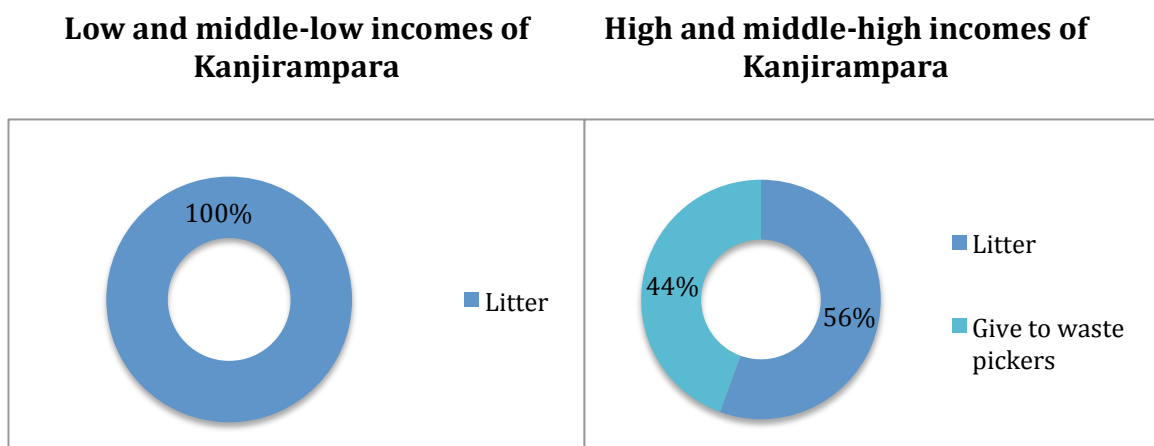
**Figure 17:** Households of different incomes in Kanjirampara and their practices with biodegradable waste. – Source: household survey



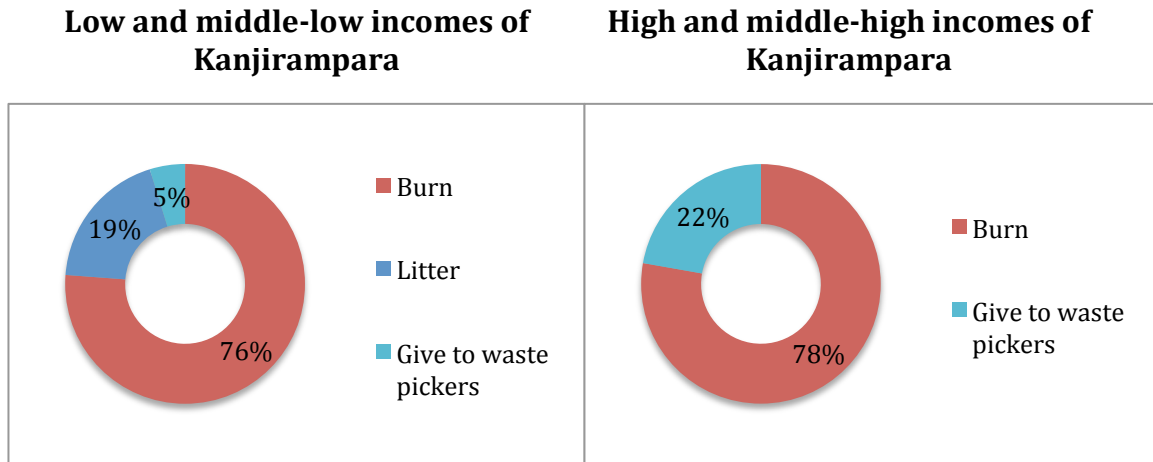
**Figure 18:** Households of different incomes in Kanjirampara and their practices with plastic waste. – Source: household survey



**Figure 19:** Households of different incomes in Kanjirampara and their practices with glass waste. – Source: household survey



**Figure 20:** Households of different incomes in Kanjirampara and their practices with paper waste. – Source: household survey



In the last figures the percentages of burning and littering in high and middle-high income households of Kanjirampara are clearly lower than those of low and middle-low income. This affirmation is valid for all kinds of waste presented above. This demonstrates the importance of income level on the practice of waste treatment. Furthermore, in Kanjirampara, where poor and rich populations cohabit, the interviews revealed tensions between dwellers regarding waste management. Especially concerning the littering of waste. Indeed, richer respondents accused the lower income families of causing environmental degradation because of littering waste.

Moreover, these graphics shows the importance of location when it comes to families' waste management practices. Indeed, many households of high income of Kanjirampara burn and litter their waste in comparison with the families interviewed in the ward of Sasthamangalam. SWM practices are thus not only effect by social class but also by space. Nevertheless, if no private companies, such as the Pelican Foundation, offer waste picking services in Kanjirampara, the richer families can have access to the services of informal workers if they decide to pay for it. These informal waste pickers mostly belong to the Kudumbashree association, which is no longer mobilized by the decentralized SWM city program.

During fieldwork, I resided at the border of the wards of Kanjirampara and Vattiyoorkavu and I ran into many difficulties for the management of my own waste. As no formal service of waste picking was set up in this area of the city, I faced two

solutions to deal with garbage: burning or littering. However, I tried to give back some of my recyclable waste in the malls of the central ward of Vanchiyoor, since I am used to the Swiss system, in which the sellers of a product are responsible for making recyclable waste collection available to the consumers. The malls accepted my waste, but probably because I was the only person in Thiruvananthapuram to act this way.

#### **4.2.3. Interpreting the spatial distribution of waste pickers**

None of the above results refer to the quantity of waste that is produced by a family. However, there is no doubt that the higher income households have a higher consumption and thus produce a larger amount of waste. This can be one of the explanations for the higher presence of waste pickers in Sasthamangalam. Waste pickers are more interested in the high-income regions of the city, as they can collect a larger quantity of waste faster (from fewer households). The municipal program is also influencing this situation, as they decide in which wards the waste enterprises can work or not. However, independent waste pickers can propose their services wherever they want to.

Moreover, I was able to notice that in the lower income wards, it is often the case that all members of a given household work and, consequently, are not present during the day. This makes it very difficult for waste pickers to collect anything. On the other hand, in the high and middle-high income households, I observed that someone is nearly always present, which made it easier to conduct interviews in Sasthamangalam, just as it makes it easier for waste pickers to collect the waste during daytime.

#### **4.3. The different practices of waste enterprises and waste pickers**

Whereas waste enterprises are formally appointed by the TMC, most of the waste pickers that work with them have no formal contracts. A key informant working at the VCare Company, which takes care of both biodegradable and non-biodegradable waste, explained: “We are only twelve formal workers in the company. The waste pickers can work with us if they want to. They directly collect the waste and their salary in the households where they work. Then they have to give us the collected waste.” The key informant working for the Pelican Foundation – involved in Sasthamangalam – claimed

that the agency worked in a different manner: “We have two male workers that collect the money in the participating households. Then, we give the salaries to the waste pickers working with our agency, when they give us the collected waste. If we don’t act in this way, waste pickers will throw their waste in the public places.”

In Sasthamangalam, the only formally involved waste pickers were the one working for the Pelican Agency, which takes care of plastic waste brought to a recycling plant in Nagercoil – a city in Tamil Nadu 70km away from Thiruvananthapuram. For all other kinds of garbage in Sasthamangalam – biodegradable, paper and glass –, it was difficult to get to know about the final treatment or disposal.

#### **4.3.1. Rivers, empty land and final disposal**

When waste pickers are not formally hired by the agencies, they tend to throw the waste in public places. Since they received the money directly from the households, the more households they take care of, the more money they can earn. Nothing compels them to take the waste to the correct structures<sup>25</sup>. The informal waste pickers did not provide clear information on where they dispose the garbage of. This can partially explain the huge amount of waste that offends up in the rivers of Thiruvananthapuram. The river separating Sasthamangalam and Kanjiramprara, for instance, was full of garbage. The same is valid for the empty plots in Kanjirampara.

Some households interviewed in Kanjirampara complained about the dumping of waste on the open land near from their living area. They blamed people, who were mostly informal waste pickers, from outside their neighborhood. One of the interviewed persons said that she had contacted the police about this recurrent issue. In the ward of Vattiyookavu – where I resided – my neighbors expressed the same complaints. Moreover, every bridge of the river between Sasthamangalam and Kanjirampara has a panel that warns that the people who litter in the water will be prosecuted. However, I observed people throwing waste in this river at night. A key informant told me that some CCTV were set up on one of the main bridge – the same installation was made near the

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<sup>25</sup> On the contrary of formal waste pickers that shall bring the waste to their enterprise to receive their salary. These waste are then transferred to a treatment structure, such as in Nagercoil for the plastic waste of the Pelican Foundation.

central railway station – to avoid the littering and to fine the people acting this way, but the TV camera was broken a few days after its installation.

Thus, the important presence of public waste in Kanjirampara – in comparison with Sasthamangalam – stems from the inhabitants of the ward and from informal waste pickers. Some of the waste dumped in Kanjirampara and its river probably comes from Sasthamangalam and other wealthy wards. As garbage remains ubiquitous in the majority of the wards and as their inhabitants throw their waste in the streets and burn it, it is difficult to notice when a waste picker takes waste from a “clean” ward to dump it in an unclean one. Therefore, it seems that the decentralized management increased the spatial inequalities within the city. (Under the centralized management, most of the waste from everywhere in the city was collected and brought to Vilappilsala.) This spatial disparity has also class dimension as the waste moves from wealthy areas to poorer ones.

#### 4.4. The loss of confidence in the Corporation

Nowadays, political commitments are still not well respected and the confidence of the majority of the city dwellers in the current MSWM is thus low. From one ward to another, the involvement of both TMC and the population varies a lot. The so-called “clean wards” remain rare in Thiruvananthapuram and their achievements are debatable (see chapter 3). The answers to the questionnaire for the wards of Kanjirampara and Sasthamangalam highlighted sizable differences in perceptions and opinions.

**Table 5:** Percent of population thinking that waste collection has changed compared to 5 year ago.

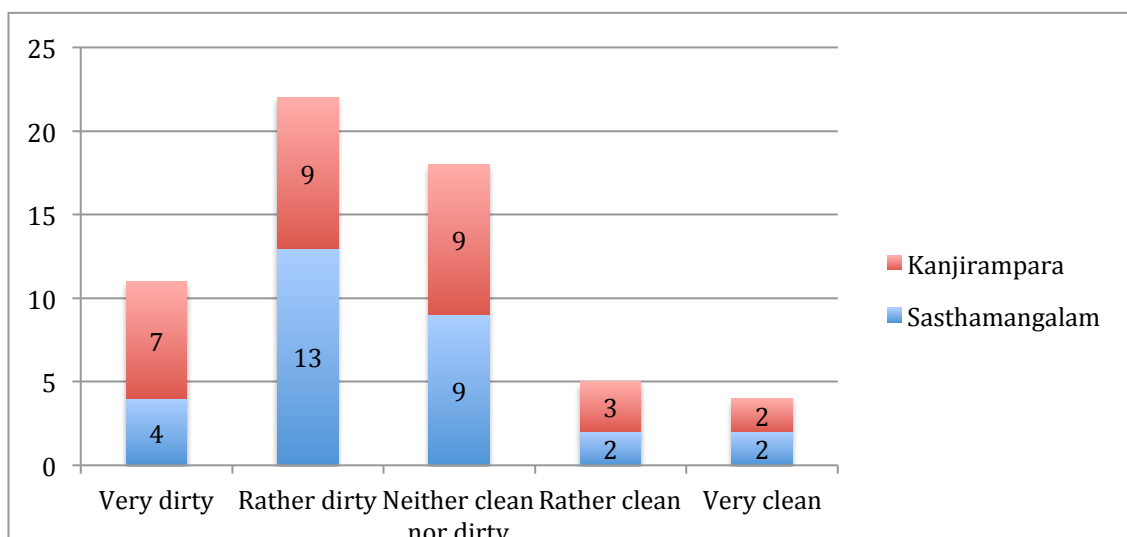
Source: household survey

<b>Kanjirampara</b>	Changed	<b>7%</b>
	Not changed	<b>93%</b>
<b>Sasthamangalam</b>	Changed	<b>30%</b>
	Not changed	<b>70%</b>
<b>All</b>	Changed	<b>18%</b>
	Not changed	<b>82%</b>

Since the closure at Vilappilsala, most of the population has been accusing the city authorities for the mismanagement of waste. Moreover, most of the interviewed households explained that they do not trust the Corporation with the planning of MSWM anymore. Even if the citizens know about the issue of pollution in the panchayat of Vilappil, they seem to miss the previous centralized program of waste management. At the time when that system was in place, most of the city wards were relatively clean because many Kudumbashree waste pickers were employed to collect the garbage in the households and in the streets of the whole municipality.

The shift from the centralized to the decentralized SWM system did probably not change the situation of high and middle-high class families very much. They are still delivering their waste to formal or informal collectors, who take care of their segregation and/or disposal. The biggest changes came about for the families of lower income in poorer wards. However, the situation of the whole city has changed. Most of the interviewed families, rich or poor, were talking of a degradation of the entire municipality. As a matter of fact, when interviewed about the cleanliness of the whole city, more than half of the households of both Kanjirampara and Sasthamangalam expressed the feeling that nowadays the city is very dirty (18%) or rather dirty (37%) (see figure 21). The results are quite the same for the answers of the both wards' inhabitants. On this question, many interviewed families expressed their dissatisfaction further, saying that the situation was much better when the program of SWM was centralized. However, many dwellers also explained that the centralized program was not fair for the Vilappilsala inhabitants and that the situation in Thiruvananthapuram is better than in many other Indian cities.

**Figure 21:** Cleanliness of the whole municipality, according to the interviewed families - Source: household survey



## 4.5. Section conclusion

The differences in waste management between wealthier and poorer areas reinforce socioeconomic spatial disparities and inequalities between populations. In the studied under-served ward, for example, most of the inhabitants disposed their waste on the side of public roads and burn it. Others throw their waste in empty lots or even in the nearby river. Moreover, informal waste pickers also seem to throw the collected waste (mostly from richer wards) in public spaces (particularly rivers) in poorer areas. People in the studied poorer ward are thus more exposed to the problems that are linked with pollutions, such as the proliferation of stray dogs.

The preexisting socio-spatial inequalities seem to be reinforced through the new decentralized SWM. High distinctions of practices have been observed between the households of the two selected wards. The differences between the wealth and poor areas are high regarding the practices toward the different kinds of waste. However, the class of the families is not the only factor that causes these inequalities, which seem to be as much linked to the spatial situation of the households in the city. Indeed, the families of higher class of Kanjirampara are not segregating their garbage much in comparison with the ones of Sasthamangalam. This can be partially explained by the unequal presence of waste pickers in the different city wards.

The households' responsibilities have thus changed a lot for the families of Kanjirampara, which have to frequently burn their waste on the streets of the ward. Moreover, some of these households have to watch that no waste pickers are throwing waste in their neighborhood – especially in the empty lots and riversides. On the opposite, the practices of the inhabitants of Sasthamangalam did not change that much. They have to deliver their garbage to the waste pickers, just as it was the case with the centralized program. However, at the scale of the entire municipality, both wards inhabitants talk about a degradation of the city cleanliness.

The existing environmental inequalities observed between the two wards selected in this study can be compared with other works that links socio-spatial analysis with UPE. Indeed, as demonstrated by Bullard and Harvey, the areas where the less wealthy population is living face more environmental injustices (Bullard, 1990; Harvey, 1996).



Regarding decentralized SWM, space and environment in Thiruvananthapuram are thus defined by the valuation of (one ward/one community) money. According to the works of Heynen, Perkins and Roy, it can be concluded that the production of the environmental inequalities is dependent to the local political economy, which particularly affects the marginalized populations and the areas where they reside (Heynen, Perkins and Roy, 2006). This statement is particularly true for the population of the Kanjirampara colony (15 households of the ward survey), an area where the presence of waste on the riversides and streets is extremely high.

## **5. Social class, gender and population**

The following chapter intends to answer the third specific research question: **What are the gender and class dimensions of MSWM; how do they interact with MSWM in Thiruvananthapuram? How have the household responsibilities changed with decentralized SWM?** Many class and gender aspects and their relation with SWM were observed during this fieldwork.

There are many habits concerning gender issues in waste management. At the household level, women (be it the wife, the grandmother, the daughters or the housemaid) are responsible for the management of waste. Many interviewed residents and key informants claimed that this fact is not a real issue, but just a cultural factor, which is complicated to understand for westerners. Nevertheless, just as in western countries, many women of Thiruvananthapuram work during the day (20%) (Census of India, 2011) so that the activities of waste management represent an additional unpaid activity for them. This last point is particularly true with regard to the decentralized waste management program.

### **5.1. Waste as a responsibility of marginalized people**

Waste management has become an activity that attracts increasing interest from private enterprises. These are now contracted by the TMC. This explains the increase in the number of private enterprises and organizations involved in this domain. Residents are also increasingly interested in this issue. Indeed, most of the people I met during fieldwork had something to say about waste management – probably because of the recent garbage crisis in 2012 – even if it involves many taboos. Nevertheless, even if most of the interviewed households thought that the responsibility of a good system of waste management belongs to the TMC, the activity related to waste management is still reserved for marginalized populations.

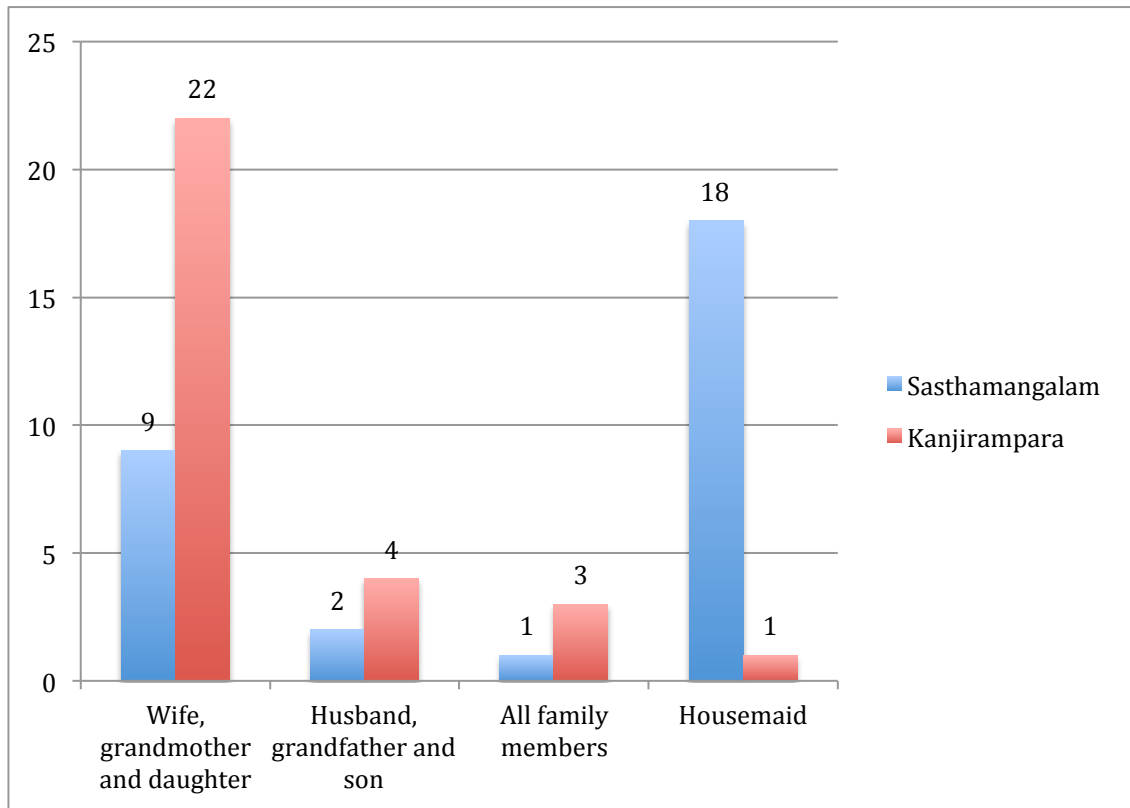
#### **5.1.1. A duty for dirty people and a girlish activity**

The definition of waste can be conceptualized in several ways (Moore, 2012). First, the perception of waste either as resource or simply as waste, influences its management. Second, garbage products can be conceptualized as separate or not from

the rest of the society. However, in urban centers of Kerala, it is difficult to imagine that waste can be separated from society, as the question of its management is strongly politicized. As a matter of fact, almost all the politicians met during this fieldwork had an opinion to address about the SWM issues and the same is true for the residents. Moreover, the issues of SWM were frequently discussed in the local media during my fieldwork, especially regarding the problem of littering and dumping. Research concerning the representation of waste can be particularly important in India, where the notion of impurity, connected to the Hindu religion, is deeply rooted in the popular consciousness. Indeed, waste is considered a taboo, whose management is the task of impure people.

As claimed by Dianne Rocheleau, an analysis of the gendered phenomena is crucial to understand the power relations in a society (Rocheleau, 2008). This statement is particularly true when analyzing MSWM in India. As a matter of fact, at the community or household levels, many differences were observed between male – husband, grandfather and son – and female – wife, grandmother, daughter and housemaid – actors. In the rich households of Sasthamangalam and Kanjirampara, when interviews were done with husband and wife, the answers were not the same as those obtained when only the wife was present. As explained above, in the subchapter concerning the limits of data collection, during an interview in Sasthamangalam, a husband – who claimed that he takes care of his household waste – left the house after a few minutes and his wife suddenly asked me to change some of the answers. She told me: “I don’t want to lie to you, most of the waste management in this house is done by me. My husband never takes care of the garbage.” This suggests that the data in the following figure are probably biased and still underestimate the work done by female members of the households. These are demonstrations of the existing power relations within households regarding waste management.

**Figure 22:** Households members taking care of waste at the household level in Sasthamangalam and Kanjirampara. – Source: household survey



In many of the richest interviewed families, female household members had not much contact with waste, as a housemaid took care of this chore – 60% in Sasthamangalam. The discourses that concern waste can partially explain the lack of waste segregation at the source, particularly at the household level. In the rich households, some interviewed family members expressed their disgust for waste. A housewife of Sasthamangalam told me: “I shall not touch waste, because it disgusts me. [...] But it is a good thing as it gives work to poor people. I pay a housemaid for segregation; such as I pay the Pelican workers for plastics and other people who come to take care of my biodegradables. If I was taking care of the waste myself, these people will lose their jobs.”

Nevertheless, most of the household having access to a housemaid said that it was a part-time service. Consequently, when the housemaid is not present, waste is still the responsibility of the female family members. For example, a grandmother of high-

income in Sasthamangalam told me that she puts all the waste in one waste bin and waits for the housemaid to come to do the segregation required by the Pelican service. The situation of high-income female family members is thus not the same that the one of the low-income ones. This can explain the difference in perception in the following table.

**Table 6:** Percent of high, middle and low-class women thinking that waste collection has improved compared to 5 year ago.

Source: household survey

<b>Low income female family members</b>	Changed	<b>0%</b>
	Not changed	<b>100%</b>
<b>High and middle income female family members</b>	Changed	<b>28%</b>
	Not changed	<b>72%</b>

It is uncommon in India to talk about gender relations. Nevertheless, many people I talked to tried to express their thoughts about it. A recurrent discourse was that the majority of the waste is produced while cooking, which is the responsibility of the women of the household. Therefore, taking care of the waste is also claimed to be their responsibility. Women gave this argument just as frequently as men.

A key informant told me that the Suchitwa Mission made a TV advertisement to motivate the population to segregate their waste at the source. To do so, they asked a local politician to be filmed while sorting the garbage in his house. He accepted, but his participation was not what the Suchitwa Mission expected. The politician asked his wife to segregate the waste in front of the camera. Finally, after a few explanations regarding the purpose of the video, he accepted to participate in the sorting of the waste for the purposes of this TV spot.

The representation of waste as dirty makes it difficult for many city dwellers to consider the treatment of garbage as their responsibility. This is especially true for the high incomes families. When waste is considered impure material, it makes it very difficult to ask the citizens, particularly those of higher social classes, to take care of it. The housemaid is thus doing the segregation of waste in the richest households. Moreover, as explained in last chapter, a family member is almost always at home in the

high-income household, which gives more time to its members for waste segregation. This is not the case for the low-income families, where apart from their jobs, waste management represent an additional activity for (female) family members – may it be the segregation, the burning or the dumping.

Among the interviewed families in both wards, when a male or female family member answered to the question: Are you worried of the effects of the burning (from yours or other households) for your health? Only 19% of women said that there were not afraid where men were 38%. This tends to show that more women were involved in the activity of burning, and thus to the resulting pollution.

## **5.2. From a job opportunity for women to additional unpaid activity**

A key informant who works on gender relations in Kerala revealed some of the conditions of the Kudumbashree working in the closed centralized plant of Vilappilsala. He explained their conditions: “When the Kudumbashree working as waste pickers finished their work, they were considered dirty people. Thus, they cannot even wash themselves in their workplaces (as they were not only among themselves there). They have to go home for a wash. When the people find out what their job is, nobody wants to touch them. They are considered untouchable.” People working with waste are still considered untouchable, no matter what is their original caste or class in society.

Nevertheless, waste-related jobs represent an economic opportunity for many poor people, as it is a stable source of income. As waste pickers under the previous centralized system told me they missed this activity. They expressed their disappointment at losing their livelihood when the Vilappilsala plant was closed: “Before, I used to work everyday and I earned good money (about Rs. 10’000/150 CHF per month). Nowadays, I do daily wages and most of the time I have no work”. These two Kudumbashree are not working in waste picking anymore.

The decentralization of waste management led in many cases to the loss of a source of income for poor women and to the creation of new unpaid labor. First, since the closure at Vilappilsala, many Kudumbashree have lost their jobs because waste is not collected anymore in the majority of the city wards. Second, waste management at

the household level, which is a requirement of the new decentralized program, gives rise to a new kind of unpaid work within households, which is mainly done by female family members or housemaids. These observations are true for the municipality of Thiruvananthapuram, just as they are true for the city of Alappuzha, which has also decentralized its waste management.

When waste management is seen as the responsibility of women, it maintains the gender inequalities through the gendered separation of tasks. However, paradoxically it can give a paid activity for marginalized poor women, just as it was the case for the Kudumbashree involved in the waste picking and waste segregation of the centralized program. Nowadays, these gender inequalities are strengthened at the household level – especially in the poor wards – as waste management represents an additional unpaid activity for poor female household members.

### **5.3. Capturing income-generating activities**

In the centralized program of Vilappilsala, the Kudumbashree were taking care of all kinds of waste, by picking up the waste in all the TMC households, transporting it and disposing this garbage of in the Vilappilsala installation. Nowadays, the waste pickers are specialized in different kinds of wastes, that is, biodegradables, plastics, paper and glass. According to a key informant, waste pickers specialized in the collection of biodegradable waste are still essentially composed of female actors. Except for the transportation that is done by male workers. Plastics and paper waste, which represent more lucrative materials, have become the domain of male workers. Therefore, the decentralized program seems to have resulted in the appropriation of resources by new (largely male) waste pickers leading to the loss of work for people of lower classes and especially for poor women.

As the market for waste products is still not much developed in Kerala, waste still represents a job opportunity for marginalized people – even if female actors already lost part of their activities under the decentralized system. If this market tends to develop in the future, it may lead to a further loss of income for the poorest families, notably by the privatization of the waste collection chain. While analyzing the consequences of the SWM privatization in Cairo, Didero showed that the appropriation of this market by

foreign enterprises impacted negatively the situation of the informal waste pickers. Since the beginning of the last century, informal waste pickers (known as Zabbaleen<sup>26</sup>) were involved in the collect of the city waste in the Egyptian Capital. However, in the 1990s, this informal waste collection was overtaken by a rapid increase of the waste production. This led the city authorities to commission several European multinationals to take over the responsibility of the waste removal by the year 2003. The new situation removes the entitlements to the waste of the Zabbaleen, so they quickly lost their only source of income, which considerably increased their vulnerability (Didero, 2011).

Samson and Hurt showed that the privatization of the waste management system in South Africa municipalities affected both workers and working-class population. The privatization of the basic services was originally supported to empower the black communities economy. Unfortunately, studies conducted in three municipalities demonstrated how the women where the ones suffering the most in this system. This resulted of the division of labour taking part at the household level but also at work, where women involved in SWM by private enterprises were excluded of collective bargaining arguments (Samson & Hurt, 2003).

The same could happen in Indian waste management, a market that is still relatively unattractive. Therefore, if sizable changes in management regarding waste were to happen, a part of the marginalized populations could quickly lose some of their principal income-generating activities. Notably in the decentralized SWM of Thiruvananthapuram, where more and more private enterprises are taking part in the market of waste management.

#### **5.4. Section conclusion**

The decentralized management of waste reinforces gender inequalities at the household level, which especially concern poor women (wives, grandmothers or teenage girls). The previous, more centralized waste management system provided employment to marginalized women through the Kudumbashree groups (locally organized women self-help groups). Under the recent decentralized system, these women's groups are no

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<sup>26</sup>This word literally means "garbage people" in Egyptian Arabic



longer employed for waste segregation and collection, transferring the responsibilities to unpaid women in the households. Inside the houses, the chore of waste management is mostly reserved for female family members; particularly in poorer households, which have no access to housemaid services. Furthermore, the female waste pickers employed in the previous system took care of all kinds of waste, whereas nowadays (valuable) plastics and papers are more and more appropriated by male waste workers. Women waste pickers now deal almost exclusively with biodegradable waste, which are less lucrative.

The gender and class dimensions of MSWM in Thiruvananthapuram are multiple and they interact with it in various ways. In this chapter, these interactions are observed at the household level, where the responsibility for waste management is especially the one of the low class women living in impoverished areas. Waste management in India, such as in many other countries in the world, is traditionally a duty that is being take care of by marginalized members of the society (Madsen, 2006; Gill et al., 2009; Scheinberg, Muller, & Tasheva, 1999; Rocheleau, Thomas-Slayter & Wangari, 1996). In the municipality of Thiruvananthapuram, this statement is true for both centralized and decentralized waste management programmes. However, depending on the plan and its management, this responsibility can represent an opportunity, but it can also become a brake to development. In the old centralized project, the management of waste was an opportunity of livelihood for the hundreds of Kudumbashree involved in the (second phase of the) program. It represented a job with a correct level of income, even if the waste pickers were suffering from bad considerations. In the new decentralized project, it was demonstrated that in the low class families, SWM is mainly a duty reserved for the female members of the household. On the opposite, in the richer areas, a part-time job housemaid is often doing this activity. Nevertheless, in a third of the families of the highest class, female members still are responsible of the household waste management. Two issues have therefore emerged in the shift of the centralized to the decentralized program. First, many Kudumbashree lost their job and thus their source of income and livelihood. Second, many impoverished women have to deal with a new unpaid activity, the management of their own family waste. As argued by Madsen, the appropriation of the waste market by poor female actors is a great opportunity for their livelihood

(Madsen, 2006). But when the activity is not remunerating anymore, it is only a (new) way of marginalizing women.

Moreover, the privatization of the waste-picking services in the new program led to a partial loss of job for many women workers that are still involved in the management of waste. Where the women were collecting all kinds of waste in the centralized management, the collection of plastics, papers and the transport of biodegradable have been taken over by male workers in the current program. This capture of the income-generating activity due to the privatization of the waste system has been demonstrated in other fieldworks. Didero observed it in the case study of Cairo and the same observation was made in the works of Samson and Hurt in South African municipalities. In both case, working-class populations and informal female workers were the ones suffering the most from the privatization of the waste collection (Didero, 2011; Samson & Hurt, 2003).

According to Poswa analysis in the case of waste management in South Africa, particular attention should always be given to the consequences of gender in the choice of any waste collection system (Poswa, 2004). In Thiruvananthapuram, one can argue that the effects of demographics of households were not considered as an integral part of planning when they designed the decentralized program, which can explain the reinforcement of gender inequalities at this level of analysis.

However, Scheinberg, Muller and Tasheva explained that the consideration of gender in SWM should not be seen as a burden to policymakers. Therefore, the issues of class and gender expressed in this chapter should not be considered as a brake to the decentralized plan of action, but rather as a mean of improvement for the program outcomes (Scheinberg, Muller & Tasheva, 1999).

## 6. Conclusion

### 6.1. Synthesis

Claiming that the centralized and decentralized programs of MSWM in Thiruvananthapuram were total failures would be incorrect. The two programs have had many undeniable achievements, as the city was ranked the 8th cleanest of the country, according to the Swachh Bharat Mission. But the (partial) failure of each programs is due to inherent flaws in the conception and the implementation of the MSWM system. The centralized installation and the existent decentralized and participatory strategy have many issues of similar origins. The installation of the plant at Vilappilsala showed the limits of both the municipal authorities and the Poabs enterprise to fulfill most of their commitments. The lack of a correct use of technologies was a basic problem for the centralized plant, a problem still seen today at the level of the wards and households. In addition, even when appropriate technologies were set up in households or markets, no one was employed by the TMC to explain to the population how these composting units function, even though this is a requisite of the program established by the new SWM project. Moreover, the participation of the citizens in at-the-source segregation of waste is another issue, which still persists. Especially in the poorer areas of the city, the segregation of waste also represents an additional unpaid activity for marginalized (female) family members.

Political initiatives to act against the degradation of Thiruvananthapuram's waste management are seen as ineffective by most of the city's residents. A majority of the people I interviewed during my fieldwork, particularly poor women, were dissatisfied with the current situation and thus regret the closure of the Vilappilsala plant. On the other hand, the ULB blame the population for the recurring problems due to improper segregation of waste at the source. Thus, it can be assumed that cultural factors affect the issues and awareness raising is not done sufficiently yet. Meanwhile, nobody seems to blame the producers and distributors for their inactivity regarding waste management. Presently, the TMC has only implemented small measures to involve big malls and shopkeepers. Moreover, these actions seem to be more for show than real restrictions for the big producers and distributors. Indeed, when an action – such as is the ban on plastic

bags – is launched, it seems to have only a small impact on environmental preservation. These actions also seem to cause more repercussions for the small shopkeepers than for the largest supermarkets. Furthermore, none of the producers or distributors pay taxes on waste management yet.

The increase in interest in waste management by small enterprises, organizations and associations creates tensions between those who are mandated by the TMC and those who are not. They defend different points of view and most of them want to be appointed by the Corporation, and they therefore create violent discourses against each other. An example is the Thanal Trust blaming the CED for the mismanagement in Vilappilsala and the closure of its centralized plant.

Regarding the increase in burning, dumping and littering in the city wards – according to the interviewed population – the repercussions of the current MSWM bring changes to the quality of life of the city dwellers, usually impacting the poor more severely than the wealthy. When the ward of Sasthamangalam is shown as an example of good management, poorer wards as Kanjirampara are accused of mismanaging their waste, even if the production of waste is higher in richer wards, such as Sasthamangalam, and nobody really seems to control where the majority of the garbage is disposed of – as a large part finishes in rivers and on vacant land.

Furthermore, the closure of the centralized composting plant has had severe repercussions on the incomes of a multitude of waste pickers. Nowadays, a small part of them continue to work in the wards that have been declared clean, but their job is still informal. Moreover, many women used to work for the centralized installation at Vilappilsala, even in waste transport as lorry drivers. Nowadays, waste collectors seem to be composed of both men and women, but a gendered separation of tasks has occurred: the men mainly take care of plastic waste, paper waste and waste transport, while the women carry out the more dangerous and less lucrative jobs, as they take care of the biodegradable wastes.

At the household level, gender inequities in waste management are large, even in wards that are considered clean. Women are responsible for the management of garbage at home and this unpaid activity can be more or less time-consuming from one family to

another. This implies more unpaid labor for women, as they have to segregate their waste, burn it and dump it. Most rich families employ a housemaid; so wealthy women have less contact with waste than poorer ones.

This thesis revealed how socio-spatial differences influence the inequalities concerning environmental degradation in Thiruvananthapuram. Indeed, the low-income populations and neighborhoods face more difficulties. It revealed that women are also facing more difficulties than men when it comes to waste management. This was observed at the household level, but also among the waste workers.

The politicians talk a lot about the issue of waste management, but they seem to do little. They tend to shift the blame to the population or to the opposite party. On the other hand, many city dwellers claim that corruption is an issue affecting waste management and that for this reason the situation will never be improved. Moreover, the waste is not yet seen as the resource it can be. This can explain that its management is still done in a marginalized way. Furthermore, the gendered discourse claiming that in India waste management is a duty for women was recurrent, which is reinforced in the decentralized SWM as every household is now more responsible of its own waste.

Based on the points mentioned above, I conclude that the current decentralized and participatory solid waste management program of the TMC reinforces different kinds of gender and social class inequalities. Spatial analysis shows that these inequalities exist between the different wards, with an increase in pollution in the areas of lower income of the municipality. The cleanliness degradation impacts mostly the poorest wards and populations of the city. Notably, this degradation is produced by socio-economic disparities in the city, as waste management services are unequally distributed between rich and poor areas of Thiruvananthapuram. At the household level, decentralized management impacts female actors, especially the ones living in the low-income-areas – as they have no housemaid or waste picking services. While the plant of Vilappilsala gave an opportunity for many of the Kudumbashree waste pickers – even if their work condition is debatable – they lost their jobs because of the current waste management program, which also increased the unpaid labor load of the households' female family members.

As shown in the sections conclusions (see subsections 3.3, 4.5 & 5.4), the UPE theoretical framework was useful among the different analysis chapters of this work.

First, the analyses of politics and waste management shown that the political maneuvers were important in the implementation of the decentralized project. As shown by Cornea, cleaning specific areas before local elections can be a mean of gaining the confidence of the voters (Cornea et al., 2017). This can explain the quick positive outcomes of the project in the central and rich wards of the municipality by the end of 2014. Indeed, Bullard showed that the wealthier population has more power to mobilize the politics than the poorer ones (Bullard, 1990). Led by the LDF, the claim that the project was already successful can explain part of their victory in the TMC elections of 2015. Moreover, just as in the case of the dump in Oaxaca, the politics in charge of the municipality had to ask the whole city population to keep their waste in households after the closure of the centralized plant, which occurred an important dissatisfaction from the citizens (Moore, 2009). In the case of Thiruvananthapuram, the important politicking around the centralized plant changed the local perception in the politics of waste – as the closure of the Vilappilsala plant was very party-politicized, and thus it probably helped the LDF to come up with its new decentralized proposal. The closure of the centralized plant probably also brought about due to political games (notably between the State authorities and the ULB).

Second, at the community level, the effects of socio-spatial phenomena on the production of environmental inequalities can be analyzed through the works of Bullard, Harvey, Heynen, Perkins and Roy. Indeed, Bullard and Harvey argued that the areas where the less wealthy population is living face more environmental injustices (Bullard, 1990; Harvey, 1996). The environmental services are influenced by political economy, and that these produce spatial (class related) inequalities. Harvey demonstrated the differences that exist between rich and poor regarding environmental quality. The valuation of money is thus a process that is defining space, time, environment and place (Harvey, 1996: 11) It was demonstrated in chapter 4 that regarding decentralized SWM, space and environment in Thiruvananthapuram are defined by the valuation of one ward money – notably by the presence (or absence) of waste pickers. The political economy is therefore producing the environmental inequalities in the municipality, and these affect

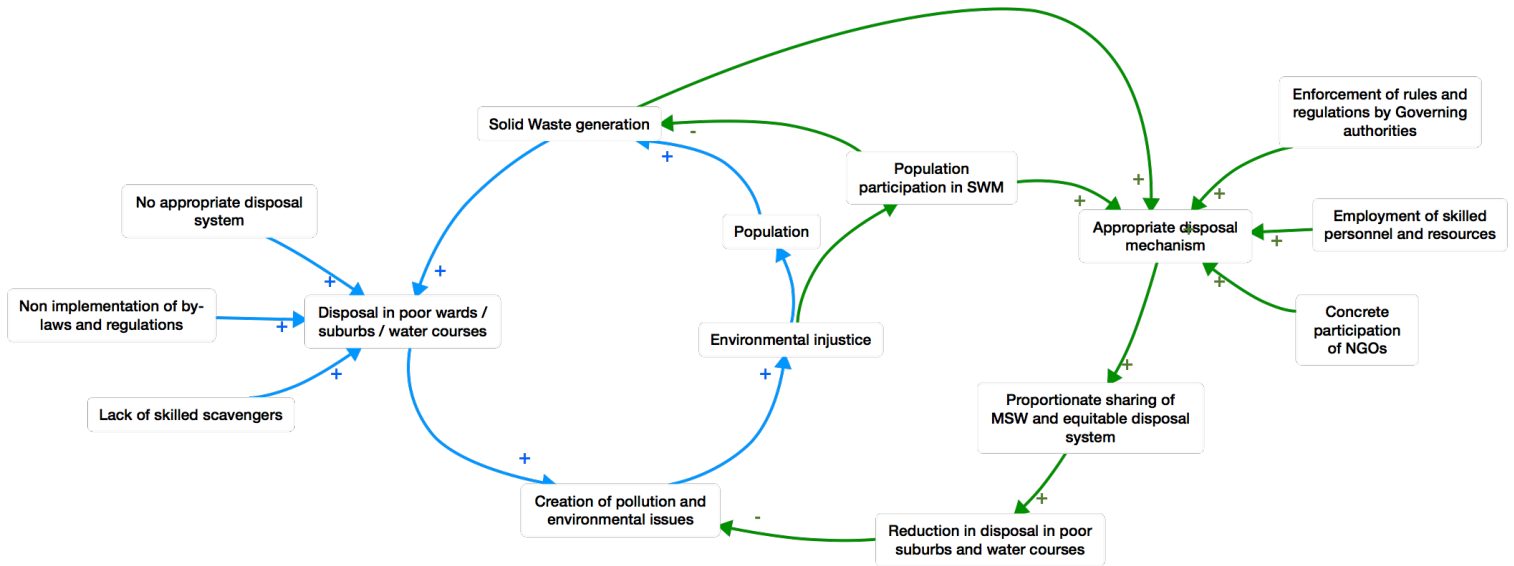
particularly the marginalized populations and the areas where they reside. Same analyses and similar results were found in other fieldworks, such as in discriminatory distribution of the urban canopy-cover in Milwaukee (Heynen, Perkins and Roy, 2006).

Finally, as explained by Poswa, any SWM system should consider the effects of demographics of the households, and thus consider the effect of gender on the choice of the waste collection system (Poswa, 2004). Therefore, gender considerations in PE allowed us to bring the analysis at a new scale: the household level (Elmhirst, 2011; Truelove, 2011). Madsen showed that the market of waste is often appropriate by marginalized female actors, which represent an opportunity for their empowerment (Madsen, 2006). However, the field studies of Didero, Samson and Hurt demonstrate that the privatization of the waste market can exclude the poorer actors of both working class dwellers and informal waste pickers (Didero, 2011; Samson & Hurt, 2003). This is the case in the decentralized program of Thiruvananthapuram, where the waste market tends to be more and more privatized by small waste enterprises. The analysis at the household level showed that the new program excluded many Kudumbashree waste pickers and that more and more men are involved in the market of waste. Consequently, in the low class households the management of waste represents a new unpaid activity, which is mainly (if not exclusively) done by the female family members.

## **6.2. Beyond this project – policy recommendations**

The current situation of SWM in the municipality of Thiruvananthapuram can be summarized by the following figure. The positive (green color) and negative (blue color) feedback loops are expressed by the influence of the various phenomena and actors on the waste management system. The '+' and '-' signs express whereas the different links increase or decrease a phenomenon.

**Figure 23:** View on the causal feedback mechanism for SWM and Environmental Justice. – Source: Kubanza NS & Simatele D (2015)



As shown on figure 23, three points seem to particularly provoke the environmental, spatial and social injustices in the MSWM project. First, the city possesses no appropriate final disposal system. Second, bylaws and regulations of both the MoEF and the SWM program are not concretely applied or respected yet. Finally, there is an important lack of skilled scavengers and/or waste pickers. This tends to increase the disposal in poor wards and thus the creation of pollution and environmental issues. The resulting environmental injustices raise a kind of fatalism by the population and therefore, they are not changing their attitudes toward SWM and waste generation.

The first action should therefore be the enforcement and concrete respect of bylaws and regulations that have already been established by the Governing authorities. If these rules were respected, they will notably allow the professional formation and employment of skilled personal, as this point is part of the original decentralized program propositions. Finally, the local NGOs and Research for Development organizations should have a concrete participation in the SWM program, which seem not to be always the case. As some of them are appointed by the TMC, they levers of action can be limited.

According to the work of Zhu, Zurbrügg, Anapolsky, Asnani and Mani, one



should consider the entire chain of waste management in the view of improving and developing a proper management of these materials. This chain can be summarized in 7 steps: “(1) Waste segregation and storage at source, (2) primary collection, (3) street sweeping, (4) secondary waste storage, (5) transport of waste, (6) treatment and recycling options for solid waste, and (7) final disposal” (Zhu et al., 2008). Acting on different levels of this list can be a mean of improving the current system of SWM. Therefore, I will address some of these points here and propose few policy recommendations.

In the first place, (1) the waste segregation and storage at source has been demonstrated to be socially and spatially unequal in Thiruvananthapuram. Good practices are more common in wealthy wards and seem to partially depend on the presence or absence of waste pickers. Moreover, at the household level, inequalities were observed between male and female family members regarding the duty of waste management. One solution to these issues can be the enforcement of educational campaign to explain the good practices of waste segregation at source and to limit the household gender segregation of tasks. The distribution of two waste bins (one for biodegradable and one for other products) can help the citizen to segregate the waste in a proper way. This measure is already done by some waste enterprises involved in ‘clean’ wards and was already used in the centralized program. However, in the old program, the segregation in these two bins was incorrectly done, notably due to a lack of educational programs.

Secondly, (2) the primary collection should be done by skilled waste pickers and through all the city wards (as it was the case in the centralized program). Nowadays, waste pickers are collecting their salary in each household where they collect the garbage. Therefore, the more household they take care of, the more money they get. This tends to influence them to collect much waste and to get rid of it very quickly, which often mean to throw it in open places and riversides. The work of the waste pickers should therefore be more formalized, and one should be sure that the wastes are disposed of in a correct secondary or final disposal plant before the employees receive their salary. Thus the enterprise that employs them should receive money from households and pay the waste pickers when they bring the collected waste in disposals (only the

Pelican Foundation seems to act this way). Moreover, the formalization through private enterprise should concern the waste pickers already involved in SWM, in a way to avoid the loss of money for the marginalized actors working in waste management today.

According to key informants and the household survey, (3) street sweeping is done in the richer areas and in the place where the tourists reside. This should be extent to the whole municipality.

There is not much plant at the ward level yet (as it is the case in Alappuzha). Indeed, most of the decentralized plants were observed at the household level. The creation of such (4) secondary waste storage could help to decrease the presence of waste upon the streets and rivers, especially for the wards exclude from the presence of waste pickers.

(5) The transportation of the waste should be done through lorries with correct technologies. A key informant and some press articles report that in the centralized project, the transport of the waste was not done correctly and that many garbage and leachates were falling from the lorries all along the roads on the way to the Vilappilsala installation.

(6) The treatment and recycling options for solid waste should not only be done in other states of India. The state of Kerala should develop and build up installations and recycling infrastructures. This will tend to develop the local waste market and influence the different municipalities to improve the treatment of their own waste. To do so, taxes have to be collected from the waste producers and distributors, which will allow financing such programs. If the laws of the MoEF claim that it should be done, according to the key informants at the TMC, no producers or sellers are paying taxes for waste management yet. Moreover, the distributors and sellers could put taxes on the recyclable products they sale, and give this tax back to the consumers when they give back their empty products (such as PET bottles). Then the producers and sellers could give these recycle products to the correct structure and be paid for the sale of these materials.

Finally, some (7) final disposal should be installed to receive the city wastes that cannot be recycled, such as some of the plastic products. Even if the NIMBY effect is

important in the city since the closure of the centralized plant, some centralized structures should be envisaged again. As a matter of fact, the creation of a well-managed landfill can be a cheap and simple technology to avoid the current situation of the burning in the streets. But such a structure can be used correctly only if the segregation at source is done correctly. If biodegradable and recyclable wastes are not separated from other wastes, the landfill will certainly not be working properly.

The better solution seems thus to be a mix of decentralized and centralized program. At the scales of the households and wards, decentralization can be very useful and avoid the problem met in the Vilappilsala program. However, at the level of the entire municipality some centralized structures (such as a well-managed landfill) are a requisite.

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