Waste in the city

**A case study
on waste management perceptions and behaviors
of citizens and municipality
in the city of Xai-Xai, Mozambique**

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Acknowledgements

Abstract

A case study on waste management behavior of citizens and municipality in the city of Xai-Xai, Mozambique

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This research in the city of Xai-Xai in Mozambique explored the actual behavior of citizens and the municipality on waste management. It looked at the actual waste disposal methods of citizens on household and street level, studied the municipalities' waste management activities and tried to understand the rational of actors' behavior. The motive for the case came from the mayor of the city. She framed Xai-Xai as a dirty city but why she perceives it like this and whether other people support her view are unknown factors.

For the case study twenty interviews were held with citizens; ten with assumed low income and ten with middle class, higher income citizens. Six interviews were executed with the staff of the municipality and four with key-informants. The latter are persons that from their personal expertise could give new insights on the case. Other empirical data were collected by informal chats, observation, two focus group discussions and the screening of documents.

On household level the majority of citizens of Xai-Xai employ one waste disposal method. Whereas the disposal method is unique and frequently repeated, it can be considered as an automatic behavior. Waste disposal methods also seem to be part of a collective behavior as citizens appear to choose the same methods as their neighbors.
Littering in public spaces turned out to be an automatic and collective behavior. The phenomenon was widespread and could be observed for citizens as well municipality staff.
The municipalities' waste collection is for the waste collectors an automatic behavior. The workers wait for instruction or already know what to do as is the case in some of the areas with a regular collection service. For the head of the sanitation department the decision where to collect waste is a daily one and based on the collection schedules of former days, the availability of means and request of influential people. He evaluates and considers every situation; his behavior can be seen as a non-automatic one.

The majority of interviewees frame waste as the leaves of trees and in second instance includes other organic material. Another characteristic of waste is the uselessness. Waste is such when it is not longer of use. The decision whether or not an item still has utility is a personal one. Where some citizens littered items, others were observed collecting them.
The respondents perceived that garbage causes problems; the type of problems though varied. Unanimous were the mentioned problems around garbage attracting insects which cause diseases.
 About the cities cleanness and road access not a single frame could be distinguished. Last but not least the citizens and municipality mention a problem around the waste tax. Citizens who pay a waste tax though do not have a collection service are agitated and perceive the payment is an unjust action of the municipalities' administration. For the 3 latter issues, the case study distinguished a limited number of interactions between actors holding a different frame. The narrated encounters

talked about agitation and stress. The question though is if those tensions can be seen as a chaos, a state where through interactions frames and actions of actors interact and can make change.

The behavior and frames the citizens and municipality of Xai-Xai hold can largely be explained by the non-enabling environment. The study results give strong indications that the rational of actors' behavior is caused by poverty which embraces a lack of means, inconsistent schooling and general low education levels.

Poverty triggers a whole range of interconnected and intertwined actions and behaviors. In this perspective the case of Xai-Xai can be seen as a complex system in which the various actions and behaviors are part of a complex network of non-linear relations. How this system will evolve and if the mayor will get her desired change is difficult to say; possible it is only visible with hindsight.

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Word-list

Apoio:	Help
Bairro:	Neighborhood
Castigo:	Curse or penalization
Cidade:	The most urbanized part of the city; in this case also downtown
Codigo de posturas:	Code of behavior
Combate:	Battle, fight
Epaa:	An exclamation of surprise
Jogo logo:	Fling it immediately
Mato:	Bushes, wilderness; that what's outside the civilization
Machamba:	Agricultural field
Machimbombo:	Bus
Podre:	Decayed
Praia:	Beach
Qualquer coisa:	Anything
Qualquer maneira:	(fig) In any which way
Quarteirões:	Block of houses

List of Abbreviations

MICOA	Ministry of Environmental Action
NGO	Non-Governmental Organizations
UNEP	United Nations Environmental Program

1. Introduction

'I don't want to be the mayor of the dirtiest city of Mozambique' was a statement heard by a representative of the Frysian Urban Sanitation Program Mozambique[1] in the start of 2010. The mayor of Xai-Xai views a problem and wants to resolve it. But, to resolve her problem, first it has to become clear what the actual problem is. Is the problem caused by citizens who contribute to the uncontrolled waste disposal and littering? Or could it be the poor collection methods of the municipality? Maybe other factors influence the waste disposal and collection in the city of Xai-Xai? The waste management behavior of citizens and the municipality is the central theme of this MSc thesis.

The thesis is part of a specialization in Communication and Innovation Studies within the MSc program Development and Rural Innovation. The research aims at obtaining knowledge on behavioral patterns and frames people hold. Therefore a case study design is applied and different qualitative research methods will be used.

1.1. Background

Waste management in development countries does have three general characteristics.
Firstly, the content and quantity of waste can give an impression of the living standard and lifestyle of people. Urban solid waste in general consists out of organic and not organic parts. According a publication of the International Environmental Technology Centre of the United Nations Environmental Program (UNEP), organic items form the bulk of waste in development countries. With an increase of income, the percentage of not organic waste is growing.
A second waste pattern mentioned by the UNEP is the relatively high amount of recovery or re-use of waste in development countries. Especially in peri-urban areas bags, bottles, textiles and cans are re-used for domestic purposes. In the high-income areas, recovery is carried out by domestic servants. Re-use also has its' limitations. At a certain point the waste volume will be too big to continue re-use besides not all the waste can be re-used.
A third characteristic of waste in development countries is the in general poor management of waste collection. Especially in medium and large urban centre, waste collection and treatment of solid waste is a problem due to limited sources. Inadequate waste collection can lead to serious public health and environmental risks. The publication mentions 'transmission of diseases and spread of epidemics, the degradation of the urban and natural environments and, most importantly, the social reinforcement of poor hygienic habits and practices, all of which compose a vicious cycle (UNEP Volume 1, 2005)'.

Mozambique is one of the poorest countries in the world. World Bank figures show that the Gross National Income per capita in 2008 was calculated on 380 US dollars. A liberation war, the civil war and the instability in the region highly contributed to this situation. The country though is improving. Since a peace agreement was established in 1992, the situation started to recover. In the first years of the new millennium the economy grew with an average of 8% per year (Ruigrok, 2005). In 1997, 69.4% of the population was living below the poverty line. In 2003 this percentage was 55.2% (World Bank, 2010).

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[1] The Frisian Urban Sanitation Program Mozambique is a consortium of Wetterskip Fryslan, Province of Fryslan, Vitens Fryslan and the Association of Frisian Municipalities

In Mozambique the municipality is by law responsible for the collection and processing of solid waste (MICOA, 2010). This includes the establishment of codes and tariff setting for the provision of the services. In the city of Xai-Xai, a medium large urban centre solid waste is collected by the workers of the municipalities' sanitation department. Beside the collection of domestic waste, the municipality collects the waste from bins and executes street sweeping activities. The estimation is that around 12% of the solid waste is collected by the municipality (WAPCOS/SULABH, 2008). A study executed by the Ministry of Public Works indicates that most interviewees are not satisfied with the municipality services of the waste collection. The interviewees suggest that the municipality could improve their services by a regular collection service (Africon, 2009). The mayor as well is not satisfied with the waste management. She perceives her city as a dirty one.

Since 2009 the municipality of Xai-Xai has a partnership with the Frisian Urban Sanitation Program Mozambique. The overall goal of the partnership is to contribute to Millennium Development Goal number 7 on poverty eradication and environmental sustainability. The primary goals of the program are the provision of institutional support, the contribution to capacity building and the provision and proper management of new facilities (Schouwenaar et al, 2009). However the focus of the partnership is on waste water, some of the activities are related to solid waste. The program is co-financed by the Ministry of Foreign Affairs (DGIS) and runs in the cities of Xai-Xai, Inhambane, Maxixe and Chókwè.

1.2. Problem statement

The mayor of Xai-Xai expressed her concern about the increasing amount of solid waste that can be found in different parts of the city outside the municipality defined places. Solid waste is spread through the city, along roads, on the roads, in open spaces and put in holes in yards. She is anxious to recuperate the uncontrolled waste disposal and littering. The question is if the mayor is alone in her position, i.e. do citizens of Xai-Xai and the workers of the municipality perceive waste disposal and littering as a problem? And is what the mayor perceives as a constraint the real problem?

Based on conversations with co-workers of the Frysian Urban Sanitation Program Mozambique and literature study, a knowledge gap can be identified on perspectives of the different actors in the city of Xai-Xai in relation to waste, waste disposal and littering. So far, no research has been executed on actual behavior and the perspectives of different actors. Also unclear is how the waste management behavior can be explained and whether or not the phenomenon is seen as a problem.

Knowledge on actual behavior of different actors and the explanation of that behavior is of importance for the municipality as well as the Frysian Urban Sanitation Program Mozambique. Findings can be used in the activities and actions that the two partners will develop and execute.

1.3. Research objective

The objective of the study is to understand the actual solid waste management perceptions and behaviors of citizens and the municipality of the city Xai-Xai in Mozambique. Hereby can solid waste management be understood as the activities of collection and disposal of domestic waste as well street garbage. The study aims to include an interpretation or rational of the actual behaviors. Practically the study results can be used to develop recommendations for the municipality to reduce urban waste problems. From a theoretically perspective the study can give insights in the relations between perceptions and behaviors of different actors in a certain context.

1.4.   Research questions

The research question of this MSc thesis is formulated as:
- What are the actual perceptions and behaviors of citizens and municipality in the city of Xai-Xai in relation to solid waste management and how can this be explained?

The sub-research questions are:
- What is waste according the citizens and municipality and is waste perceived as an urgent problem?
- How do citizens and municipality manage solid waste at home and on the street?
- What is the rational of actors' behavior?

1.5.   Description of the study area

In the description of the study area subsequently the city of Xai-Xai, the climate and recent history will be portrayed.

The city
The municipality of Xai-Xai in Mozambique is with almost 116.000 inhabitants a medium large urban centre. The city is located in the south of Mozambique at the river Limpopo and nearby the Indian Ocean. In a straight line it lays 130 kilometers north-east of the capital Maputo. The city is the capital of the province of Gaza and accommodates governmental services, small industries and commercial activities. The main activity though is agriculture. Around 60% of the population executes agricultural activities (WAPCOS/SULABH, 2008).

The city exists of two different parts. The lower city is a flat area with clayey soils. However several families live in this area, this part of the city is first of all considered as an administrative and commercial center with governmental offices, two markets and two bus stations. The upper part of the city is located in a former dune area and thus hilly. The soils of the upper city are sandy and sensitive to erosion. The majority of citizens live in these upper city neighborhoods

For the lower part as well the upper part of the city, the majority of the citizens do live in a detached house surrounded by a large garden with trees, grass and cleaned soil. Houses are either constructed from brick or reed. The city hardly has flat buildings and the few existing ones consist of maximum three floors.

The cities' 12 neighborhoods are divided in 4 administratively zones, namely Cidade[2], Inhamissa, Patrice Lumumba and Praia. Within a zone, neighborhoods can be dispersed located as well contain totally different types of housing and urbanization. For example Cidade exists of the Centre which contains stone houses and the administrative and commercial center with a structured road pattern, but as well is surrounded by houses of reed where hardly a road structure can be found. The neighborhood of Fenciline in the same zone can be seen as a rural area with mainly houses of reed.

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[2] Cidade means literally city. In this case the older neighborhoods such as *bairro* 9, 10, 11, Fenciline and the downtown part of the city are considered as Cidade.

Climate
The southern part of Mozambique has a subtropical climate. The characteristics of this climate can vary. For the Southern part of Mozambique the daytime temperature in summertime is around 30° while in wintertime the average is around 24°C. Rainfall can be as Christie describes 'highly irregular and variable throughout southern Africa (Christie et al, 2001)'. The rainy season from October to March have variables between 242 mm up to 1080 mm (measured in Maputo) and varies even on short distances (Christie et al, 2001). The last extreme rainfall that coincided with tropical storms and a cyclone found place in the year of 2000. The whole Limpopo basin including the lower part of the city of Xai-Xai was completely flooded. Since then many citizens do life in the upper part of the town.

Recent history
Recent history of Mozambique is one that can be characterized by dramatic and difficult transformations. After 11 years of war, the Liberation Front Mozambique (Frelimo) freed Mozambique in 1975 from its' Portuguese colonizer. In that same year the country became independent and power was handed over to the military commander of Frelimo, Samora Machel. He became the first president of the Republic of Mozambique. He and his party established a one party government which was strongly inspired by the ideas of Marxism.

Only a few years after independency, a civil war started between the party in rule Frelimo and the National Resistance Mozambique (Renamo). Members of Renamo could be found under former Portuguese colonists, outcasts and other frustrated who were organized and supported by the Rhodesian secret service and later the South African apartheids regime (Ruigrok, 2005). This war ended in 1992. With a view to the end of the war, Mozambican government adopted in 1990 a new constitution that allowed other parties to participate at elections and embraced a capitalistic political system.

However there are no specific data for Xai-Xai it is clear that the wars must have had its' impact. In Mozambique 'over a million people were killed during the civil war, almost 2 million people fled to neighboring countries, and over 3 million were displaced internally (Hanlon, 1996). The country's entire infrastructure was severely damaged in all sectors and the economy collapsed (Klees et al, 1997)'.
During the civil war citizens came to life in cities, where the government could protect them. According data of the United Nations in the liberation year 1975, 8.7% of the population in Mozambique lived in urban centers. By the end of the war the city population tripled to 26.2% in 1995. The urban population still continues; in 2005 34.5% of the population is living in urban centers (United Nations, 2007).

Later governmental reforms included the establishment of administrations of municipality and province. In 1998 the first municipality elections took place. Since then the municipality of Xai-Xai had three different mayors all of the Frelimo party. Rita Muianga is the actual mayor and the first elected female mayor in the country. In 2009 the first provincial elections were hold.

1.6.   Outline of the report

This first chapter is an introduction of the case study in the city of Xai-Xai. The problem statement, the research objective and the research question have been explained. Besides that, a brief description of the study area is given. In the second chapter the theoretical exploration of the study and five key-concepts are explained. Chapter 3 will go into the research methodology and the various

methods of data collection. In the fourth and fifth chapter are the empirical data of the fieldwork described. Chapter 4 focuses on the frames different actors hold in relation to waste and waste management. It describes the different perceived realities and problems that arise around waste management.

Chapter 5 explores the different behaviors of both citizens and the municipality in how they manage waste at household and on street level and. The last chapter includes the findings and conclusions of the MSc thesis research and reflects on the limitations of the case-study. The chapter finalizes with some recommendations for further research.

2. Theoretical exploration

The aim of this MSc thesis is to understand the waste management behavior and the rational of that behavior of citizens and municipality in the city of Xai-Xai in Mozambique. To do so, five different theoretical concepts will be used, namely framing, chaos and order, automatic behavior, collective behavior and last but not least the concept of an enabling environment. These key- concepts are outlined in the following subchapters. In the final subchapter the different concepts are interrelated.

2.1. Framing

When people converse they exchange values, norms, interests, beliefs, assumptions, experiences and knowledge. In these interactions so called frames are constructed and sometimes changed. People use frames to make sense, interpret and give meaning to what is happening (Gray, quoted in Aarts et al, 2011).

Theories on framing explain that the construction of frames depend on with whom a person is talking and what this person in the conversation wants to achieve. A persons' frame will emphasize certain aspects of an issue while other aspects are downplayed. While there are numerous possibilities people can select from, they select a frame that will support that persons' objectives (Aarts et al, 2008).

Dewulf et al. describes frames as communicative devices. The frames are used 'by individuals and groups to negotiate their interactions (Dewulf, 2009)'. In that perspective the content of a frame held by individuals or groups may develop and shift during the process of interaction. It can be seen as a dynamic process between different actors. This process can lead to different views, i.e. a reconstruction or a reframing of phenomena. In the process of reframing social learning, negotiation and conflict management may take place (Dewulf, 2009).

Different scholars noticed the framing of an issue in a certain direction to activate and mobilize people (Gray, 2003, Marullo 1996 both quoted in Idrissou et al, forthcoming). It is seen as a strategically form to persuade people into a certain direction (Shmueli et al, 2006, quoted in Idrissou et al, forthcoming) and can be called interactional framing.

In this thesis research the existing frames on waste management of citizens, the municipality of Xai-Xai and key-informants were investigated. It examined what different actors perceive as waste and if they consider waste as a problem. To do so, the data of the interviews and the group discussions were analyzed. The analysis focused on what was said and how it was said. Furthermore different documents and the content of articles on waste in the national newspaper Noticias were scrutinized.

2.2. Chaos and order

Chaos and order are two severely close related concepts in the theory of chaos and self-organization. The theory describes the evolution of complex non-linear systems such as a flock of birds, a school of fish and the weather. Typically for all those systems are the constant changing forms through apparently insignificant events (Gilchrist, 2000). If we look at the form of a flocks of bird we will see its' continuously and unpredictable changing forms. While the form of the flock changes, still a pattern or a kind of order appears. 'The amazing thing, however, is that despite all the unpredictable, coherent order always emerges out of the randomness and surface chaos (Morgan, 1998). Examples

from nature are also applicable for societies, communities and organizations. 'Groups evolve in an environment of complex and dynamic social interactions (Gilchrist, 2000)'.

According the theory, systems evolve and even have to evolve in order to survive in their environment. The systems go through stages of instability and disturbance; a stage of chaos. In this chaos a change or move is made and a new pattern, structure or order is formed. Systems furthermore are characterized by self-organization. Patterns emerge on a self-organized base. 'Its' precise nature never can be planned or predetermined (Morgan, 1998)'. For human beings the stage of instability or chaos can be recognized by feelings of stress, discomfort, friction and anxiety. While people try to avoid or minimize the uncomfortable state characterized by unpleasant feelings they could consider a change of behavior or perspective and make a move (Marcus, 2006).

Some systems though do not move and are unable to innovate or change. In case of organizations or communities, they can be seen as static or stable and are often characterized by a low number of interactions with the outside world. They probably are homogenous and even avoid interaction with others (Gilchrist, 2000). Those organizations or communities lack the necessary instability and disturbance to make a move.

'When a system is found in an undesirable state, the challenge will be to open the door to instability, or even to create instability that will help a new pattern of behavior to emerge (Morgan, 1998)'. In order to do create instability, Morgan suggests investigating the forces that lock an organization into a fixed pattern. Is it the culture, hierarchy or something else why the organization does not change? And if change is required, how can it be achieved? He suggests that the manager creates a new context either by changing the mindsets of the employers or by mobilizing a group of powerful key individuals, i.e. he suggests creating a certain form of chaos (Morgan, 1998).

If the city of Xai-Xai is seen as a system, some actors see the waste management as a problem and try to achieve a behavioral change. As could be read, for a change tension, instability and thus a certain form of chaos is needed. The interesting question is though in which phase the community is. Do citizens feel uncomfortable with the becoming filthy of their neighborhoods? Do they feel a tension around the waste disposal? Or is waste disposal and littering not an issue? Is the actual waste problem discussed by people with different opinions and thus a topic in interactions?

If almost none of the actors feel discomfort about waste disposal and littering, what are the possibilities for the 'manager' of the city? Can the mayor undertake some steps to change the situation? Morgan suggests that managers are capable to create a new context (Morgan, 1998). The mayor and the councilman of Xai-Xai do hold formal positions to create a new set of formal and informal rules, conditions and/or actions. They can decide on new waste collecting methods and regimes; they can create a new context in which a new pattern or order can be established.

To investigate if the community of Xai-Xai is in a stage of status quo or in the moving state of chaos, the thesis studied if waste is framed as a problem and if so what kind of problems are perceived. Furthermore it investigated if the determined waste problems are discussed in social interaction. Especially conflicting frames are interesting in this perspective. If the issue is discussed often between people holding conflicting frames and in different settings it could indicate that something is moving. It could be a form of chaos out of which a new order can be formed.

2.3. Automatic behavior

Human action is often subject to habitualization. 'Action that is repeated frequently becomes cast into a pattern (Berger et al, 1966)'. Scholars mention efficiency and economy of effort as reasons for automatic behavior (Berger et al., 1966; Cialdini, 2001, Petty et al, 2005).

To function in contemporary society, human beings even need automatic behavior. We cannot function if we have to analyze every situation, encounter or event in which decisions have to be made. It implies that humans need to depend on other mechanism. We need 'simple means for deciding what is good and what is bad (Petty, 2005)' or in the words of Cialdini shortcuts for responding (Cialdini, 2001).

The 'choice' for taking a shortcut decision or careful evaluating an issue is thoroughly described in the Elaboration Likelihood Model of Petty and Cacioppo. The model, which is elaborated in the scope of persuasive communication, starts with two assumptions. The first assumption is that 'people neither have the time nor do have the motivation to evaluate everything carefully'. Secondly, people strive to have correct attitudes and beliefs, because it makes life easier (Petty et al, 2005). The scholars describe two routes op processing information, namely the central and the peripheral route. A person that takes the central route is thinking thoroughly about an issue, pays attention to details and often wants to know more about it. The route involves cognitive effort. The peripheral route is the opposite of the central route in which a person is not thinking and takes a decision on the already mentioned shortcuts. Which route a person takes depends on different factors as the issue at stake and the individual need to evaluate.

The central and the peripheral routes of processing information of Petty and Cacioppo do have a lot of similarity with respectively the conscious and automatic process of Bargh et al. The latter distinguished the conscious process as 'a mental act of which we are aware of, that we intend, that requires effort and that we control (Bargh et al, 1999)'. Behavior becomes automatic when it is frequently repeated and consistent under the same circumstances (Bargh et al, 1999).

Automatic behavior slightly differs from the processing of information through the peripheral route. The former is something that always happens in a certain context, where the latter does involve some thinking although it is through a short cut.

Thaler and Sunstein describe the conscious process as the reflective cognitive system and the automatic behavior as the automatic cognitive system. The reflective cognitive system is characterized by control, effortful, deductive, slow, self-aware and rule-following. The automatic system can be seen as uncontrolled, effortless, associative, fast, unconscious and skilled (Thaler et al, 2009).

How people deal with waste disposal could be such an activity in which a peripheral or automatic route of processing is used. It is like taking a bath, tooth brushing or driving a car. Once we learned to brush our teeth, the brushing will be under the same circumstances be automatically. Not a lot of effort has to put in. The person that has to deal with domestic waste repeatedly probable disposes it under the same circumstances in the same unconscious way. Probably the same applies for the individual having the skin of a fruit or a wrapper in his or her hand; it will be disposed automatically i.e. thrown away immediately. It is as pushing a start button. When the button is pushed, the subsequently behavior is automatically (Bargh et al, 1999).

To investigate whether or not waste management can be seen as an automatic behavior the daily practices of citizens and the municipality were observed and discussed. Special attention was given to the repetitiveness of those practices in the same way and under the circumstances.

2.4.   Collective behavior

In short, collective behavior is the behavior of a group or a social network of people. In a research on smoking cessation, Christakis concluded that the decision to quit smoking is related to the social networks the person is connected with. Smoking behavior is an extreme social activity and it appeared that interconnected people seem to quit 'in concert'. However the decision to stop smoking is an individual one, people may feel an increasing pressure of the group by the new norms

settled by the group (Christakis et al, 2008). In the same line of thought Cohen describes that 'networks of social interaction are constructed and reinforced through the activities of everyday life and cultural rituals, creating inter-personal ties and affirming community boundaries (Cohen quoted in Gilchrist, 2000)'.

Another example of collective behavior in social networks can be found in Elias' The Established and the Outsiders. In Winston Parva, a suburban community near Leicester, United Kingdom, the interaction between the existing group of habitants and the newcomers was studied. The old established group had constituted a set of norms which were highly valued and defended. Group members had to submit to group rules and defended them. To do so, the established group avoided informal social contact with the newcomers. 'The internal opinion of any group with a high degree of cohesion has a profound influence upon its members as a regulating force of their sentiments and their conduct (Elias, 1994)'.

In 'the Social Construction of Reality' Berger and Luckmann describe that people in a group share habitualized actions that are historically grown and controlled by the group. The advantage of this process of socialization or institutionalization is that people in the group can predict the other's behavior. A second advantage is that a person knows how to behave. Both relieve group members from considerable stress and will save time and effort to perform actions (Berger et al, 1966). The reason for socialization can be found in a felt need to belong that will be described further on in this subchapter.

However scholars use different terms for the collective behavior, the examples have in common the importance of the establishment of a set of rules and the force or power of a group to keep them in place. The former examples seem conscious processes, i.e. processes in which people are aware of the existing rules.
That group behavior also can be unconscious is shown by a substantial number of experiments. Salganik elaborated an experiment in which participants visited an artificial website where they could listen to the music of unknown bands. Where half of the group could see which songs were downloaded by others, the other half of the group did not have this information. Surprisingly or not, the participants with information on the number of downloads choose to follow the choices of the others. The selection of music in the other group without information differed completely (Salganik, quoted by Thaler et al, 2008).

In an experiment executed by Cialdini, a model walks through an either completely clean or littered environment. In half of the cases, the model dropped waste, the other half of the cases, the actor just passed through. The results of the experiment show that littering occurred more in unclean than in clean environments and even increased when participants saw a model drop trash into a littered environment. The model and the littered environment showed that many people do litter and participants unconsciously followed that behavior. According the scholar the participants followed unconsciously a descriptive norm. This norm is characteristic for the dominant behavior or in other words what people typically do (Cialdini, 2003).

Consciously or not, the main question is why do people do this? Why do people follow the unwritten rules of the village, why do they litter more in a dirty environment and why do people download music that was downloaded by a significant number of others?
As different scholars describe, people do need to belong and to be accepted (Baumeister et al, 1995). To do so, people conform to the norms, beliefs and behaviors of others. They 'adopt as their own whatever beliefs and behavioral tendencies are popular among those who they want to accept them (Schaller, 2001)'. People seem to engage in the same behavior as the group they feel part of. They constantly evaluate the behavior of others and draw conclusion on that perceived reality. According

Dijksterhuis this process is continuously and automatically. The matching of behavior takes places for more basic behavior such as facial expressions and accents as well more complex behavior (Dijksterhuis, 2001).

The research investigated if waste management is a form of a collective behavior. Questions as 'do citizens put their waste where other people leave it, do they litter where others litter and do they hand it in to the municipality service if their family, neighbors or friends do?' were studied. In short, it looked at the practices of citizens in relation to what others do.

2.5.   The enabling environment

Environmental factors largely can influence individuals' behavior. The environment in this case is the wider environment which includes policy and legislation, service provision, culture, religion, education as well as socio-political, socio-economical, physical and institutional factors (Carnegie et al, 2000).
Environmental factors can support, constrain and resist behavior change. Even if a person is aware of the importance of a certain 'new' behavior, the environment can make or break it. Clear examples can be found in health programs such as prevention of AIDS. The use of condoms can be promoted by an agency but if different actors in the persons' environment deny the existence of the disease or the buying of a condom is a shameful and difficult activity, the new behavior probably does not appear. 'So even people do have knowledge, motivation and skills, still they can face difficulties adopting new behaviors (Carnegie et al, 2000)'. In order to achieve a change Carnegie suggests thinking beyond the individual behavior by looking at the constraining factors in the environment (Carnegie et al, 2000).

The concept of environment in relation to behavior is also described in the Broken Window Theory of two criminologists Wilson and Kelling. 'The theory suggests that a setting with disorder triggers disorderly and petty criminal behavior (Keizer, 2008)'. So if someone sees a broken window or a dirty environment, the person will conclude that breaking windows and littering is the common behavior in that setting. The more people do litter, the more chance other persons will comply with this and other kinds of disorderly behavior.
Keizer executed several experiments based on this Broken Window Theory and Cialdinis' research on littering in a clean or dirty environment as describe in the former subchapter 6.3 on collective behavior. The results of his research were very clear. Littering more than doubled in disorderly environments. Whether the norms were socially set, by private companies or by law or police ordinance, did not matter. What mattered was that signs of inappropriate behavior encouraged violations of other norms. He calls this phenomena cross-norm inhibition effect (Keizer, 2008)'.

The influence of the context or environment on behavior is in general underestimated. Behavior is interpreted based on personal character traits while the context in which the behavior took place is overlooked. Though, as the Broken Window experiments showed environment can be the tipping point in inducing other behavior. Signs of disorder just can tip a person and make him or her act disorderly or even violently. Contrary, it also functions. 'Environmental tipping points though are things that we can change (Gladwell, 2000)'. By cleaning up, by taken away signals that induce disorder behavior people can to start behave differently. In that way the environment enables the desirable behavior.

The thesis research looked at the context or wider environment that influenced the behavior of the citizens and the municipality in relation to their waste management methods. Special attention was paid to the actions and role of the municipality. If people do want to collect waste and hand it in to

the municipality service, do they really have that possibility? The methods and locations of waste collection as well other environmental factors were examined.

2.6.   The interrelation of the theoretical concepts

The different theoretical concepts are not independent; they seem to be largely interrelated as can be seen in figure 1.
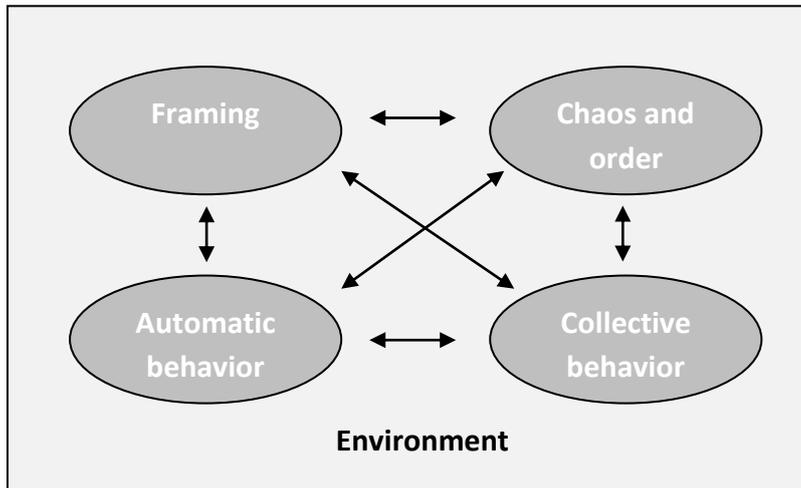
Figure 1: The interrelation of the theoretical concepts

A frequently repeated action that is executed without much thinking can be described as the automatic behavior of an individual. This form of behavior can be influenced by the collective behavior because the collective set the behavioral norms of a group. In contrast, the individual behavior affects the existing collective norms.

Both individual automatic and collective behavior influence the way people perceive and talk about an issue, i.e. how actors frame a certain phenomenon. In reverse the framing influences behavior. When a certain frame is repeated frequently and reinforced by the surroundings, it becomes reality and people could start to act according the frame.

When actors hold different contrasting frames and start to discuss, tensions and agitation can arise. The interactions of people who hold different frames could lead to feelings of stress, discomfort and ambiguity. While people do want to avoid or minimize those feelings, they could start to reconsider their perspectives and actions. According the theory of chaos and self-organization people can make a change when disturbing and uncomfortable feelings arise. A change influences the individual automatic and collective behavior of persons as well the frames they hold.

As was described in subchapter 2.5, the environment can support, constrain and resist behavioral change. Secondly the environment can influence the sensed necessity of a change. For example if an area is totally littered, it can reinforce feelings of discomfort and trigger certain actions. Thirdly, the environment can affect the way people talk about an issue. The environment thus can have an impact on the individual automatic and collective behavior, the felt urgency of a change (chaos) as well the frames people hold. The contrary as well takes place. Certain behaviors, either automatic or collective, the frames actors hold and the type interactions of actors can have an impact on what occurs in the environment.

3. Research approach

3.1. Introduction to the methodology

The focus of this case study will lay on description and interpretation of the actual situation of waste management in the city of Xai-Xai in Mozambique for both citizens and the municipality. The actual behavior and the rational of behavior of the different actors will be studied as well the perceptions of those actors on waste and waste management.

A case study is a form a qualitative research in which both theory and fieldwork are important. The fieldwork will generate data from the 'field' and the theory puts the data in a context.

The social constructivist perspective can be seen as a point of departure for this research. In this perspective people construct their own reality through interactions, experiences, etc. 'It means that the world we know and understand is our invention (Maturana and Varela, 1987, von Foester, 1984; Watzlawick, 1984b, quoted in Ford, 1999)'. The way we see things is the result of historical, social and political processes (Green et al, 2009).

The case-study is part of the activities of the Frisian Urban Sanitation Program Mozambique and was executed overtly. The researcher was housed in the office of the municipalities' sanitation department from where also the staff-members of the Frisian Program are executing their activities.

3.2. Methods of data collection

To collect data different qualitative research methods were used. The different ways of data collection and the different sources will contribute to a higher validity and reliability (Ranjit, 2005). For this case formal and informal interviews, observation, focus group discussions and document analyses were used as research methods.

3.2.1. Formal and informal interviews

Interviews are an important resource for qualitative research. The interviews gave an insight in peoples' knowledge, perspectives, beliefs, behavior and concerns and explore how people talk about a certain issue. Interviewing is seen as an efficient way of generating data. The method though also has a limitation. It only produces data on 'what people say and how they say it' and not on what they actually do (Green et al., 2009). According Hammersly, data of interviews can be as the result of a social interaction. What interviewees actually say is shaped by social interaction in a particular context (Hammersly, 2007). Thus, situations occur in which socially correct answers will be given instead of real beliefs, perspectives and accounts of actions. Where socially desirable answers were expected, for example when the persons' individual waste behavior on the street was discussed, the answers of the interviews were matched with data of observations.

In total 30 formal interviews were held in the period of October 2010 till March 2011. Twenty citizens were interviewed, six interviews were held with employees of the municipality and 4 with so called key-informants; people who from their personal expertise could add new insights on the case.

The twenty citizens were selected on two criteria. The first criterion was based on the area. While the city consists of 4 administrative zones from each zone a number of citizens were selected. From Cidade which is the largest zone 6 citizens were selected, from Inhamissa and Praia each 4 and from the smallest zone Patrice Lumumba 2. The second criteria had to do with presumable wealth. In each zone the citizens were selected randomly whereby one citizen was chosen that presumably was 'of lower income' and the other was expected to be 'middle class' or 'rich'. The selection was made on the type of housing the interviewee held whereby the poor families presumably live in a house of natural materials while the middle class and rich do live in a house of stone. In some of the cases not the house but the company building or job was the reason for selecting the wealthier interviewee in a particular zone.

The interviews with the citizens were mainly held at the homes of the interviewees with the person that was available. In a small number of cases, the interview took place at the company. 'Choosing peoples' own space contributes to a more comfortable and relaxed state of mind of the interviewee' (Herzog quoted in Hammersley et al, 2007). Besides that, it gave the researcher the possibility to observe what types of waste people had and how they managed their waste in their own environment.
In several cases the interview started with one of the family members, but during the interview other family members, friends or neighbors start to participate. The reactions, comments and observations of these people are also integrated in the research. The asked question can be found in the interview schema in annex 1.

Within the municipality the councilman, the head of the department and 3 co-workers of the waste collection service were interviewed as well the head of the municipality police. The group of interviewed key informants consists of the head of the environmental studies at the University Eduardo Mondlane in Xai-Xai, the head of the urban environmental department of the Ministry of Environmental Action, the director of an international NGO specialized in education on sanitation in the province of Gaza and a journalist for the national radio station Radio Mozambique based in the city of Xai-Xai. The key-informants contributed to the case-study by looking at waste and behavior from their professional angle. The interviews with the persons in a public or administrative function took mainly place in their working environment.

Most interviews were held in the Portuguese language except for the three with the co-workers of the municipality. During these latter interviews an employee of the municipality was translating from the local language Shangaan into Portuguese and vice versa.
The majority of interviews were recorded and transcribed. In four cases recording couldn't take place; two participants didn't allow the recoding. In the other two cases the recorder was out of order.

3.2.2. Observation

Where in interviews data are collected on what people say, in observation was established what people actually do. Observation is thus an extremely important method to collect data on real behavior. Czarniawska states that she does interviews to collect accounts of a practice and observations to contrast these accounts. The difference between those can be seen as a source of knowledge (Czarniawska, 2000). It bridges the gap between what was said and what is done or can be seen in reality. Observation as a method was used during the interviews with the citizens, the waste collection and street sweeping, a quantitative experiment and daily activities.

Observation during citizens' interviews
During the interviews with citizens the types of waste a person possessed and the disposal method were observed. The interviewees were asked to show where they collect their waste and how it is

disposed. The observation gave the researcher the opportunity to check on the content of the waste. Only in two interviews with citizens observation couldn't take place. In one situation the interviewee refused. In the other case the interview took place at the interviewee's company.

Observation of municipality waste collection
Observation was used as method to gather data on the municipality waste collection activities. By joining the collection team 'on the tractor' and the ladies that sweep the city centre streets could be established where the municipality collect waste, how citizens deliver the waste, how it is collected and what kind of problems the workers face during the execution of their job. Moreover daily activities were observed at the municipality office where the department of waste collection is housed.

Observation during an experiment
A small quantitative experiment based on the Broken Window Theory and similar to experiments executed by Cialdini was executed in the main street of the city. This experiment investigated if people do litter and if so, if it differs for a clean or filthy environment. Two research sites were chosen. The first site can be considered as a clean one. That part of the main street has sidewalks, is swept daily and waste bins are available on almost every corner. The second site on the same road is the opposite of the clean one. The road shoulders are unpaved, do have pits and are littered. No waste bins are available and the municipality doesn't execute visible cleaning activities in this zone. On both spots 50 persons were observed. In the first part of the experiment they received a sweet in a wrapper from a Mozambican 30 year old man. In the second part the pedestrians received a hand-out on which they were asked to keep the city clean; they were asked to throw their waste in the waste bin. Thereupon was observed what they did with the wrapper and the hand-out. The pedestrians were not aware that they took part in an experiment. They were observed for a distance of 50 meters.
The conditions of the experiment such as weather and period of the day were kept as constant as possible. The experiment was executed on four different days but always around the same time in the morning while the weather circumstances were equal sunny and warm. The person handing out the sweet and hand-outs is a Mozambican living in Xai-Xai and contracted for the experiment. While in former research on littering in clean or littered environments executed by Cialdini et al. there were no differences found for gender or age data (Cialdini et al, 1990), pedestrians were selected randomly. The researcher was out of sight of the pedestrians.

3.2.3. Focus group discussions

At the end of the fieldwork two focus group discussions were held in which the preliminary findings of the fieldwork were discussed. 'The methodological strength of group interviews is that they supposedly approximate a more 'natural' interaction than individual interviews, thus providing the researcher with access to how people talk to each other about particular topics (Green et al., 2009)'. If the group is well facilitated, a kind of everyday conversation may appear in which people joke, argue and interact with each other. The role of the facilitator will be limited (Green et al., 2009). One focus group discussion was held at the municipality with the members of a new sanitation commission. The commission hereinafter called the sanitation commission is constituted by political leaders such as the mayor and the councilman, the administrative heads of departments and community representatives. The second focus group hereinafter called the focus group was held in the House of Culture. The participants can be seen as representatives of a younger and better educated generation. The discussions of both sanitation commission and focus group were recorded and transcribed.

3.2.4. Screening of documents

To support and confirm findings of the interviews and observation different types of documents were screened, such as the national newspaper 'Noticias', different policy documents, a promotion materials. During a period of three months, the content of the national daily newspaper 'Noticias' was examined for items on waste. The choice for using national newspapers has to do with the non-existence of local or regional newspapers. As a side effect the screening can give some insight in the national discourse on the topic.

4. Framing waste

4.1. Introduction

In this chapter perceptions' of waste of citizens and the municipality of Xai-Xai will be analyzed; it will look at the different frames or realities that exist. A frame is a way of seeing things. It is about how a person perceives reality whereby reality is constructed by values and norms, interests, beliefs, knowledge as well experiences of that person. A frame is furthermore about language: it is how people talk or write about an issue. The content of this chapter is thus mainly based on what different actors said or wrote.
The last subchapter investigates the different frames people hold around waste as a problem. The frames will be analyzed based on the concept of chaos and order. This concept expresses that systems such as communities in principal constantly change, though for a change tension, instability and disturbance or i.e. a form of chaos is needed.

To figure out what frames do exist in the city of Xai-Xai 20 citizens were interviewed as well 6 municipality employees and 4 key-informants. Furthermore different documents were analyzed.

In the following subchapter 4.2 is described what interviewees perceive as the content of waste. Then is defined when waste is considered as such. In the third and last subchapter the problems around waste are paraphrased and the nature of the different frames analyzed.

4.2. The content of waste

Types of waste
If being asked, Xai-Xai citizens do coincide in the types of waste they mention. Waste on household level consists of tree leaves. On the question 'What type of waste you have?' more than three quarters of the interviewees spontaneously mention the leaves of trees. Besides that, grass, food left-overs and rotten fruits are mentioned by more than half of the respondents. An example:

> Interviewer: 'What type of waste do you have?'
> Interviewee: 'It is leaves of trees.'
> Interviewer: 'Anything else?'
> Interviewee: 'Grass, and mangos that fall.'
> Interviewer: 'Do you have also other waste?'
> Interviewee: 'No.'
> (Anita, housewife and farmer, Cidade)

The tree leaves and other organic materials are mentioned by poor as well as middle class and rich people. There is no differentiation for citizens of the different neighborhoods. Even in the more urbanized part of the city in Cidade tree leaves and fruits are spontaneously mentioned as waste. And while the period of fieldwork was the season of mangos, many of the respondents were referring to the falling mangos as waste.

In which poor and middle class and rich citizens differ is in the number of items they consider as waste. Three rich and one poor respondent came spontaneously up with more than three types of waste including non organic items such as cans, bottles and boxes. It is not so that other respondents

do not have that kind of non-organic waste; the citizens mention bottles, cans and plastics only after specifically being asked:

> Interviewer: 'Do you have also other waste?'
> Interviewee: 'It is leaves of trees, the mayor part of the waste. I do not have other waste.'
> Interviewer: 'You don't have bottles or boxes?'
> Interviewee: 'Yes, yes, they appear.'
> Interviewer: 'And cans?'
> Interviewee: 'Cans as well. Soft drinks, etc, etc. I also do have plastics in which I carry small shoppings to my house.'
> (Samuel, governmental employee, Inhamissa)

The tree leaves were not only mentioned by interviewees but also were showed as waste items in a campaign on health and hygiene. A poster was developed under the title 'Always keep your house and garden clean. The poster of the Republic of Mozambique and Unicef in 2008 show a lady that sweeps the garden; in front of her broom mainly leaves and some grass can be found.

Changing volume and characteristics of waste
That in particular tree leaves and other organic material is considered as waste also emerges when citizens react on possible changes in the volume or types of waste they have. Several citizens mention that the volume of waste changed over the last 10 or 20 years. The opinions though do vary and depend largely on citizens' garden and actions:

> 'Nowadays we do have many trees and many leaves fall. This increases the waste, exactly. When we arrived here, we didn't have any trees. That tree, I planted it. So when the moment comes that the tree leaves change to have new leaves, we have a lot of waste.'
> (Carla, maid, Patrice Lumumba)

And

> 'No, it is totally identical (in relation to 10 years ago). Our waste is from trees. It is the same, it didn't change. We do not have factories to have other things, things *podres*'.
> (João, retired, head of neighborhood, Cidade)

Citizens that cut their trees in their gardens mention that the volume of waste decreased. The volume of waste also depends on the season. In the season of mangos citizens find themselves with a lot of waste:

> 'We do have this existing problem of mangos; they fall and create a lot of waste.'
> (Jito, unemployed, Cidade)

Only two of the interviewed citizens, both rich, mention some differences in the kind of waste they encounter. Veronica, a retired employee, comes with the example of people that don't buy baskets anymore but bring plastic bags back from the market. Abdul, the manager of a company is commenting on the plastic bags and prepaid cell phone cards that are littered in the streets and block the drainage system. According him, people used paper bags before. Furthermore one of the key-informants working in the environmental area has a different view on changing objects in the waste:

> '[The waste is changing] considerably. The consumption is enormous. There is a lot of consumption of objects and products such as cans and plastics. Before, we didn't have plastics. People didn't use plastics, they used baskets.'

(Head of environmental studies at the university in Xai-Xai)

According to this key-informant, the items in the waste of citizens started to change after the civil war in 1994. The councilman is confirming this:

'Now we have more waste because during the war there was nothing available, no chicken, no rice, no clothing. Right now, there is a market.'
(Councilman of the municipality Xai-Xai)

The Head of the Waste Collection Department mentions differences in waste but then on neighborhood level. He mentions that in the upper part of the city more organic waste can be found such as sand, tree leaves and rests of plants while Cidade in the low part, more commercial items can be found such as plastics and papers.

In only one situation dangerous types of waste was talked about. In the focus group hospital and industrial waste were mentioned as well as batteries and plastics. The discussion continued by stretching the importance to separate these types of waste from more regular waste in order to protect the environment.

Analysis
The United Nations describe municipality solid waste as 'waste originating from households, commerce, and trade, small businesses, office buildings and institutions (schools, hospitals, governmental buildings). This includes bulky waste and waste from selected municipal services, e.g. waste from park and garden maintenance, waste from street cleaning services (street sweepings, the content of litter containers, market cleansing waste), if managed as waste (United Nations quoted in Moore, 2011)'. Moore is commenting that the last words of this description 'highlight the importance of the social context in deciding on what is and what is not garbage: waste is waste when it is managed as waste (Moore, 2011)'. So what the citizens of Xai-Xai perceive as waste is apparently what they manage as waste. In this case it is leaves of trees and other organic materials.

Observations of citizens' waste and data on waste characteristics of Maputo waste (figure 2) do support citizens' perception that the main part of waste is indeed organic. However Maputo with a population above 1 million inhabitants can be considered as an urban centre city, the percentage of organic material still forms the mayor part of the waste. The percentage of organic waste Xai-Xai as a more 'rural' city is assumable equal or even higher.

	Cement city (%)
Organic material	67
Glass	4
Metals	2
Plastics	10
Paper	13
Dust, sand	0
Rest	4

Figure 2: Maputo waste characteristics
(Source: Joaquim Stretz, municipality of Maputo, Seminar on Urban Waste Management on 26th of November 2010 in Chókwè)

Two considerations related to this issue of waste characteristics are housing and the standard of living. Concerning the housing, the majority of the citizens of Xai-Xai live in freestanding houses either from stone or reed surrounded by large gardens. In almost every garden trees can be found to provide families with shade as well fruits. While tree leaves, branches and/or fruit fall down continuously, this type of waste is managed on a daily bases.

The second aspect is the standard of life. As UNEP describes, the characteristics and quantity of waste can give an impression of the living standard and lifestyle of people. A large number of Mozambicans live close to or below the poverty line. According the World Bank in 2003 this percentage was 55.2 (World Bank, 2010). The Gross National Income per capita for Mozambique in 2008 was calculated on 380 US dollars. Which such a low income, the question is if you can speak of improving income that lead to different consumption patterns.

Concerning the standard of life, other data show that agriculture is the main activity for citizens in Xai-Xai . Around 60% of the citizens do live from agricultural activities (WAPCOS/SULABH, 2008). Several respondents confirm the low standard of life. However the economy is growing yearly, citizens apparently still do not have the money to buy items; they survive from agriculture activities and do not see a change in the waste they have. In several interviews, the interviewer was asked for employment and the strenuous circumstances of living were mentioned. The low standard of life is for many citizens the reality and from that reality waste is framed. In that way, it is not unusual that plastics, cans and other non-organic materials in first instance not are mentioned as waste. Besides the low standard of living that goes with a low consumption of non-organic products, probably more reuse takes place. The following subchapter will go into the issue of reuse.

Citizens of the city of Xai-Xai perceive waste as tree leaves and other organic materials. It is how citizens perceive their reality. This frame can also be seen as the dominant frame. Just a few citizens comprehend waste differently. Those who hold another broader frame on waste are either citizens with a higher income or in waste management or environment involved interviewees.

For changes in the waste volume doesn't exist one dominant frame. For some the volume decreased, for others it increased while others didn't see any change. Many respondents relate changes in volume to activities in their garden such as cutting or planting trees. The majority beliefs the type of waste didn't change over the years. Only a few saw a change of the types of waste people posses; objects changed from organic to non-organic material. Furthermore the higher consumption level was mentioned.

Between what citizens told and what could be observed there were some differences. The respondents, who mentioned that they only had organic waste, could be found with different kinds of non-organic waste such as plastic bags, bottles and cans. Klandermans suggest that the frames people hold are so obvious to them, that others aspects are completely overlooked (Klandermans, 1992).

4.3.   When is waste considered as waste

To analyze when waste is considered as such, respectively the utility of waste, the economical value of garbage and the daily sweeping activity are looked at.

Utility
Related to the question what kind of waste exists in the city of Xai-Xai, it is interesting to know how citizens perceive waste. When is waste waste? In general the citizens are uniform in their answers. Waste is waste when it doesn't have any utility or is of use anymore. The unemployed citizen Jito commented that his old worn-out shoes would go into the pit if they would be '*podre*'; but it wasn't time yet, he was still using them. Nhantumbo, a company owner in Patrice Lumumba brings empty bottles to the *mato* because the bottles do not have utility anymore.

> 'Waste doesn't have any utility and because of that people throw it away.'
> (Tina, administrative employee, Inhamissa)

But what is waste for one person isn't it for the other. In the focus group the theme was also discussed:

> 'What is waste? For me, in my point of view, it depends of the person. What is waste for me isn't waste for you.'
> (Fabião, electrician, focus group discussion)

And

> 'When we are going to buy a garment or a 2M beer, they always give us a plastic bag. These bags, the first time you take out the garment, it could be waste for some persons. But for me it isn't, no, when I still can use it tomorrow.'
> (Filomena, student, focus group discussion)

The concept of utility is thus a personal issue. Choices if an item is waste vary from person to person. Where citizens understood the concept of use and utility, several respondents had problems to grasp the words reuse, reutilization and/or recycling:

> Interviewer: 'Do you have items that you reuse or reutilize; items that you use another time?'
> Interviewee: 'That I take out of the waste bin?'
> Interviewer: 'It is not yet in the waste bin. It could be waste, but you still can use the item in another way.'
> Interviewee: 'No.'
> (Angelina, administrative employee, Praia)

After an example of the reuse of a water bottle and a rephrasing of the question applying the word of 'use', the interviewee affirmed:

> Interviewer: 'So you use it [the water bottle] more than once?'
> Interviewee: 'I use it more often, I wash it, put water in it, but when it is tired I throw it away.'
> (Angelina, administrative employee, Praia)

Around utility and usefulness many examples came up. Examples came up spontaneously as well after interviewees specifically were asked. The use of water bottles seems common. As in the example given above, people reuse water bottles to cool water in the fridge. Also tree leaves are used by several interviewees. People put the leaves in a pit, cover them and after a period use it as a fertilizer or as a planting site. Not all the leaves are usable; some leaves do not decompose and are put aside. Others use tree leaves and branches to cover pits and holes that arise as result of intense rains (for more on this issue see subchapter 4.4.4). Food left-overs are used to feed the chickens, geese or pork. For construction several citizens save or collect debris. One respondent and her neighbor came up with several examples of items that still have utility after she already had mentioned that she uses plastic bags to light the fire:

> Interviewee: 'The wrapper of a sweet, kids play with it. They make puppets out of it.'
> Neighbor: 'The tops of soft drink bottles, we save them and use them to play checker.
> Interviewer: 'And cans?'

Neighbor: 'The cans we give it to children so they can make cars out of it.'
(Belinha, housewife, farmer and small sales, Cidade)

Only one of the rich interviewed citizen mentioned that she does not recycle.

'I, do not [recycle]. But I see that other people indeed look for bottles. But I, I never recycle. Here the guards take the bottles, what they do with it, if they sell it, I do not know, but we never have this type of waste in the waste. They give it a destination.'
(Maria, company owner, Cidade)

The well known song 'Xa tuma mwani' of the band Gorowane in the local language of Chope probably gives a good description how utility is perceived. 'Xa tuma mwani' can be translated into 'Still has utility'. It is about a person taking items to his home; items that would be thrown away by others. The text says 'Sorry, maybe that item is not for any use for you, I am going to take that, I am going to use it, and if not then still it can serve for my children.' The song was described by the Head of the Environmental Studies.

A complete different viewpoint of use of waste items was brought up in the focus group discussion. Participants came up with examples in which items that could be considered as waste were used to show off in what he or she was capable to buy:

Fabião: 'I bought [a bottle] of Amarula, I drank it in December and it is still in the cupboard, that bottle.'
Chiure: 'Who goes to Gringo, who goes to Classis, that plastic bag you will keep at a place to show that you bought that proper clothing.'
Paulo: 'It is imported.'
Fabião: 'But this items, can we call it waste or not?'
(Focus group discussion)

The participants concluded that the packaging matters to consider an item as waste. Nice packaging or packaging from 'famous brands' were not thrown away. In that way it still has utility.

The economical value of waste
Waste and utility can also have an economical component. However not as extensively as the examples of reuse, a broad range of perspectives on economical value exists in the city of Xai-Xai. Some respondents were not aware that waste can have an economical value while one respondent had a business in buying up used glass bottles, scrap metal and cans. Tina and her brother bought up waste from neighbors. Their garden was a kind of collection point where citizens and especially children passed by to sell items and buyers from the capital Maputo and the Northern city of Tete passed by to buy the stuff. Tina knew exactly where the items were going to, the prices of the different items as well mentioned the possibility to collect plastics however they didn't collect the latter. Knowledge on the economical value also exists with the two municipality workers that collect the waste on the tractor. During the waste collection they separate plastic bottles, small non refundable beer bottles and scrap metal.

Interviewer: 'Today I saw you came back [from waste collection] with a bag with bottles.'
Translator: 'They collect them to sell.'
Interviewer: 'Ah, to sell it. Thus some waste has an economical value?'
Waste collector 1 and translator: 'Sim!'
Translator: 'They sell it to get at least *qualquer coisa* to buy bread.'
(Waste collector 1 of the municipality and translator also municipality worker)

The examples of Tina and her brother and the municipality workers show different activities of different actors on collecting waste items to resell them. Other citizens were aware that waste can have an economical component but were unknown with the fact that in the city of Xai-Xai waste was already collected for that reason:

> 'I believe it is a lack of ideas. Maybe no one discovered that waste has a value. That waste can give employment. I guess it is the lack of experience.'
> (Nhantumbo, company owner, Patrice Lumumba)

 And

> 'I do know waste has an economical value but here in Mozambique we do not have favorable conditions. Everything, for example, boxes, plastics, bottles can be regained. Iron. But here in Mozambique, we take it and throw it immediately in the waste. We do not know how to transform those items.'
> (Jaimen, unemployed, Inhamissa)

Not only non-organic items were specified as having an economical value. The leaves of trees produce fertilizer and were mentioned by a few respondents as economically valuable.

> Interviewer: 'Do you know waste has an economical value?'
> Interviewee: 'Sim.'
> Interviewer: 'What is it?'
> Interviewee: 'With waste I can for example extract fertilizer. Lettuce produces well with fertilizer. Lettuce, cabbage.'
> (Belinha, housewife, farmer and small sales, Cidade)

Waste and sweeping
In several cases the action of sweeping the house and garden seem to be important to understand to the concept of waste:

> 'My grandchildren wake up in the morning, take the broom 'chu, chu, chu' and sweep, they gather the waste and put it in the bag.'
> (Veronica, retired, Cidade)

And

> Interviewer: 'What makes something waste?'
> Interviewee: 'When we sweep we leave it in the waste pile.'
> (Tina, administrative employee, Inhamissa)

Several citizens mention spontaneously the sweeping in the morning as part of the waste collection. Also the municipality waste collector Boca is following this way of thought. According him, the waste is the same per neighborhood because people sweep the houses where the same type of tree leaves fall.

Analysis
The online dictionary Lexio describes waste as that what is thrown away because it is of no use (www.lexico.pt). As could be read in the former subchapter waste can be seen as waste if managed as waste. Moore explains this by the example of an empty soda bottle: where one person will throw it away, the other takes it out of the bin or picks it up from the street and will use it. 'The point is that

thing can alternate, in the course of their social lives, from trash to treasure, useless to useful, valueless to invaluable, just as easily as they can go in the opposite direction (Moore, 2011).'
In short, the concepts of uselessness to useful vary from person to person. The perceptions of interviewees and the participants of the group discussion support this view. Also observations of citizens on street and beach and of co-workers of the municipality during waste collection confirm that an item for one can be trash but for the other can be of value. That items still have a value also could explain the general ignorance of words as reuse, reutilization and recycling. For the majority of the interviewed citizens it is either useable or not. The use of 'second hand' items is as normal and pervasive that it is not considered as 'reuse'.

A lot of items do have a 'second or third life'. A broad number of items were mentioned related to reuse, from plastic bottles, plastic bags, tree leaves to bottle tops. Only one rich citizen mentioned she didn't reuse but her staff did. The broad number of items that are 'reused' can probably also be related to the standard of life. If people do have a low standard of life, items can be seen as more valuable. The UNEP mentions the relatively high amount of recovery or re-use of waste as a pattern in development countries. The report also indicates that especially in peri-urban areas bags, bottles, textiles and cans are re-used for domestic purposes. In the high-income areas, recovery is carried out by domestic servants. (UNEP Volume 2, 2005).

Last but not least, several people were talking about sweeping when waste was discussed. The online dictionary Priberam is supporting this association. The first interpretation for the Portuguese word for waste 'lixo' is described as 'that what is swept with a broom' (www.priberam.pt). It also confirms the interpretation of Moore who perceives waste as what is managed as waste. For almost all the citizens first thing what is done in the morning is the sweeping of the house and garden either by themselves, the children or member of the staff.

In short can be said that an item is considered as waste when it loses its' utility. At least it is the way how citizens frame waste items. The moment an item or commodity becomes waste is a personal matter and largely can differ; only the person can decide when that moment is there. What is waste for one person can still have utility for the other.
Furthermore can be concluded that words as reuse, reutilization and recycling are not well known in the city of Xai-Xai. Citizens apply the word 'use' instead of 'reuse'. In the city a considerable number of items are used by the majority of people for a second or third time till the item it is 'tired'. While some of the citizens know waste can have an economical value others were unaware of this fact or unaware of the fact that on city level already several citizens are involved and consider the collection and sale of waste items as a business. Last but not least the sweeping of the house and garden seems to be necessary to understand how citizens perceive waste: waste is what is being swept in the morning.

4.4.   Waste as a problem

The starting point of this research on behavior and waste management was the perspective of the Mayor. She pointed out that she didn't want to be the Mayor of the dirtiest city in Mozambique. During the sanitation commission with participants from the municipality and the community she repeated the same message a bit more softly:

> 'It is bit bothering when a city is not clean.'

And

> 'It is our responsibility to do it. So that malaria disappears, that cholera disappears in the city. That waste isn't visible by those who pass by in the neighborhoods. That is our responsibility and in particular that of the municipality.'
> (Mayor of the municipality of Xai-Xai, sanitation commission)

The mayor sees waste as a problem and connects it with diseases. Furthermore she does want to have waste out of sight. The central question of this subchapter is citizens' frames of waste as a problem. Successively will be discussed the problems that citizens perceive around waste and health, the cleanness of the city, the paying of a tax while not receiving the waste collection service and the access of roads. In the last part of this subchapter an overall analyses will be made of the cities' waste problems and the different frames actors hold.

4.4.1. Waste and Health

On the level of the city of Xai-Xai waste is firstly related to tree leaves and secondly to diseases. When being asked if waste is a problem, two third of the respondents spontaneously came up with the waste, insects and health sequence. Citizens' reactions varied from the simple statement that waste causes sicknesses to a thorough description on what happens when waste is kept in the open:

> 'Waste is a problem in the time of cholera. The period of mangos that's coming now, a person eats a mango and leaves it the *qualquer maneira,* flies. That fly is going to intersect with dirt and will stay in the water. Then you got the problems. You will get diseases.'
> (Soto, housewife and farmer, Praia)

And

> 'I hope the municipality will start with waste collection. It will avoid flies in the house. We have many flies, we have many mosquitoes. Waste induces more flies and mosquitoes. In that way, it is easy that people get diseases like cholera.'
> (Eugenia, housewife, Inhamissa)

As the examples illustrate, citizens talk about flies and mosquitoes which causes diseases such as cholera. Also malaria and diarrhea were brought up regularly as waste related diseases.
In the group discussion waste and health was debated on a more general level:

> 'It is a threat for the public health to have waste on that site!'
> (Filomena, student, focus group discussion)

And about a situation in a neighborhood where the municipality tried to dump some waste:

> 'And thus [the municipality] is bringing that bad smelling waste to our neighborhood. Aren't that diseases? Is that sanitation? They are not collecting the waste; the dumping is a provocation. It is diseases!'
> (Cathelina, employer of a NGO, focus group discussion)

In other settings the waste and diseases connection is affirmed. The national newspaper Noticias published several articles on cholera cases that appeared after severe rains in January and February 2011. One of the articles shows a picture of waste collection and has as subtitle: 'Habits of hygiene and cleaning can avoid the breakout of colera' (Noticias, 6th of January, 2011). Waste is framed as one of the causes of the disease and becomes part of the broader term of sanitation.

In the *codigo de posturas* of the municipality of Xai-Xai, waste is part of the chapter on public hygiene and environmental protection. The municipality is obliged to undertake action to guarantee public health. The code mentions education and monitoring as means to achieve that goal (Municipality of Xai-Xai, 2003).

Where diseases caused by flies and mosquitoes were mentioned frequently, just a few respondents mentioned that waste can harm or injure people. Paula, inhabitant of Cidade mentioned the broken cans and bottles that cut children and could create diseases. In an informal chat an employer of the urban drinking water supply mentioned that her co-worker was at home. She cut her foot badly on a glass bottle and couldn't walk.

The strong connection that people hold on waste and diseases is supposedly the impact of years and years of health campaigning and the main discourse in politics and media. Mozambique as a development country has been and still is confronted with high mortality rates due to endemic and epidemic diseases. Right now the national government is executing the Action program to Reduce Poverty (PARPA) and one of programs' priorities is healthcare (Ruigrok, 2005). The strategic plan of the municipality of Xai-Xai also considers health as a top priority (Municipality of Xai-Xai, 2009).

Health campaigns date back from decades ago. Several interviewees refer to Samora Machel, the first president after independency in 1975. Samora strongly promoted health and hygiene. One of the key-informants mentioned a speech he held in Maputo:

> 'He was promoting to kill flies in the city. Samora Machel told us that every Mozambican had to kill at least a number of flies per day. Why? Because Maputo started to lose its' beauty because of the waste. He went to the square and started to speech which started at 10 hours and ended at 16 hours. Next day he continued. Every secretary [of a neighborhood] together with the neighborhood' inhabitants had to start cleaning, to sweep and collect the waste.' (Journalist, Radio Mozambique in the province of Gaza)

In the newspaper Noticias the head of the Maputo city Health Department Alice Magaia, is commenting on the fact that Maputo did not have cases of cholera in 2009 and 2010. She believes that the messages of washing hands with soap after using the toilet, washing food that is not cooked and the treatment of waste are 'coming through' (Noticias, 6th of January, 2011).

Health campaigns were held and are still being executed by local, national and international governmental and non-governmental organizations. In February 2011 the municipality started a sanitation commission to promote health in the broad sense. The establishment of the commission was an assignment given to the Municipalities by the Ministry of Health and is a reactivation of the former commissions that functioned in the time of Samora Machel. The commission is meant to transfer knowledge on how citizens have to deal with waste and waste water (Ministry of Health, 2010).

Analysis
A strong and almost unique frame exists around waste and hygiene. The citizens of Xai-Xai as well as actors in the public and political discourse frame waste as the cause of sickness. It is a frame that at least came up after independence and is hold by a majority of citizens. The frame assumable included the necessary actions about how to manage the waste in such way it doesn't attract insects.
The framing of an issue in a certain direction to activate and mobilize people is noticed by different scholars (Gray, 2003, Marullo 1996 both quoted in Idrissou et al, forthcoming). It is seen as a strategically form to persuade people into a certain direction (Shmueli et al, 2006, quoted in Idrissou et al, forthcoming) and can be called interactional framing. The examples of Xai-Xai and in a broader

context Mozambique in which waste already for years is framed as the cause of diseases for which citizens should undertake action could be seen as such a form of framing.

4.4.2. The cleanness of the city

To figure out citizens' frames on waste and in particular littering on city level, they were asked if they perceive the city as clean or dirty and if this perspective changed over the years. Comparisons were made between the city of Xai-Xai, Maputo and South-Africa. A blurred picture arises.

A cleaner city, or is it dirtier?
Of the 20 interviewed citizens a small majority perceive the city as clean:

> 'It is clean, because the municipality is almost cleaning daily, even Cidade.'
> (Tina, administrative employee, Inhamissa)

And the city is getting cleaner:

> 'Nowadays we do not have dirt. Before we had mud, dirt, cesspits, but now when we are there, we can enter the city on flip-flops while in that time we had to arrange boots.
> (Jito, unemployed, Cidade)

That the city is getting cleaner is connected with Municipalities' efforts. Citizens mention the sweep activities of the ladies at night in the Cidade area and refer to the waste collection with the tractor.

A small minority of the respondents didn't have a meaning or were in doubt if they would call city clean or dirty. The other minority finds the city dirty.

> 'The city isn't clean. For example over there, where the market is, there you can find loads of waste close to the things we eat. Loads of waste.'
> 'When you go now, in the rainy season, it is worthless.'
> (Carla, maid, Patrice Lumumba)

Especially when this group that perceives Xai-Xai as dirty starts to compare the city of today with the city just after independence they feel that there is a difference. Remarkable is that it are mostly rich people mentioning the difference as well as the key-informants. They all denote the important role of the first leader of the country Samora Machel. On the point of cleaning, the former President was demanding. He was the one that introduced collective cleaning days. An illustration is given by one of the key-informants:

> 'Before the war, the public space was much cleaner. In that time, Mozambique had a one party communistic system. Cleaning days were organized in which one family member per family had to participate. This was obligatory. If a family didn't participate they were punished for example by not getting bread for one day. Or they were denied to travel because you only could travel if you had a letter of the head of the village. With the introduction of democracy, the collective cleaning died.'
> (Geraldo, NGO co-worker in the province of Gaza)

Different perspectives exist why the city becomes dirtier. Beside the end of the collective cleaning days Maria, company owner is referring to the moral values that disappear as well that children are not educated on that point. Carla suggests that the city is dirtier now, because there are more people that came to live in the city. She also suggests that people do not have the habit to keep waste with them till they would find a waste bin.

Abdul, the manager of a company believes that people from the rural areas dirty the city. He also mentions that nowadays other types of waste can be found that make the city dirty. The paper bags they used before, when they came in contact with water disappeared in contrast with the plastic bags that nowadays block the drainage system. Furthermore Abdul comes up with the absence of monitoring and fining. The work of the municipality and the municipality police is hardly monitored. He believes that you only can change the working attitude if peoples' work is controlled on a daily base. Also the utility of means can be improved if you monitor how the means are used. The manager talked about the dirtiness of the city with the mayor of the city:

> 'Look at how dirty it is beyond the Catholic Church. It is a shame! I talked with the mayor about this but so far I do not know what happens. Maybe my requests didn't arrive at the right place.
> (Abdul, company owner, Cidade)

The citizens with the opinion that Xai-Xai is dirty or becoming dirtier didn't seem to be angry; they rather appeared resentful or disappointed with peoples' behavior. They do not seem to understand why people do leave waste on the street, in the public places and on the market:

> 'The municipality does everything, but we are the guilty ones. We, the people! We do not take care of the market.'
> (Carla, maid, Patrice Lumumba)

And:

> 'I am one of those persons that want to see the city cleaner and better organized. The country, that is our image, our business card. After all, it is here where we life and pass the most part of our time.'
> (Maria, company owner, Cidade)

However respondents differed on their perspective of cleaness of the city of Xai-Xai and the evolution of that, they were unanimous about peoples' street behavior. People do litter, they throw away things the *qualquer maneira*. Littering and possible explanations for that behavior will be the central theme of the subchapter 5.3.1. In that subchapter also a number of interactions between citizens are described in which some citizens commented on others' littering behavior and experienced a kind of aggressive or arrogant reaction.

South-Africa and legislation
With some of the respondents, those who travel, the cleanness of the city of Xai-Xai is compared with that of Maputo and South-Africa. Where Maputo is mainly framed is a dirtier city, South-Africa is considered as clean. Legislation, the monitoring of it and having means are considered as the main reasons for a cleaner South-Africa.

> Interviewer: 'Is there any difference between Mozambique and South-Africa in relation to waste?'
> Interviewee: 'There is a lot of difference. In South-Africa it is clean. On the roads you find waste bins to put the waste in. People do not throw waste away the *qualquer maneira*. If you only have a paper, you must put it in the waste bin.'
> Interviewer: 'Do you know why this difference exists?'
> Interviewee: 'I do not know, maybe it depends on the conditions of the country.'

And

> Interviewer: 'I heard that in South Africa exists a law that prohibits littering the *qualquer maneira*?'
> Interviewee: 'Yes, I heard that as well. That person, that leaves waste the *qualquer maneira* can even end up in prison.'
> (Eugenia, housewife, Inhamissa)

All the Mozambicans that travelled to South-Africa knew about the legislation and fining system. Citizens mentioned that they even get fined if you would throw away a wrapper or a beer can out of the car window.

The actual knowledge of respondents on legislation on littering in the public space in Mozambique and in particular Xai-Xai was pretty unknown. Of the interviewed citizens just a few indicated the existence of rules, regulations or a system of fines. According Abdul, the company manager Mozambique only had fines before independence. Persons that know about legislation are those whose positions require having this knowledge like the municipalities' councilman, head of the waste department and the head of the municipality police. Furthermore the head of environmental studies was aware of the existence of legislation.

Respondents do though believe that legislation and fines are useful to discourage littering. In relation to the behavior change one of the participants of the sanitation commission said:

> 'We have to become disciplinary, we have to oblige the people and start with applying fines.'
> (Artur, sanitation commission)

Other participants of the sanitation commission supported his proposal of applying fines. Fines are seen as a good method to stimulate non-littering behavior but first people have to be informed and educated. The head of the municipality police suggests starting with civic education. He believes that the actual fining system is working normal, but couldn't provide data on the number of fines and the type of violations related to littering.

The limited existing knowledge of legislation on littering in Xai-Xai is likely related to the limited execution of fining. Company owner Abdul already mentioned the lack of fining as reason for a dirty city. In the city no stories exist about fining. In Xai-Xai however citizens are familiar with the South-African fining system. Many citizens do have family members working in South-Africa and hear their accounts as well experienced the neighbor country themselves.

Analysis
The cleanness of the city of Xai-Xai gives a blurred picture. Different interviewees in the city keep different realities on the issue; where some find it dirty, others say that the city is clean and getting cleaner. Dewulf et al. remarks that different equal plausible frames can exist side by side. Different frames about the same issue leads though to ambiguity. According the scholar ambiguity gives opportunities for negotiation and is even needed in a process for change. 'Some or all parties will probably have to revise, enlarge or reframe the way they relate to the issues and to each other, in order to create a vocabulary that can support mutual understanding and common action (Dewulf et al., 2005)'. Interesting in this aspect is the action of interviewee Abdul trying to negotiate support from the mayor for cleaning of the area beyond the Catholic Church. This could be seen as an action to create a common action. The main question though if other actors holding frames of a clean city also can be involved in the discussion around the cleanness of the city.

4.4.3. Paying the waste tax without collection service

Where citizens are divided on the issue if the cleaness of Xai-Xai is a problem, they are almost unanimous on the issue of the waste tax. The waste tax is a tax that automatically is discounted on the energy bill. The tax is meant to finance the waste collection and the cleaning of the city. All the citizens that own an energy connection pay although in many cases waste is not collected or it is collected irregular. In those cases citizens are unhappy and even upset with the tax:

> 'You see, we pay always. I paid this time. When I pay, if you pay for the service it is 20 Metical (circa € 0.48). It is a lot because I am paying for a service that doesn't come. I am paying for an unfair work.'
> (Samuel, governmental employee, Inhamissa)

The issue is a 'hot' issue. Without being asked citizens mention the issue in the first answer of the interview:

> Interviewer: 'What kind of waste do you have?'
> Interviewee: 'Here we have grass which we leave to decompose and then burn it. Those of the municipality receive the waste tax but when you call them they refuse to come.'
> (Alberto, different temporary jobs, Praia)

People talk about the waste tax with emotion. During the interviews respondents return several times to the unfair issue of being discounted without having a service and emotional words are used to comment on the tax:

> 'I insist the municipality comes here to collect waste because now I am paying money for nothing'.

> 'We talk with the neighbors, we are complaining in this area. We are suffering a waste tax, but the municipality is not entering.'

> 'Our problem is, we are crying, about this money that goes out.'
> (Jito, unemployed, Cidade)

The journalist of Radio Mozambique is confirming the existing agitation:

> 'We have contributions of citizens by telephone: 'We pay taxes, the waste is in front of our houses, but the municipality is doing nothing'. A week doesn't end without having broadcasted at least two new items on waste.'
> (Journalist, Radio Mozambique in the province of Gaza)

Paying for nothing is not the only argument to be agitated. Citizens talk about the little space they have left in the garden to make a pit, that they are left with the smelly waste that does attract insects and thus diseases. The councilman of the city agrees on citizens' complaints:

> 'When you pay this tax, you expect a certain service, but the municipality is not able to provide this service yet. The municipality does not cover all parts of the city. So the complaint is true.'
> (Councilman of the municipality, Xai-Xai)

The existing knowledge on the tax, the height of tax and how often it is paid gives a blurred picture. Some citizens do know exactly how much they pay, others were searching the bill to find out, some didn't know. Some believe the height of the tax is a lot, especially when waste is not collected, some believe it is normal. No one mentioned that the service of 20 Metical (circa € 0.48) per month is cheap. Most were acquainted that the tax was discounted on the energy bill.

Unknown was the fact that the tax is not only used for waste collection as well for city cleaning. The only person who came up with that point was the mayor. In the sanitation commission she explained that people have to pay the waste tax although there is no waste collection service in every part of the city:

> 'The waste tax is not only paid for waste collection. Many people make waste. Sometimes you even can't believe it.'

> 'We have to collect the waste of the city.'

Later she added:

> 'The waste tax is not covering the cost we are making. It is not covering. So we will have a war. People have to pay the tax.'
> (Mayor of the municipality of Xai-Xai)

Considering the remarks of citizens as well of the mayor it appears a situation of incomprehension. The angry citizens do not understand why they have to pay for a non-existing or irregular waste collection service while the mayor doesn't comprehend why citizens are upset to pay the tax that is used for the cleaning of the whole city. To provide a service the mayor needs citizens' financial participations which on this moment do not even cover the costs.
The cause of incomprehension can probably be found in the limited and inadequate communication of the municipality. However regular meetings are held between neighborhoods and municipality apparently no satisfying answers are given or even worse. In a meeting between the municipality with the inhabitants of a kind of isolated neighborhood in Cidade, the municipality had said the following:

> '[You have to pay the tax] because when you go to the city, you bring your dust to the city.'
> (Veronica, retired, Cidade)

The population had been furious and according Veronica as well the representative of that particular neighborhood, the municipality had left the meeting in a hurry.

Analysis
The dominant frame of citizens in Xai-Xai on waste tax is one of agitation about paying for a service that doesn't exist or is poorly executed. The majority of the citizens still use 'own' waste disposal methods and pay in their perspective for a non- or limited existing service. The only actor in the entire municipality who tried to reframe the waste tax was the mayor of the city. She took the opportunity in the meeting of the sanitation commission in which different community leaders participate to reframe the waste tax. She obviously was trying to add information to the existing frame of agitation and tried to obtain understanding for her position. Dewulf mentions the importance of negotiation and emotional confrontation as important elements in the whole process of reframing (Dewulf et al, 2005). If the mayors' attempt can be seen as a negotiation and can lead to a shift of frames, is hard to say. During the meeting she explained her perspective on the reasons and importance of paying a tax but there was no confrontation. Contrary to the emotional reactions of

respondents in interviews, the participants of the sanitation commission didn't react, critic her explanation or try to explain citizens' agitation.

The example of the isolated neighborhood in Cidade unveiled a confrontation between the municipality and citizens. If these confrontations are regular and terminate with participants leaving without finalizing the debate can't be affirmed. The tension indisputable exists.

4.4.4. Waste and Roads

In the city of Xai-Xai waste as a problem is connected with road problems. The problems vary from waste used to level eroded roads, the blocking of drainage systems due to littering and the bad access of roads so waste can't be collected.

However some of the interviewed citizens framed waste as useable to cover the pits and depressions made by intensive rains, others perceive this way of erosion solution as a problem. In the focus group Paulo mentioned the problem in the perspective of giving the bad example:

> 'The municipality is collecting waste; two meters further on in front of a house they already dump it because there is a pit with water, because the rains opened a hole. There you will find all types of waste. The municipality only drains it. Children will play there. For me this is not convenient. Children will grow up knowing that waste isn't bad, you can leave it on the street.'
> (Paulo, student, focus group discussion)

Cathelina, a trainer for a NGO-organisation on sanitation and participant of the focus group commented that waste used for close erosion pits brings diseases with it (subchapter 4.4.1). For that particular reason she and her neighbors had stopped the municipality workers that same morning from dumping waste in an eroded part of the road of her neighborhood.

Paulo came up with the problem of littering:

> 'You see, when a wrapper isn't considered as waste it will have consequences. It will enter drainage systems and block it. But people, they do not have this knowledge.'
> (Paulo, student, focus group discussion)

The problem of road access and waste has two variants. In the first variant the roads are not accessible because not maintained by the municipality:

> 'Why doesn't the [municipality] tractor doesn't pass here? The municipality has to do what? They have to arrange the road. In the colonial times we had a road here up to there. When the car of the municipality could pass here it would be easy for them to pass here and collect the waste.'
> (Belinha, housewife, farmer and small sales, Cidade)

In the second variant, the municipality cannot access the road because people have put their waste out:

> 'The municipality is not coming, they are not collecting waste. Because of the waste, roads close down. One neighborhood after another, for example in Marien Ngoby, that zone of Patrice Lumumba, the roads do not exist any longer because of the waste, no one takes it away and there is no space left to pass.'
> (Journalist, Radio Mozambique in the province of Gaza)

The access of roads has to do with urbanization, the type of roads and the erosion solution. The city has some very well organized neighborhoods with wide roads while other parts seem to be urbanized spontaneously. In the latter case it means that the roads are small or rather are footpaths; the houses therefore are not always easy or not accessible for cars and thus waste collection.

The majority of roads in the city are unpaved and constructed of the same soil as the surrounding gardens. Only the main street, some parallel streets in downtown Cidade, the road to the regional hospital and Praia are paved. Especially after severe rains the unpaved roads suffer erosion in the upper part of the city and silt up in the lower part. Citizens as well the municipality, cover and drain the pits by using waste.

Analysis

Problems related to waste and roads are as diverse as the perspectives citizens of Xai-Xai hold about the cleanness of the city. For some citizens problems around roads and waste are a daily reality; others do not mention it at all.

The interviewees that perceive a problem ascribe these towards different actors and different reasons. Citizens and the municipality are blamed for putting or dumping waste on the street. The municipality is not maintaining roads and citizens spontaneously inhabit parts of the city in an unorganized way so neighborhoods could become limited accessible.

The different existing frames also have to do with the locality of erosion and inadequate urbanization. Nevertheless erosion is perceived as a problem. As can be read in subchapter 5.4.1 erosion is even framed as a treat. Especially for those whose houses are immediately affected by erosion, there is a felt tension. The examples of this subchapter show that citizens and the municipality both undertake action by using waste to cover the eroded areas. How far the these actions of using waste for erosion solution will lead to tension and possible negotiations between different actors didn't become clear. Nevertheless a form of ambiguity is noticeable that could lead to interactions between different actors.

4.4.5. Analysis of waste as a problem

In the perspective of both citizens and municipality waste is considered as a problem in the city of Xai-Xai. The problems as described in the former subchapters focus on waste and diseases, the cleanness of the city, the payment of the waste tax without a service and the complicated roads access. The difficulties are divergent and sometimes intertwined. In this subchapter the different existing frames of citizens and municipality will be analyzed and the interaction between different frames. For the analysis the concept of chaos and order will be used.

An almost unanimous perspective of citizens and the municipality exists around the problem of waste inducing sickness. The existing frame seems to be strong and enduring and tries to activate people to deal with waste so that it doesn't attract insects. Supposedly the perspective of the governmental actors is dominating in this frame.

For the problems around the cleanness of the city, the payment of the waste tax without a service and the complicated roads access different conflicting perspectives do exist on the level of the city. In the case of waste tax, conflicting frames can be observed and heard between the municipality and primarily the citizens without waste collection service. The different perspectives on the cleanness of the city and road problems live among the citizens themselves as well between citizens and the municipality. The research identified tension, agitation, critics and emotion around those three problematic themes.

The consequent question is whether or not different actors holding different frames will be capable and willing to debate with each other to come to a shared understanding, i.e. a reframing of the

problems (Dewulf et al, 2005). A possible way to answer this question for the case of Xai-Xai is to look more closely at the kind and number of interactions between actors. The nature of the interactions could be an indicator for a society, organization or community in a status quo or contrary in a status of chaos. According the theory on chaos and self-organization interactions with outsiders or actors holding different frames are required to change a system. If a system, an organization or community is stagnant or frozen and just a limited number of interactions take place with citizens who hold different views, it is hard to make a change (Gilchrist, 2000).

In the former subchapters on waste as a problem several interactions came up. Cathelina mentioned her action in which she and her neighbors stopped the municipality workers of dumping waste on an eroded part of the street; Abdul talked with the mayor about the cities' dirtiness beyond the Catholic Church. Diverse community meetings were held in which the waste tax was discussed. Citizens who addressed other citizens on their littering behavior got aggressive or arrogant responses. Last but not least, citizens discuss waste problems such as erosion and the waste tax with their neighbors.

Two types of interactions seem to take place; firstly interactions between actors who hold a similar frame can be distinguished and secondly interactions of people holding opposite frames could be identified.

In relation to people who hold a similar frame, the remark citizen Jito made is illuminating:

> 'We talk with the neighbors, we are complaining in this area. We are suffering a waste tax, but the municipality is not entering.'
> (Jito, unemployed, Cidade)

Apparently he discusses the problem with peers; with people who live in the same area and not with representatives of the municipality. Similar types of interaction of different actors holding a same frame were brought up by Abdul and appeared in the sanitation commission. Abdul discussed the littering of the area behind the Catholic Church with the mayor. Both Abdul and the mayor hold the same opinion of a dirty city in which the littering has to be stopped. In the sanitation commission the need for a fining system was discussed in which participants agreed on the introduction and importance of fines. The examples show that discussion take place but apparently with citizens that hold the same opinion.

Opposite and conflicting frames could be distinguished in community meeting such as in one of the more isolated neighborhoods in Cidade where the representatives of the municipality explained that citizens have to pay a waste tax although no waste collection service is executed. The municipality representatives had explained that citizens have to pay the tax because when they visit the city they bring dust to downtown. Cathelina her action against the dumping of waste on the road by municipality workers can be seen as an example of a conflicting frame. The reaction of her and her neighbors had ceased the waste dumping; the collectors had left the scene while taking the garbage with them. The citizens that request other citizens not to litter and the aggressive or arrogant response can be seen as actors holding opposite frames.

As the examples demonstrate, in the case of Xai-Xai both types of interactions can be found of different actors retaining a similar frame as well holding opposite frames. The question then is it is possible to state whether the nature and the number of interactions are in a form of status quo or a moving state. Based on the existing data it seems complicated to predict if the existing conflicting frames will continue in the existing form or shift. First the number of conflicting frames seems to be limited. Second, the interactions should be observed and analyzed over a longer period. Maybe a change only can be analyzed in retrospective (Morgan, 1998).

Nevertheless the research identified a number of interactions between actors holding different frames. In the interactions tension, agitation, critics and emotion arouse; requirements that

according the theory on chaos are essential to change a system, community or organization. As far can be distinguished the number of actors proposing a change in relation to the waste tax seems to be considerable and both citizens and the municipality are involved. The number of people that promote a cleaner city and roads appears to be relatively small. The people holding this frame seem to be from the top of the municipality as well the richer citizens.

5. Waste management at different levels

5.1. Introduction

In the former chapter the perceptions of citizens and the municipality of Xai-Xai in relation to waste have been described. It is about how different actors frame waste; about how they talk and write about the issue.

This chapter on waste management will outline mere behavior. It is about the activities and actions of both citizens and the municipality of the city of Xai-Xai in relation to waste collection and disposal.

The behavior of the citizens and the municipality will be analyzed on the theoretical concepts of automatic behavior, collective behavior and the enabling environment. The concept of automatic behavior is about the conscious or unconscious way a person decides about an action and the repetitiveness of that action. Collective behavior studies the actions and activities of a group of people and how members in a group influence each other's actions. The concept of the enabling environment is about the influence of the environment on people's behavior.

The analysis is based on the data of the 20 interviews with citizens, the 6 interviews with technical and administrative staff of the municipality, the 4 interviews with the key-informants, the two group discussions and informal chats. Furthermore is observation used as research method; street behavior was observed as well two experiments on littering were organized. Last but not least different documents were scrutinized.

The following subchapter describes how citizens deal with waste at household level. Subchapter 5.3 is about citizens' behavior on the street in which the littering as well collection will be discussed. In the last subchapter municipalities' waste management is analyzed.

5.2. Domestic waste disposal

To deal with waste on household level different actions can be distinguished. Starting point is that a person is holding a waste item and wants to get rid of it. A waste item can be disposed immediately to its' final destination. Sometimes it is put in a temporary place, gathered and finally disposed. However the main focus of this subchapter is on the final disposal some observations will be made in relation to the way items end up in the waste bag, bin or pit. Successively the waste disposal on household level, other aspects of waste disposal of a household and the waste disposal methods of a household in relation to its neighbors will be examined.

5.2.1. Waste disposal methods on household level

In the city of Xai-Xai a broad number of waste disposal methods can be found. Where some citizens burn the waste, others use a pit in which waste is gathered. Some use the garbage to close erosion pits that can be found in the yard or road while others hand it in to the municipality. Also dumping as waste disposal method can be found. Based on the interviews the following overview could be made:

Domestic waste disposal method	Number of interviewees
Burning	2
Municipality service	4
Pit	8
Dumping	1
Combination of methods	5
Total	20

Figure 3
Domestic waste disposal methods of interviewed citizens

The pit
The majority of the interviewees use a pit for domestic waste disposal. One of the interviewed citizens commented:

> 'In the places where the municipality is not collecting, a person will dig a pit and put the waste in.'
> (Jaimen, unemployed, Inhamissa)

The majority of the interviewed co-workers of the municipality and key-informants living in Xai-Xai also had a pit for domestic waste disposal. Using a pit is assumable the general waste disposal for citizens in the city of Xai-Xai.

In general a pit is made within peoples' garden. Some interviewees dig a hole themselves; others contract a person to dig. When the pit is filled with waste and the content is dried, it is burned. This process helps to reduce the volume and thus the number of pits that have to be made. When the pit is filled completely another is made and the old one is covered. Some respondents use the filled pit as a future planting site for banana trees.
According the councilman of Xai-Xai local health commission in the days just after independency promoted the use of pits for waste:

> 'They [the health commissions] were teaching communities to make pits and cover it after use.'
> (Councilman of the municipality, Xai-Xai)

The process of instructing people to use pits is a still ongoing activity in local meetings and through other canals. On a poster made pubished in 2008 by the Republic of Mozambique and Unicef is advised to put waste in a container or a pit which has to be covered with soil. More recently, the Ministry of Health elaborated a manual for the Provincial Health delegations to inform and educate the public (Ministry of Health, 2010). The pit and the handing in waste to the municipality are shown as the methods to deal with waste in a hygienic way.

Municipality service
Four of the 20 interviewees dispose their waste by handing it in to the municipality. In the neighborhoods they life, the service seems to be more or less regular. These interviewees have in common that they are the middle class and richer inhabitants that life in the older neighborhoods. Three of this four are company managers. When asked what they do with the company waste, they all indicated that they deal personally with the disposal. The municipality can't handle the volume and isn't coming regular enough so they themselves dump the waste in the *mato*. The lady company owner contracted a private company to take away the garbage. The other two have their own means of transport to remove it.

Combination of disposal methods

A quarter of the interviewees use a combination of waste disposal routines. This combination can include the use of waste to close erosion pits. Jaimen is using all kind of waste to prevent further erosion of the sandy soil in and around his garden. He uses plastic bags and former rice bags and fills them up with sand. He only hands in waste to the municipality if all the erosion pits are filled up. Using waste as a mean to repair eroded places seems to be a normal activity. Veronica is telling about a neighbor that asked other neighbors to help covering the holes, because erosion was 'threatening' the house. When the national newspaper Noticias reported on severe rains in Xai-Xai the use of waste was described as a normal act without any disapproval:

> 'Even where residents tried to reduce the natural action of erosion by putting waste, it was washed away by the anger of the rain water.'
> (Noticias, 14th of January 2011)

Of the group of interviewees that use a combination of waste disposal methods, several do turn in their waste to the municipality. It depends though on the existence of erosion pits, if a member of the household is at home when the tractor is passing by and if the municipality delays in collecting:

> 'They [of the municipality] should come once or twice per week, but you have weeks they do not pass by at all. When the municipality doesn't appear and I have waste, I put it in my car and leave it on a site which already has waste, here in this zone.'
> (Angelina, administrative employee, Praia)

Three of the interviewees could hand in waste to the municipality but didn't do that. Reasons for not delivering differed. Tina mentioned that the volume of the waste is too large; Francina said she doesn't have a waste bag. Furthermore she refers, like Artemisia to the lack of habit:

> 'The municipality is collecting but here in my house they do not take the waste because I do not have the habit to put it in bags. But they collect the waste. Always! On Mondays, today for example they will pass. '
> (Francina, housewife and farmer, Praia)

Burning the waste

Two respondents burn the waste. They gather the waste on one location and when the material is dry, they burn it. One of them had the fireplace in the garden, the other fireplace was found on 6 meters outside the fence of the household.

Dumping

Only one of the interviewees is dumping his waste. The rural neighborhood of Fenciline, Cidade in which João lives doesn't have a waste collection service. On a daily basis he or one of his kids gathers the waste in a wheelbarrow and brings it to the edge of the neighborhood, to the *mato*. For him the *mato* is a site where no one is living.

Only one method

However on the level of the city of Xai-Xai seem to exist a broad number of disposal methods, on household-level the majority of the interviewees treat their waste only in one way and do that for a longer time.

Analysis of waste disposal methods on household level

Possible explanations for citizens' waste disposal approaches are the existence and regularity of the municipality collection service, the instructions of the municipality representatives, the existing

habits and the necessity of waste for closing erosion pits. Note that the number of interviewees following a certain practice in a certain zone is limited and thus possible not representative.

Whether or not households hand in waste to the municipality seemed largely to depend on the regularity of the municipality collection service. If the service is regular, they turn it in; if it is irregular the interviewees do hold different disposal routines that can include waste collection by the municipality. In general people do not want to stay with the smelling and insect attracting waste. In the subtropical climate with relatively high temperature waste and especially rotten fruits and food left-overs will start to smell and attract insects almost immediately. If the municipality does not appear for a week, people will take their own measurements.

Beside the regularity, the duration of the existence of the service appeared to be of influence on citizens' waste disposal routines. In the zones Inhamissa and Patrice Lumumba were the waste collection only started in 2010, interviewees seemed to have more different waste disposal manners or clinked on to the existing one. In parts of the zones Cidade and Praia, waste collection exists for a longer time and seems to be more regular, more interviewees hand in their garbage.
Last but not least, the turning in or not of waste to the municipality also depends on the existence of erosion. If erosion occurs in garden or roads, interviewees used their waste to cover the holes and try to prevent further erosion. The given examples of the newspaper reporting and the help neighbors were giving to others to close the erosion pits show that this activity is seen as a normal.

Dealing with waste on household level is a daily returning activity. In that way it seems logic that people do not want to put too much effort in actions related to waste. Citizens will try to find a way that is most convenient and cost less effort. They just want to get rid of it and due to the subtropical circumstances fast as well. This paraphrase does have many similarities with what scholars call automatic behavior, short cut decision making or the peripheral route of processing information (Petty et al, 2005, Thaler et al., 2009, Bargh, 1999). Effortless, fast, unconscious, intuitive and skilled are characteristics of this automatic behavior. The fixed action pattern does not involve much thinking. (Thaler et al, 2009). When a decision has to be made about waste disposal the person assumable will take a shortcut route or follow an automatic behavior.
For this majority of citizens who only employ one manner, waste disposal can be seen as a shortcut decision or an automatic behavior. The waste disposal has become a habit or fixed action pattern; something what is always done. In this perspective it also becomes understandable why citizens hold on to their routine of waste disposal. The disposal method they use can be seen as an almost unconscious action and it doesn't take much effort, so why bothering a change.

For those citizens that employ different waste disposal methods, the process of waste disposal is a more conscious process. On the moment the municipality collection service occurs or erosion, citizens do evaluate what they do. Their process on deciding what to do, appear to be a more conscious and controlled process which largely depends on the occurrence.
Those households who do want to hand in waste to the municipality but the service is irregular or relatively new, are supposedly more alert on the arriving of the Municipalities' tractor. Especially in the cases where erosion appears, citizens' behavior seems to be thoughtful. These citizens have to prevent further erosion of their properties and repair the existing pits and holes. Some citizens also felt responsible to cover the road in front of their houses. The given examples demonstrate the effort respondents put in this work: former rice bags are filled with sand and waste and neighbors are asked to put their waste to cover the eroded soil.
This type of decision making can be described as the reflective cognitive system or central route of processing information and is the opposite of the automatic behavior (Petty et al, 2005, Thaler et al., 2009, Bargh, 1999). Behavior based on the reflective system or central route is characterized by control, effortful, slow, reflection and rationality. The people deliberate or reflect on what to do. While the waste collection schema in some zones as well the occurrence of severe rains and thus

erosion are not very predictable, waste disposal is not the fixed action pattern like it is for the interviewees that only employ one way of waste disposal.

The most common way of waste disposal in the city of Xai-Xai appears to be the use of a pit that is covered with soil when full. Two interconnected explications for this predominant method can be mentioned, namely the instructions of the Ministry of Health and the non-existence of a waste collection service.

As already mentioned in the former chapter on framing, citizens do connect waste with the attraction of insects which cause diseases. For Frelimo, the party in rule since independency, health has a high priority (Newitt, 1995, Klees, 1997). 'Since independence, health policy in Mozambique has been emphasizing primary health care, with the objective of controlling major diseases through preventive, curative and rehabilitative measures (Klees, 1997)'. Years of campaigning and health promotion contributed to the existing knowledge and the existing habits of putting waste and a pit.

The second explanation for using pits is the limited waste collection service. The liberation and civil war contributed to as Klees noticed a severe damage of countries' infrastructure as well a collapse of the economy (Klees et al, 1997). Following this line of thought, there were and still are no or limited means for waste collections. Subchapter 5.4 on municipality waste management will further elaborate this interpretation.

5.2.2. Other aspects of waste disposal on household level

Waste items on their way to disposal
Before waste items end up in the bin, bag or pit, they have to be brought there. Some waste items are brought immediately to the 'final' destination. So was seen that the left-overs of a mango immediately were put in a pit.

> 'Even with children, I explain that you can't leave the peel of a mango on the ground. They have to take the peels, because mosquitoes could come and from there they go to the plates with food.'
> (Eliza, housewife and farmer, Inhamissa)

Other items though were first thrown on the floor in the garden. Nut shells, sweet wrappers, paper and bottle tops were thrown on the ground. Sometimes people walked to the door of the house and threw the waste item in the garden. While Eliza was commenting on what they normally do with a peel of a mango, she herself and her children threw the sweet wrapper on the ground in the garden.

However not researched thoroughly it seemed that smaller non-organic items were thrown on the ground in the garden wherever the person was sitting or standing, while bigger non-organic items such as bottles could be found close to the walls of the house or annex and against the trunk of the trees. In cases where this was observed, none of the other present persons commented on that action. In several households were the researcher returned after one month bottles still could be found laying on the same place as where it was seen earlier. Fruit left-overs though were immediately gathered.

Analysis of waste items on their way to disposal
An explanation for this behavior of throwing items on the floor of the garden can be found in automatic behavior. This behavior is extensively analyzed in the former and following subchapter. In short it means that people do not take time to consider all the actions and activities of their daily life. Most actions take place on an automatic behavior. Assumable the consumption of an item and the consecutive disposal of it on the ground in the garden is such a fixed action pattern.

On household level the automatic behavior of littering could be related to the early morning activity of sweeping. In the former chapter is pointed out the connection several citizens made between waste and the sweeping of the house and garden. Waste is to be understood as what is gathered during the sweeping. People apparently are used to consume items and then throw it away on the place where they sit or stand, knowing that next morning someone will sweep and thus clean it. The daily regularity of the sweeping doesn't prevent the accumulation of waste. In this line of thought littering on household level doesn't become an issue.

For waste items that attract flies or mosquitoes citizens act differently. Those insect attracting items such as fruits in general immediately go into the bin, bag and pit or are feed to the animals. However citizens do conduct oppositely as in the case of non fruit waste items, it still could be an automatic behavior. The act of eating fruits and the getting rid of the left-overs is supposable a frequent repeated action. The frequency makes that citizens do not evaluate the disposal.

Another explanation for littering behavior on household level could be the non-existence of waste bins. The majority of the respondents do not have waste bins in the house neither in the garden. Only the majority of middle class and rich respondents mentioned that they have a waste bins. If they always use waste bins or use a combination of disposal methods was not researched.

Waste bag, bin or pile
When citizens hand in garbage to the municipality some put the waste in plastic bags or former 50 kilo rice bags. Others put the waste on a pile in a corner of the garden or just outside the fence. A minority of citizens do use waste bins or former petrol barrels:

> 'I never see another waste bin except for my house and that of my neighbor.'
> (Angelina, administrative employee, Praia)

The use of bags, bins and barrels is not without problems.

> 'In downtown we had beautiful waste bins but people stole them. In my house we are used to put the waste in bags but even the bags people turn out the waste and take the bags with them.'
> (Abdul, company manager, Cidade)

Waste bags, bins and barrels are apparently taken by others. In one neighborhood the inhabitant had put a chain and lock around the waste bin that stood outside the garden. The waste bins that were distributed by the municipality for public use could now and then be found in citizens' garden. One respondent had delivered waste in plastic bags to the municipality service but had quit with this activity. The municipality workers had collected the full bags while he had expected that they would have returned the empty plastic bags.

An aspect related to the plastic waste bags are the quality, the availability and costs for purchasing them. The small bags that people receive when they purchase an item are of such a low quality that they mostly can be used once and then have to be disposed. The bigger 'real' waste bags are quite expensive for an average Mozambican and can only be bought in a few shops in the city. Twenty waste bags are sold for about 50 Metical (circa € 1.20). To compare, the minimum salary for a worker in the agricultural sector is 1.600 Metical (circa € 38.40).
Observations make clear that citizens who possible could afford waste bags or bins not always utilize them. In some cases the citizens in richer neighborhoods did pile their waste in a corner of the garden close to the gate or just outside the fence. Others used a combination of methods especially when the volume of the waste was not fitting into the waste bin.

Analysis of waste bag, bin or pile

Citizens of Xai-Xai that hand in waste to the municipality employ different methods to deliver it. Possible intertwined explanations for citizens' different delivery methods are the volume of the waste that doesn't allow them to put everything in the existing bins or bags, the lack of habit to deliver waste in an organized way, the limited instructions of the municipality as well the costs and availability of the plastic bags.

5.2.3. Waste disposal methods of the neighbors

Beside their own waste disposal methods on household level, interviewees were asked about what neighbors do with their waste. However not everyone could respond to this question, the majority seems to have neighbors with the same disposal routine. Samuel who lives at the same street as Eugenia in Inhamissa, both have a pit for their domestic waste. All the neighbors of Belinha do make a pit and cover it when it is full. Mrs. Soto said the following:

> Interviewer: 'The neighbors, what do they do with their waste?'
> Interviewee: 'With waste? We burn it.'
> Interviewer: 'All of you?'
> Interviewee: 'Even here, even her. All the places.'
> Interviewer: 'At this road?
> Interviewee: 'Yes. I know how we life.'
> (Soto, housewife and farmer, Praia)

This picture that most neighbors dispose waste in the same way as their neighbors was confirmed by observation. On one sandy small road in Praia, most inhabitants make a pit in the corner of their garden close to that road. A parallel sand road where Mrs. Soto is living, all the households burn their waste. At the connecting tarred road, households put their waste bags outside and make piles for the municipality to collect it. In Cidade most citizens put their waste bags outside.

That a citizen applies the same waste disposal method as the neighbor can be related to the given instructions in meetings organized by the representative of that same neighborhood and could explain that citizens in one block or *quarteirão* use the same waste disposal method. Several citizens mentioned that they got instructions through these community meetings:

> Interviewee: 'We always talk [about waste] during meetings. No one likes to stay with waste. We stay with waste because, *epaa*. But do we want it? It induces sickness, flies, I do not know what, other things, yes. The secretary of the neighborhood talks about waste.'
> Interviewer: 'With who is this meeting?'
> Interviewee: 'With the neighborhood. We have to dig a hole and put the waste in there. '
> (Belinha, housewife, farmer and small sales, Cidade)

Not all interviewees dispose waste in the same way as their neighbors. Francina from Praia was the only one that didn't put waste in bags to turn it in while all her neighbors did. She mentioned that she didn't have the habit to do that. Latter on she mentioned she didn't have the money to buy an empty rice bag. Apparently her financial capacity influences her behavior. Her story that she doesn't hand in waste could be confirmed by observation. All her surrounding neighbors had waste bags standing outside the fence waiting for the municipality collection service. Veronica of Cidade said the following:

'Not all of us put waste outside for the municipality to pick it up. For example, that house over there, I never saw waste bags. That other house, I never saw waste bags. I think they still use the same old system.'
(Veronica, retired, Cidade)

That citizens hold different waste disposal methods as their neighbor can also be related to the duration of the existence of a municipality service. If the waste collection service is relatively new interviewees and their neighbors appear to employ more ways of waste disposal.
Besides that, the occurrence of erosion leads to different waste disposal methods among neighbors. On short distance the impact of severe rains can be completely different and thus the need for using waste for the reparation of holes as well.

Analysis of neighbors' waste disposal methods
The majority of the respondents seem to employ the same waste disposal method as their neighbor. This applies for the neighborhoods where there is no waste collection at all and where it already exists for a long time. Equal waste disposal method seems to occur on street level. Where the households of one street adheres one particular method, the other street seems to adopt another method, even the roads are on a short distance from each other.

How comes that citizens seem to adopt one waste disposal method that is equal to the method the neighbor in the same street? Beside the more practical reason of the availability of a municipality service, the possibility of the influence the social networks could be considered. In social networks people follow the rules of the group (Elias, 1994). Cohen mentions the importance of daily activities to reinforce the network (Cohen quoted in Gilchrist, 2000). Both rules and daily activities lead to a similar collective behavior.

Two connecting remarks can be made related to the social networks, namely the organization of the communities in Mozambique and the social cohesion of the households at a road itself. Mozambique has a relatively high level of organization. Municipalities for example are divided in administrative zones which are divided in neighborhoods. The neighborhoods are organized in *quarteirões* and subdivided in blocks of 10 houses. Each level has an appointed or chosen representative who is responsible for the organization of community meetings and the communication with the municipality administration. Thus communication and instruction between the highest level of a municipality and lay-people takes places through the representatives. As several interviewees confirmed, instructions on how to deal with waste followed this communication line. The hierarchical Mozambican culture probably only has reinforced the following of rules. The analyses of automatic behavior in subchapter 5.3.1 will go into this cultural aspect.

The organization of neighborhoods in *quarteirões* and blocks, the way governmental instructions are communicated and the hierarchical culture possible all contribute to a certain collective behavior. But those reasons for collective behavior are so far mainly caused by outside forces while collective behavior is about the internal cohesion of a group of people. In this perspective, Mrs. Sotos' remark about 'I know how we life.' is probably quit enlightening. In her street with about 10 houses, they all burn the waste, while in the parallel street the households make a pit. Mrs. Soto knows about her street. She can see that her neighbors do the same thing as she does. Consciously or not, Mrs. Soto does what the other neighbors do. In the same interview she said that she doubt if she would change her waste disposal method in case of a waste collection service would arrive. She answered that 'they' already were used to the method of burning, so it was not really necessary. It didn't became clear who she meant by the word of 'they'.

Theories on social networks describe the cohesion of a group and the importance of the group to keep values and norms in place (Elias, 1994, Cohen quoted in Gilchrist, 2000). Elias describes that

people in an established group see 'themselves in human terms as better that the others' and differentiate 'in the degree of internal cohesion and communal control' (Elias, 1994). In the same line of thought, Haslam mentions the three core symptoms of group decision making, namely 'overestimations of the power and morality of the group, closed-mindedness and pressures towards uniformity (Haslam, 2001)'. In the interview with the chosen representative of a more or less isolated neighborhood in Cidade some examples came up:

> 'If the population is not fulfilling, when there is a problem, they come to tell us and we resolve it, it is their *castigo*.'

> 'This neighborhood is clean, that's true. You can see it when you pass by. There is no waste.'

> 'When the neighborhood is alive, it can mobilize the people till they do understand. When the neighborhood is not alive, they will not succeed.'
> (João, retired, head of neighborhood, Cidade)

He and the fellow-leaders of the isolated neighborhood control the cleaning and waste disposal of the inhabitants. The neighborhood seems to be the only neighborhood in the city were still community cleaning days of the communistic period of Mozambique are organized. If something is not according the rules, the community leader said he will be informed and undertake action:

Coincidently are not, the clear examples of community sense and collective behavior come from more isolated (parts of) neighborhoods in Praia and Cidade with a limited number of people. In Praia the parallel sand roads lay in two different dune valleys that can't be crossed. One of the sand roads has around 10 houses while the other consists of more or less 30 households. The isolated neighborhood in Cidade has less than 2.000 inhabitants.

In parts of the city of Xai-Xai where neighbors do differ in their waste disposal routines, the occurrence of erosion and the duration of the existence of municipality waste collection can be seen as possible reasons for the use of different waste disposal methods among neighbors. Where the municipality only started to collect in 2010, some of the citizens where handing in the waste, while others hold on to their old routine. Whether or not the less isolated location and the bigger population of these neighborhoods has been of influence on the different waste disposal methods on short distance can't be said on basis of this research.

What though came up in these larger and less isolated zones was the help neighbors gave each other in the 'battle' against erosion. A few interviewees mentioned the activity of helping neighbors out by putting waste in the eroded areas in peoples' gardens as well on the street. Neighbors asking for help and others helping them can be seen as a typical social activity. In these cases no one mentioned that putting waste to cover the holes can't be done because waste smells or causes diseases. They just helped each other and in that way reinforced their social ties. Baumeister describes this phenomenon as the need to belong. People need to be part of a group because it helps in evolutionary sense to survive. 'It is vital to belong to a group oneself, particularly a group of familiar, cooperative people who care about one's welfare (Baumeister, 1995)'. Helping out neighbors by putting waste in eroded soil is about cooperation, bounding and taking care of others and thus of group behavior. It is about social acceptance. Schaller notes that people make strategic choices on what to say and what not, because they consciously or unconsciously strive to be social accepted (Schaller, 2001). The social acceptance of a group could explain why people are not critical on the act of putting waste in eroded areas.

5.3. Citizens' waste behavior in the public space

In the public space of the city of Xai-Xai two different types of citizens' behavior can be distinguished related to waste, namely waste disposal and waste collection.

5.3.1. Waste disposal in the public space

The central theme of this subchapter is what citizens of the city of Xai-Xai do with waste items when they are in the public space. The general assumption in Mozambique on street behavior and waste is that waste is thrown on the street. Is this what they really do, is this reality?

Littering

When interviewees were asked personally where they would dispose a waste item in the public space, a blurred picture arises. A minority of the respondents said that they would throw the waste item on the ground. Other interviewees would take the waste along and a third group would put it in the waste bin. If there wouldn't be a waste bin available, they either take the waste item along or throw it yet on the ground.

> 'When I see a waste bin, I would leave it [the waste item] there. If there isn't a waste bin, I would throw it in the *mato*.'
> (Soto, housewife and farmer, Praia)

When the same interviewed citizens were asked what other people do with waste item, the interviewees were unanimous about citizens' behavior: people do throw waste on the ground.

> 'It is rare that people take waste along. A person who buys a banana in town drops the skin the *qualquer maneria*. Many people do this.'
> (Eliza, housewife and farmer, Inhamissa).

In the focus group discussion Paulo is telling laughingly:

> 'What is normal here, we can do a test at the meeting of the youngsters and hand out sweets, you will see, they will eat the sweet and throw the wrapper away.'
> (Paulo, student, focus group discussion)

The councilman of Xai-Xai narrated about a visit of a delegation with participation of an Argentinean lady. The delegation was staying at hotel Halley in Praia and left for a day travelling to the villages of Manjacaze and Chibuto. For lunch they had brought sandwiches and drinks from the hotel. The lunch was eaten in the car and while driving, the councilman had opened the window and thrown out the can. At that moment the lady asked the driver to stop the car so they could make some pictures of the surroundings. While others were making pictures, the lady walked to the place where can was launched. She took it, walked back and the group continued their travel. The councilman had asked the Argentinean lady why she had stopped to collect the can. She then explained him the importance of not littering and how it is effecting the environment. When the councilman was asked if he changed his behavior after this event, he responded that it wouldn't be true if he would say that he stopped littering.

Observations on the street, in public transport and at the beach support the general assumption that waste is thrown on the street. People walk on the street, consume an item and then throw the left-overs on the street. The left-overs of sugarcane are spit out; nut shells end up on the ground as well eaten corncobs. Many children were seen eating fruits and throwing away the left-overs wherever they stood or walked. Around the municipality garden several waste bins can be found; they are

almost empty while around the waste bin it is littered. Several observations could be made from people who threw waste out of the window of a car or bus. Travelers have been seen offering help to fellow-travelers to throw the waste out of the mean of transport. When a person buys cell phone credit on the street, the used cell phone card and the plastic wrapper end up on the street. During one observation a young men is walking on the pavement towards the waste bin. When he is almost there, the distance between him and the bin is less than 2 meters, he turns around and throws away the empty plastic bottle next to a tree.

At the beach an observation was executed at an informal selling point. At this point on the edge of the beach and pavement women sell drinks from their iceboxes. During one hour, the 11 ladies sold approximately 50 drinks. Most of the bottles were opened immediately either with the bottle opener of the saleslady, by using another bottle or using the teeth. On less then 5 meter of the selling point a colorful blue big waste bin could be found. During the observation two persons used the bin; one saleslady threw in the pieces of a broken bottle and a man threw in the empty shell of an oyster. None of the non-refundable bottles and cans was brought to the waste bin. As far could be observed, they were left on the beach. The bottle tops disappeared on the ground. No one seems to bother; people opened the bottle and just let the top drop out of the hand or mouth often without touching it. They didn't look around if they could find a waste bin. Only the empty refundable bottles were brought back to the salesladies.

During an observation of the municipality waste collecting a short break was held in which the 6 co-workers drank a cola. While they were standing next to the open waste collection wagon and next to the full waste bags and bins of a household, 5 of the workers threw the bottle top on the ground. Only the head of the department threw the top in the waste bag. He didn't comment on or correct his co-workers behavior.

The examples of littering are extensive and give the impression that many people do litter; the generality of this behavior though is unknown. To explore the generality of littering an observation experiment was executed. The experiment looked at if citizens do litter and if so, if they litter more in a dirty environment than in a cleaned one. Two sites where selected at the main street of the city. One of the sites is paved, cleaned on a daily bases and does have waste bins on every corner of the street. The shops and administrative buildings can be found here. The second site at the same main street is unpaved, littered and doesn't have waste bins. It is where people go to the market and where one of the two city bus stations can be found. On each site 25 people received a sweet in a wrapper from a 30 year old Mozambican man and were observed unnoticed for about 50 meters. About half of this group, was female, the other half male; a few children received the sweet. The 25 people who received it in the clean part were in sight of the waste bin. The results of what citizens did with the sweet wrapper can be found in figure 4.

Site	Wrapper on ground	Wrapper in waste bin	Wrapper taken along
Clean site with waste bins	88 %	8 %	4 %
Dirty site without waste bins	96 %	n.a.	4 %

Figure 4
Sweet wrapper experiment

The data of the experiment show that the majority of the citizens throw waste on the ground and confirm the earlier observations of littering. Where people had the availability of a waste bin which even was in sight, the large majority didn't use it. The wrapper was littered without paying attention to what happened to it.

A few weeks later the same experiment was repeated on the two sites, at the same time in the morning under more or less the same the weather circumstances. Now the citizens did receive a hand-out; a white A5 copy with an appeal: 'Keep the city clean. Throw your waste in the waste bin. Thank you!'. The receivers of the hand out were again tracked during 50 meters. Again more or less half of the group was female and male; no children received the hand-out.

Site	Hand-out on Ground	Hand-out in waste bin	Hand-out taken along
Clean site with waste bins	0 %	40 %	60 %
Dirty site without waste bins	12 %	n.a.	88 %

Figure 5
Hand-out experiment

The results of the hand-out experiment with an appeal for a clean city in figure 5 are almost contrary to the results of the sweet wrapper. A clear majority of the participants took the hand-out along. After about 20 meters, they put the paper in the bag, purse or pocket or just kept the hand-out in their hand. In the case that there was the availability of a waste bin, 40% of the participants threw the hand-out in the bin.

In both experiments more littering appeared on the dirty sites; the difference between the clean and dirty sites though seems to be limited.

Commenting on littering
An aspect of the waste disposal in the public space is the apparent absence of correcting or commenting on littering. In the example of the head of the department and the 5 waste collectors drinking a cola, the head didn't correct or comment when all his co-workers threw the top of the bottle on the ground while they were standing next to a waste bin and the collection wagon. During the experiment a mother walked next to her son who threw the wrapper on the ground. She didn't pay attention to his littering. Also during interviews children threw wrappers on the floor in the garden. No one reacted on that action.
The unemployed Jaimen from Inhamissa comments that he can correct family members, but friends, that's impossible. Other interviewees confirm his point:

> 'Other people throw waste on the street. They throw it away. Even when they walk on the street. But because my husband is working at the municipality, he told me not to litter. When I walk with him and I throw something away, he will be angry. Sometimes I like to throw waste away, but then I remember that my husband doesn't like it.'
> (Angelina, administrative employee, Praia)

And

> 'We were swimming in the sea and a person left a plastic bag with banana skins in the water. When I told him that he shouldn't do that, the other had responded with 'I do what I want to do. This beach is not yours neither it is mine. I can do what I want.' To avoid trouble, I shut my mouth.'
> (Alberto, different temporary jobs, Praia)

The mother of Maria, the bar owner from Cidade and Francina, the housewife and farmer of the Praia zone had similar experiences as Alberto. When Maria her mother asked people on the street why they were littering, she got as response that the road was public. In the same line Francina

received as answer that they were on the road, so they didn't see a problem. According Francina, the young boys had been a bit of aggressive in their reaction.

Citizens' clarifications for littering
Interviewees keep several explanations why people in the city of Xai-Xai do litter. They vary from the habit to litter, to absence of an urban culture, the loss of civilization and moral values, ignorance, the lack of means on Municipality side, the non-existence of regulations and the lack of responsibility for the public space. When clarifications were discussed the interviewees talked in general terms i.e. they regular spoke about Mozambique and not specifically Xai-Xai.

According the representative of Frelimo Youth people have the habit to litter:

> 'In mine opinion littering is a cultural habit. Cultural habits are those habits that characterize the population. Those are habits that are transmitted from generation to generation.'
> (Representative of Frelimo Youth, sanitation commission)

To explain citizens littering behavior several interviewees responded with the fact that more and more people came to life in the city without knowing the city rules. It is about the absence of an urban culture:

> 'What happened is that cities were created and developed by some elite during colonial times. Immediately afterwards, we came to life in the city. What arrangements we brought to the city? We brought the life style from the rural area.'
> (Chiure, director of the House of Culture in Xai-Xai, focus group discussion)

Respondents came up with several examples of the rural life style that continued in the city such as defecating and peeing in the open air or pounding corn on the top floor of Maputo flat. The noise of the pounding was heard and could be felt through the whole building.

A few interviewees mentioned the loss of civilization and moral values as a possible reason for littering:

> 'I said to the mayor of the city, madam, we like to keep our city clean, but we have children here. I painted my wall but children came and put their dirty hands on it. The children took stones and threw in the windows of my company. It is a lack of discipline. When I studied [in colonial times], we had moral civilization as a subject. Nowadays they do not educate it anymore. It was teached to have a bit of civilization.'
> (Abdul, company manager, Cidade)

And

> 'My children are my reflection. My grandchildren are their reflection. For the development of a society, we have to know where to start. I work with young people, the majority of my workers are young, but I see that they do not know a lot. I am not talking about the professional experience, but about the basics, things that in my opinion we all have to know. The Mozambican families do have low moral values, under a level that is acceptable. '
> (Maria, company owner, Cidade)

The respondents who mentioned the loss of civilization can be seen as the older in age and richer or middle class citizens. They are the same persons that perceived Xai-Xai as a dirty city (subchapter 4.4.2).

The limited knowledge of citizens on waste as reason for littering was discussed in interviews mainly with the richer and middle class interviewees, the key-informants and throughout the focus group discussion. Participants of the group discussion mentioned the general low education level of Mozambicans:

> 'There is no knowledge at the base. It is about the municipality who doesn't understand anything from waste and should and has to do this work. It is about the population, we don't know what to do. We should be educated, all of us. Maybe teachers can help, because it is easy to educate children.'
> (Marilia, farm manager, focus group discussion)

According Catheline, trainer for a NGO on sanitation, education on waste and littering is only since January 2011 part of the curriculum of secondary schools. Other participants of the focus group pointed out that the majority of the Mozambican population still is illiterate.

When littering in the public space was the topic some of the respondents explained their and other peoples' behavior by pointing at municipalities' lack of means. According these respondents the municipality is responsible to place waste bins but they are rare in the public space:

> 'My problem is that on this moment there are no waste bins in populated areas. That bus stop, does it have a waste bin? No, it has not. But there, in the Cidade during rush hour, thousands of people are waiting there. What to do with the sweet wrapper? We do not have the habit to eat something and then put it in our pocket or purse. I *jogo logo. Jogo logo*. I will not carry a sweet wrapper up to a distance from here till there, no, I will not.'
> (Paulo, student, focus group discussion)

In observations and interviews it became clear that the number of waste bins is limited. Not only in the public spaces such as streets and gardens, but as well in schools and public buildings, banks waste bins are not available, limited or difficult to find. However not researched sufficiently, there seems to be a tendency that public and private institutes though place more and more waste bins. Abdul, the manager of a company, mentioned that he placed waste bins when he was reopening his shop a year earlier. The bank with three ATM's didn't have a waste bin in December 2010 but had one in February 2011. Also the Municipality is increasing the number of waste bins in the paved part of the Cidade but is very limited in budget to do so. Subchapter 5.4 will go into municipalities' means.

Some interviewees did see the non-existence of regulation as reason for littering:

> 'The municipality has to have a regulation that educates people that waste has to be put there and not there.'
> (Abdul, company manager, Cidade)

Interesting in this aspect was the comparison some citizens made between South-Africa and Mozambique. The same Mozambicans that litter in Mozambican, change when they cross the border:

> 'When Mozambicans travels to South-Africa and pass the border, they keep the waste with them till the final destination. On the way back they keep waste with them till the border. But as soon when they are back in Mozambique, they throw the waste out of the window. People know that in South-Africa exists a fining system.'
> (Councilman of the municipality, Xai-Xai)

Several respondents mentioned the lack of responsibility for the public space to clarify the littering behavior:

> 'I am not responsible for the part outside the garden, I can clean it but people pass by and drop the skin of a fruit, you see.'
> (Anita, housewife and farmer, Cidade)

And

> 'People just discard waste, assuming that the tractor of the municipality will come to collect it. People do not perceive the city as theirs. Their side is where the bed stands. But we also have the side of the community. The responsibility for the community is lacking.'
> (Director of Health in Xai-Xai, sanitation commission)

Interviewed citizens deemed that other people littered because they hold the opinion that the municipality has to clean. Some interviewees mentioned that this attitude could be reinforced by the fact that citizens pay a waste tax but in many cases waste is not collected.

Analysis of citizens' behavior in the public space
Based on the interviews, observations and experiment can be concluded that the big majority of citizens of Xai-Xai do litter in the public space. Interviewees came up with a broad number of possible reasons for the littering behavior. The possible explanations for littering behavior will be analyzed around the concepts of automatic behavior, group behavior and the environment.

Automatic behavior
One of citizens' habits is eating on the street. In the city of Xai-Xai always people can be observed eating fruits or vegetables while walking. The act could be seen continuously and especially for children it is common. Sugarcane is chewed on and spit out; peanuts are peeled and the peels thrown away, banana skins as well are thrown on the ground. Assumable the habit of eating of fruits and vegetables while people are on their way does exist already for a while. The getting rid of the left-overs is apparently an action that follows automatically the consumption.
For daily returning activities such as waste disposal people tend to behave according shortcut decisions or an automatic behavior. In the former subchapter the automatic behavior was already discussed in relation to people's domestic waste disposal. People need shortcut decisions or automatic behavior simply because it is impossible to life and survive if you have to analyze every situation in which a decision has to be made. In this line of thought it appears logic that when a person holds a waste item in his or her hand, the person will not take time to consider what to do with it. The person will follow an efficient and effortless way to get rid of the item (Berger et al., 1966; Cialdini, 2001, Petty et al, 2005) or an automatic behavior. In the case of Xai-Xai the efficient and effortless way of dealing with waste items on the street seems to be throwing the item on the ground. The data of the sweet experiment were quite clear and supported by data of other.

Some interviewees mentioned the absence of urban culture as a reason for littering; that since the Portuguese left in 1975 people came to life in cities bringing their rural habits. In Mozambique urbanization is a continuously and rapid process. In 1975 only 8.7% of the population lived in urban environments. Twenty years later already 34.5% of the population is living in cities (United Nations, 2007). During the civil war the urban population tripled; after the war people stayed in urban centers. However exact data on urbanization of the city Xai-Xai do not exist it is assumable that they follow the national trend. The city grew and most adults that nowadays life in Xai-Xai, must have had some experiences of living rural and could have brought the habits of the rural life. What nowadays can be seen in the city is possible the 'rural' habit. The automatic behavior of eating while walking and successively throw the left-over on the ground appears to continue in city-life. Where first only

organic waste was littered, nowadays also chip bags, cans and other non-organic items as cell phone cards are handled in the same way as the organic products.

Where littering seems to be an automatic behavior, the usage of waste bins doesn't appear to be a frequent repeated act. In both experiments only a minority of the participants used the waste bin. In the hand-out experiment a majority of the people took the hand-out along even though the waste bin was in sight of half of the participants. However the participant didn't have to put much effort to throw it in the waste bin, because it was standing on their path, they preferred or maybe are used to take the item along.
Different scholars mention that behavior only can become automatic if it is frequently repeated (Bargh et al, 1999, Berger et al, 1966)'. The behavior of putting waste in a bin is apparently not an automatic one. The limited number of waste bins at homes, public places and spaces certainly contributes to the restricted use.

The littering behavior changed considerable after citizens received an appeal not to litter or do travel to South-Africa. In the experiment suddenly the big majority took the hand-out along. In half of the cases in which it was possible to throw the hand-out in a waste bin a minority did do so. The appeal of 'keep the city clean' made participants think and act differently. Where the act of throwing a sweet wrapper on the ground can be seen as an automatic behavior, an almost unconscious process in which the peripheral route of processing information is used, assumable the appeal to keep the city clean made participants evaluate the situation. Thinking and evaluating are typical actions related to the central or reflective route of processing information. According Thaler this way of thinking can be characterized by control, effortful, slow and rule-following (Thaler et al, 2009). Where the wrapper was almost immediately thrown away, it took a while before people decided what to do with the hand-out. It is possible that the participants still have thrown the hand-out on the street further on. It is imaginable that the paper was taken because the participants didn't consider it as waste and could reuse it. Although the participants never were asked why they didn't throw it away immediately, it became obvious that they first took their time to consider what to do with the hand-out and at least for a while followed the instructions. The experiment with the appeal shows that people can leave their automatic behavior.

A second possible intertwining explanation for leaving the automatic behavior after citizens received an appeal of not littering could be related to the authoritarian Mozambican culture. The appeal can be seen as an instruction. However Mozambican culture is not described thoroughly there probably can be seen many comparisons with Portugal and former Portuguese colonies such as Brazil and Angola. Hofstede positions Portugal and Brazil as countries with low levels of individualism and a high power distance. The former relates to the importance of group and collective goals over individual goals. The latter means that members of institutes and organizations expect and accept that there is inequality between authorities and subordinates (Hofstede, 1991, Hofstede in Berry et al, 2002). In those societies subordinates do not easily argue with people in higher positions; they rather follow the rule. The leaders can be seen as autocratic or paternalistic. In an article on Angola[3] also the Portuguese domination and successively the communistic one party system is mentioned as the reason for a tradition of centralized and authoritarian rule. The authors see that the tradition still is powerful although the country changed towards an economical liberalization (Roque et al, 2007). As culture is an element of the broader environment it can influence behavior. In this case the instruction to keep the city clean could have minimized the littering behavior.

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[3] Angola and Mozambique do have a many historical similarities with liberation in 1975 from the Portuguese colonization, followed by the establishment of one party system based on socialism, a civil war and with the fall of communism a transition towards capitalism and a multiparty system.

The examples of Mozambicans that travel to South-Africa reinforce the possible explanations of leaving the automatic behavior and the influence of the hierarchal culture. Travelling to the neighbor country suddenly made citizens conscious and considerative and made citizens stop litter.

Collective behavior
The collective behavior will be analyzed around the themes of the loss of civilization and moral values and the lack of responsibility for the public space.

A few interviewees mentioned the loss of civilization and moral values as an explanation for littering behavior. The examples respondents gave, assumable refer to the loss of certain manners and habits that existed collectively. Interviewees allocate these values to the colonial period and the period just after independence.

Civilization is broad term with a variety of interpretations. Civilization is about the complex human culture and can be about the science and technologies as well the behavioral patterns people hold. One interpretation considers civilization as the top-end of hierarchy of social progress with savagery as the opposite at the bottom-end (Langton, 1998, quoted in Buchan et al, 2006). A second interpretation comes from Elias. He appreciates civilization as a process in which behavioral patterns change due to changes in power and social structures (Aarts, 1999).

Explanations for the loss of civilization and moral values are divers and are assumable interconnected and possible have to do with these so called changes in power and social structures. For the case of Xai-Xai, consecutive the roles of Samora Machel in Mozambique, the family and schools will be discussed.

Samora Machel as the first president of the Republic of Mozambique after independence can be seen as the leader of the institute of Mozambique. As illustrated in chapter 4, he was a demanding and combative person who expected that people themselves, their working sites and neighborhoods were clean. He was the one that introduced the obligatory community cleaning days. The promotion of hygiene was part of the combat against underdevelopment and was focused on the destruction of causes of diseases (Partido Frelimo, 1983). The combination of his personality and the on Marxism based governance style must have set the norms for the whole society. According one of the respondents when he died, in 1986, his moral values died as well.

Another power and social structure is the family. A relatively high number of citizens raise children in a one parent family. One third of the interviewed citizens, all women, are either separated, widow or do have husbands that work in the mining industry of South-Africa who only return for the Christmas holidays. The women stay behind with their children and have to take care of the household alone. Various Western studies have been executed on the subject of one-parent families and problem behavior. They conclude that 'parental monitoring plays a central protective role in adolescent problem behavior (Griffin et al, 2000)'. In one-parent situations the parental control is limited. It is only one person that can monitor and correct behavior. According Griffin the one-parent situation leads to several behavioral problems such as the use of alcohol and aggressiveness. Although the studies have been executed in a Western context, it is plausible that the findings are applicable for one-parent families in Xai-Xai.

A second aspect of Mozambican families is the high level of illiteracy. According data of National Institute of Statistics, in 2004 the average illiteracy rate in Mozambique among adults is about 53%. In urban areas the rate is estimated on 30% whereby the averages for women are substantial higher than for men (Mario et al, 2005). In short can be said that education on household level is a complicated by either the family structure as well the high levels of illiteracy.

According one of the respondents the institutes of education, i.e. the schools, gave up teaching in 'moral civilization'. However this point couldn't be verified, it is clear that education in Mozambique is of low quality with a limited access, an absence of learning materials, limited class room facilities and teacher that are not prepared (Klees, 1997). 'About 24% of the primary school teachers have no formal training at all, and some 52% fall within the category of '6 years plus 1' meaning that they have six years of primary education and one year of professional training (United Nations Agencies in Mozambique, 1997 quoted in Klees, 1997)'. In informal talks the littering of teachers was brought up. Assumable teachers act in the same way as others citizens do, which means that they do litter. In combination with the low quality of education, teachers can't be the role model for another behavior.

The death of the first president of Mozambique Samora Machel, the complicated family situation with one parent families, the low educational level and the earlier mentioned migration from the rural to the urban areas all may have contributed to the perception of the loss of civilization and moral values and could be a historical explanation for citizens' collective littering behavior. The changes in power and social structures could have weakened and limited the setting of rules and the control on those rules by these powers in the society. Nowadays littering is the collective norm.

Some of interviewees who criticized other peoples' littering behavior could be seen possible educators of a non-littering norm. Their experiences though were not very positive; most of them got an aggressive or arrogant response. Apparently there is little space in the society to interfere with behavior of others. One interviewee said that he preferred to say nothing than getting another negative reaction. Baumeister and other scholars mention that people have the need to belong and to be accepted by a group. In order to achieve that, they follow the written or unwritten norms and values of the group (Baumeister, 1995, Schaller, 2001, Dijksterhuis, 2001). Critics on the group values and norms are complicated and not easily accepted. Group member have to submit to the group norm. In this case, the group values and norms is one of littering.

Besides a lack of civilization and moral values, the lack of responsibility for the public space was mentioned by interviewees in relation to littering. The behavior of people on the street seems to be closely connected to what people perceive as their responsibility. People do take care of their house and garden but as soon as they leave their premises, the responsibility is for someone else.
The public space is a complicated space. Sampson describes that streets, parks and sidewalks belong to no one and therefore to everyone (Sampson et al, 1999)'. According this scholar people take responsibility for their neighborhood when there is cohesion and mutual trust among neighbors. 'One is unlikely to take action in a neighborhood context where the rules are unclear and people mistrust one another (Sampson et al, 1999)'. An interesting finding of the analysis of neighbor waste disposal in subchapter 5.2.3 was the strong community sense and collective behavior for the more isolated and smaller (parts) of neighborhoods. If this strong community sense also contributed to less littering in that neighborhoods, could not established by this research. Taking into account the automatic and collective behavior of littering, assumable littering in those smaller neighborhoods occurs in the same magnitude as in other neighborhoods.

The enabling environment
As environment is a broad term, in this part of the analysis on explanations for littering in the public space the physical part of the environment and the legislation are looked at. The central question is if the environment is supportive to litter or not. Successively, the influence of the absence of waste bins, the influence of a cleaned or littered environment on citizens' behavior and the functioning of legislation will be analyzed.

The general picture of the public space of Xai-Xai is a city where bins are not available, limited or difficult to find. Waste bins can only be found in the paved downtown part of the Cidade. However there seems to be a tendency of an increasing number of waste bins, the number in public places still is limited. If waste bins are not available, it is almost impossible for citizens to habituate to use them. Habits or fixed action patterns only manifest when an action is frequently repeated (Bargh et al, 1999, Berger et al, 1966). What people are used to, is throwing waste in pits, in the *mato* or on places where already can be found waste. Where the streets were paved, citizens could be observed that put a waste item next to the tree on the unpaved part of the street. Often other waste could be found there. Concluding can be said that so far the environment with a limited number of waste bins is not facilitating a non-littering behavior. Citizens continue with their normal habits, which is throwing waste on the ground.

In the two experiments more littering appeared on the dirty sites; the difference between the clean and dirty sites though seems to be limited. Possible reasons for the higher number of people littering in the dirty environment were not researched. It could have been the dirty environment that triggered the littering behavior but also other reasons can be conceivable such as the non-availability of waste bins and last but not least the dominant automatic behavior of littering.

Subchapter 4.4.3 on framing looked at citizens' knowledge of legislation on waste and littering. Except for the interviewees that work in the area of environment or control, no one knew about the existence of rules in the city of Xai-Xai however legislation does exist in the form of a municipality regulation.
Apparently the Mozambican and in particular the rules of the city of Xai-Xai related to waste and littering are unknown contrary to the knowledge several citizens had on legislation on waste in littering in the neighbor country of South-Africa. Those respondents with knowledge about South-African legislation also could tell that Mozambicans' wouldn't litter in South-Africa, where they do in Mozambique. Possible explanations that citizens don't have knowledge of the legislation on waste and littering in Xai-Xai can be the limited communication of the municipality and the limited monitoring of the legislation by the municipality police. Both issues will be discussed in the following subchapter 5.4 on municipalities' waste management.

5.3.2. Citizens' waste collection in the public space

The first part of this subchapter on citizens' waste disposal methods in public spaces is very clear; people do litter. But citizens of the city of Xai-Xai also collect waste on the street. The activity of collecting is observed regularly.
When the municipality workers dumped waste at the landfill a small boy was searching the new brought waste and collected several non-refundable beer bottles. When he was asked what he would do with them, he answered that he brought it to a lady who would gave him 1 Metical (circa €0,02) for 4 bottles. The municipality waste collectors not only collect waste to dump it on the dumping sites. During work they also gather items for their own purposes. They separate items such as iron and plastic and glass bottles. At the end of each working day they have gathered one up to several bags of bottles. On one day they came back to the municipality office with a former stove. One of the municipality waste collectors is commenting that they separate these items from the waste to sell it.

> 'We sell it to have at least something; to buy bread.'
> (Waste collector 1 of the municipality)

On the beach and during the experiment on the main street could be observed that items that were thrown away by one person, were taken by another. Especially the plastic and non-refundable glass

bottles were collected. On a busy day on the beach several adults were seen with former rice bags on their shoulder gathering the bottles that were left behind.

Cans are also collected, but not on the large scale bottles are collected. The gathering of cans appears to be a small boy activity. The cans are often used as the wheels of a self-constructed toy car.

Analysis

In subchapter 4.2 the low standard of life in the city of Xai-Xai was already brought up. In 2003, 55.2% of the Mozambicans lived close to or below the poverty line (World Bank, 2010). In 2008, the Gross National Income per capita for Mozambique was calculated on 380 US dollars. It means that citizens on average have about 1 US dollar per day per person for all their expenses. When people do have a job with the government, salaries depend on the education level and function. The minimum salary in 2010 of workers in the public sector is 2.270 Metical (circa € 54.50) per month. The minimum salary for a worker in the agricultural sector is 1.600 Metical (circa € 38.40) per month. For jobs such as maid and guard there are no minimum salaries established. Other data suggest that Xai-Xai citizens mainly survive from agriculture activities (WAPCOS/SULABH, 2008).

In this context of poverty assumable any activity that can contribute to income is welcomed. As the examples show both adults and children are involved in the collection of bottles and iron for resale. The environment of poverty in which these collectors live, possible has triggered this behavior of collecting of waste items.

Besides the collection of waste for generating income, items also are collected for personal use. What could be observed regularly, are the small boys collecting emptied cans in the public space. In the subchapter 4.3, the utility of items was discussed. Where for one person an item is considered as waste, for another person the item still can be of value (Moore, 2011). The judgment if an item has value is a personal issue and largely context bound and in this perspective the collection of waste items as well. The magnitude of these actions though is not researched sufficiently.

5.4. Municipalities' waste management

Waste management is according the Ministry of Environmental action the responsibility of local governments. The management includes the collection of all types of waste, the treatment and the disposal of only non-hazardous types of waste (MICOA , 2010). The following subchapters discuss first the waste collection, followed by the waste disposal, regulations and communication of the municipality. In the last part of this subchapter the behavior of the municipality is analyzed. The municipality doesn't execute any form of waste treatment.

5.4.1. Waste collection

In the city of Xai-Xai three forms a waste collection are executed. The domestic and commercial waste is collected by teams using tractor wagon combinations and a regular as well irregular service can be encountered. On the street littered items are gathered by sweeping teams. The third form of collection is the placing of bins and receptacles.

Irregular service of door to door collection

Municipalities' door to door domestic waste collection is characterized by irregular services in a limited number of areas. The examples noted by citizens of irregularity are numerous and detected in most of the municipalities' zones:

> 'Sometimes the Municipality is not passing for a month. Other weeks they pass twice a week.'
> (Veronica, retired, Cidade)

And

> 'We do not have fixed days on which the [municipality collection] car passes by or fixed hours, no. When they want, they come. That can be in the weekends and during the week.'
> (Paula, housewife and small sales, Cidade)

Not only citizens mention the irregular service. From municipality side the councilman comments:

> 'Our service has to reach every house and be continuous. We have to increase our capacity. Now, when one of the tractors is broken, it has an immediate impact on the services.'
> (Councilman of the municipality)

During observations at the municipality office several broken tractors could be seen. Defects vary from broken tires to more complicated engine problems. Broken tires appear on a weekly basis.

The municipality of Xai-Xai has in principal 5 tractors available for waste collection. On each tractor 5 people work; one driver, two collectors and two receivers: people who are in the wagon to receive the waste. Each zone has the availability of one tractor except for Cidade that has a double number. In the Cidade one of the tractors executes a double shift; one in the morning to collect domestic waste and one at nighttime to collect the waste from the commercial area and market, both in downtown.

Brake down of equipment is not the only reason for the irregularity. The lack of means was mentioned by the head of the sanitation department:

> Interviewee: 'If we would have equipment doubled, then we can work. And we should increase the budget for fuel.'
> Interviewer: 'But do you have a budget for fuel?'
> Interviewee: 'Now that has been restricted.'
> (Head of sanitation department, municipality of Xai-Xai)

The lack of means is in a broader sense confirmed by different sources. In the sanitation commission the mayor mentions that the costs of the service do not cover the existing costs. In an interview with the national newspaper she mentions the need for a waste truck to improve the cleaning of the city (Noticias, 12th of January 2011). The councilman reflects on an increase of the waste tax but concludes that the municipality cannot apply it as long the service isn't provided. The same councilman visited the project manager of the Frysian Urban Sanitation Program Mozambique and solicited for a budget to purchase another tractor or a truck. Last but not least, the strategic plan of the Municipality describes the lack of revenues as one of the weak points of the municipalities' activities (Municipality of Xai-Xai, 2009).

Besides the lack of means, visits of public persons and public holidays have an impact on the regularity of the municipalities' collection scheme. The celebration of the Day of Disabled people, a visit of the provincial governor at the municipality office and the visit of President Guebuza on the Mozambican Heroes Day all disarranged the planning of the collection. The municipality workers shift to the cleaning of gardens and public spaces and apparently omit the domestic waste collection for that day. The two interviewed waste collectors narrate that the Head of the Department instruct them on a daily basis. In the morning they hear in which neighborhoods they will collect waste that day or what other activity they should execute.

Phone calls of important people influence the collection schedule. A phone call of a director from the directors' neighborhood made the head of the sanitation department change the collection route. The prioritizing of some neighborhoods above others is mentioned by a few interviewees and confirmed by municipality workers. In the directors' neighborhood and in the main street of Cidade in principal a daily waste collect is provided.

According to a few citizens it is not municipality lack of means that lead to an irregular service, but the lack of efficiency and planning:

> 'I do not agree with the lack of means. It is not true. What happens here is a bad use of the little means that do exist for waste management in the city. In this city we at least have 2 or 3 small trucks and we have 2, 3 or 4 tractors. Sometimes the tractors are not used for collecting. They stand at one site during one or two weeks, take a plow and go to the *machambas* of the councilmen.'
> (Journalist, Radio Mozambique in the province of Gaza)

Whatever reason exists for the irregularity exists, the question is then how citizens know when the collection takes place and can take their waste out. Some citizens mentioned the blowing of the horn that announced the waste collection; others told that they just listened if they could hear the sound of the tractors' engine. The blowing of the horn could not be confirmed by observation.

A consequence of the irregular service and the limited announcement of the arrival of waste collection is that people put the waste outside just after the waste collection. The head of the department is unhappy with the situation because a short while after collection it seems as if nothing has been done. The waste collectors complained that they could start again while they just had passed:

> 'We collect the waste bags, leave for de 25th of September road and when we return we will find new placed bags, you see. We can't collect waste in one round.'
> (Waste collector 2 of the municipality)

Regular service and expansion of services
Previous characterizations of an irregular service are partly counterbalanced by the more or less regular waste collection service in some parts of neighborhoods and the expansion of the collection to new zones in 2010.

Almost regular was the service in the Praia zone, in bairro 9, the so called directors' neighborhood of Cidade and the mainstreet in downtown Cidade. In Praia, the collection is once a week on a Monday; in the two latter areas the collection service is except for Sundays more or less on a daily bases. The existence of regularity could be observed since the majority of the citizens in that areas put the waste on the street ready for being collected. The regularity was confirmed in an informal chat with the workers of the second shift team in downtown Cidade in which commercial waste of the main street is picked up and waste bins are emptied.

The waste collection expanded in 2010 to new areas in the zones of Patrice Lumumba and Inhamissa. Several citizens noticed that since that year the tractor started to pass by, yet the majority of the citizens do not have the availability of a collection service. The data of citizens waste disposal methods in subchapter 5.2.1 and figures of an earlier research assigned by the Ministry of Public Works show that most people have made other arrangements. The latter research demonstrates a 62% of the households in the Cidade that benefit from governmental waste collection and a 10% of the households in more semi-urban neighborhoods (Africon, 2009).

The expansion of services can mainly be explained by the increased number of means. While in 1998, when the municipality started only one tractor was available for the whole municipality, anno 2011, the municipality possesses 5 tractor wagon combinations. Some means like brooms, wheel barrows and waste bins are bought with municipality means; other means like tractor wagon combinations are financed by the national government or international organizations.

Focus of collection in main streets
Whether the service is regular or irregular, a characteristic of the door to door collection is municipalities' apparent focus on the main streets of neighborhoods. A few interviewees imparted that waste is gathered at the main streets of neighborhoods:

> 'You have people that not succeed to leave their waste at that place because they live inside [the neighborhood]. People that live at the main street they profit. The ones that live in the neighborhood they do not have that option.'
> (Jaimen, unemployed, Inhamissa)

However not researched thoroughly it appears that the collection indeed is limited to the main roads of neighborhoods; those who are accessible for the Municipality tractor. In subchapter 4.4.4 three reasons for the limited accessibility of roads were distinguished, namely erosion, the putting of waste on the roads and spontaneous urbanization, so roads are rather footpaths then roads. In all the cases the tractor wagon combination can't pass by.

Street sweeping and collection by bins
Street sweeping can be considered as a form of collection. The work is executed by 2 groups of 15 ladies that manually clean the paved parts of the main street of downtown Cidade, three parallel paved roads as well the side roads of that area. The ladies arrive at the municipality, get their brooms and other equipment and off they go to the indication working location. Their work is carried out on a daily bases at nighttime, except for Sundays. Citizens noticed this activity and some of them valued it in a positive way:

> 'Nowadays they [of the Municipality] sweep the streets well. In the past I saw waste. Since then you will not find a peel of a banana or orange.'
> (Eliza, housewife and farmer, Inhamissa)

Another citizen, one who perceived the city as dirty, evaluated the street sweeping critically:

> 'There is no one to control their work and they do not have equipment to execute the cleaning. They say they clean the city but it isn't efficient. It is necessary that someone, after their work is finished, confirms because waste is going into drainage systems and block the tubes. Someone has to be on top of the events.'
> (Abdul, company manager, Cidade)

The interviewed cleaning lady can't agree with Abduls' point of view of badly executed work, but she admits that she doesn't have sufficient cleaning materials. Brooms, wheel barrows and spades are missing as well as raincoats and shoes for the execution of the work in bad weather circumstances. Other cleaning ladies comment that the new purchased brooms are of a bad quality; the plastic connection between broom and stick breaks easily. Purchases of new materials are public tendered; according the head of the department purchases such as the substitution of brooms have to be authorized by the municipalities' council.

Observations of the swept parts of the city show a relatively clean area. At nighttime the ladies can be witnessed working at a high pace and dedicated. They sweep the pavements as if it is their own house and garden. Unlike the workers of the door to door collection teams, they are not contracted by the municipality but giving a one year job by the National Institute of Social Security (INSS) and receive 1.000 Metical (€ 24) on a monthly bases.

In the downtown paved part of Cidade waste is partly collected by a number of bins that are placed by the municipality. The waste bins can be found on the pavement on almost every corner of the main street. The bins are used by the ladies that sweep the streets and put the content of the wheelbarrows in. Citizens utilize bins but infrequent as could be read in the former subchapter. At the Limpopo market one receptacle can be found.

The number of bins is increasing, although they only cover a small part of the city. Funds of the Frysian Urban Sanitation Program Mozambique were used to enlarge the number. The head of the department intends to increase the existing number.

Collected material
In principal all the waste items placed or littered by citizens are collected by the municipality. Hazardous types of waste such as batteries finish in the same wagon as other waste.
Formally no separation occurs. Unofficially the waste collectors do divide the garbage in organic and rest materials and materials that can be resold such as plastic and glass bottles and iron. As could be read in subchapter 5.3.2 the co-worker explained his action because it helped him to buy a bread. Another collector clarified that 'All the waste is business.' The separation of waste items was only observed during the domestic waste collection with the tractor wagon combination.

The domestic waste is collected in former rice or plastic bags, bins or from a pile (subchapter 5.2.2). The former rice bags and bins are emptied and returned to the owner; the plastic bags are taken by the collectors. Sometimes the waste items are piled up in a corner in or just outside the garden. In that case the municipality workers gather the garbage on a cloth with a hayfork or bare hands and then lift it up into the wagon. This part of the work is filthy with rotting and insect attracting materials that have to be joined and above all is delaying the pace of the work. As one of the key-informants observed:

> 'The big problem is that waste is not prepared in the house. It is not put in plastic bags or bins. That complicates the process of waste collection.'
> (Head of environmental studies at the university in Xai-Xai)

5.4.2. Waste disposal

The Municipality applies two ways of domestic waste disposal. The waste is discarded on one of the three dumping sites or is used for closing eroded areas of streets.

Dumping sites
The municipality indicated three dumping sites in the city. One can be found in the downtown part of the Cidade, one is located in neighborhood 9 in the upper part of Cidade and in third can be found in the dune area in Praia. The head of the sanitation department comments:

> 'We do not have a landfill. We put the waste in a crater in neighborhood 9. That's behind the provincial hospital.'
> (Head of sanitation department, municipality of Xai-Xai)

According the head of the department the municipality intends to create a landfill but is analyzing the possible contamination of different sites. The rules of the ministry of MICOA prescribe an environmental assessment study. The costs for such a study amount to 40.000 US dollars and should be paid by the municipality. The amount isn't available yet.

After the waste is collected in one of the areas, the tractor goes to one of the dumping sites and unloads the wagon. Three wagons can be emptied mechanical and two have to be cleaned manual.

Closing erosion pits
Employ waste as a mean to level eroded roads was already discussed in subchapter 4.4.4. Citizens as well municipality workers dump the collected waste in the eroded parts of streets:

> 'When it is raining, you can see the sites, *epaa*, something needs to be done! One part you can't even look at it. Thus the waste that I always leave at the street is collected and put in the wagon. Then they [of the collection service] leave it in that eroded parts as well. There you have some big holes. They leave it there to level the area.'
> (Jaimen, unemployed, Inhamissa)

The research couldn't clarify whether this form of disposal is an instruction of one of the municipality managers, a spontaneous act of the waste-collectors themselves or requests of inhabitants of neighborhoods. The number of examples though demonstrates that the dumping on the street by municipality workers to fill up eroded roads isn't an incidental phenomenon. In the focus group the divergent actions of the municipality in different neighborhoods and the reason for that is being discussed:

> Fabião: 'The same municipality confronted with the same problem which in this case is the struggle against erosion. Having the same problem in downtown Cidade and in *bairro* 2000, why do they use waste at one point and red soil at another point?'
> Cathelina: 'I believe that if they let the waste there and cover it, it could reduce the problem. But they leave the waste just like that. It doesn't resolve anything.'
> Fabião: 'They do not resolve anything because not all types of waste can be used in the fight against erosion.'
> Paulo: 'But this people do not have education.'
> Cathelina: 'They do not have education!'
> (Focus group discussion)

For road works in different neighborhoods a varied treatment appears to exist in which some apparently get a preferential one.

The low level of education of municipality workers was by the focus group determined as reason for these actions. The interviewed waste collectors both had gone to school in the colonial times but only finished the second grade of the primary school. The low education is furthermore confirmed in municipalities' strategic plan. The strategic plan narrates about the lack of sufficient and qualified staff. It also indicates that existing staff is not deployed as how it should be (Municipality of Xai-Xai, 2009).

The disposal of material gathered by street sweeping
During street sweeping of the main street in downtown Cidade waste is gathered in wheelbarrows. The full wheelbarrows are either emptied in the waste bins that are located in the main street or just thrown over in an unpaved side street or a corner where already garbage can be found. The swept materials are partly put in municipality waste bins which on the following day will be collected by one of the motorized collection teams.

The transfer of the content of the wheelbarrow into the waste bins is not without problems. The waste bins are around 1 meter high and a filled wheelbarrow heavy to lift. Two ladies are needed to empty the wheelbarrow. This could be a reason for the emptying of the wheelbarrow just around the corner. It is a quick action that can be executed by only one lady. Another reason was mentioned by one of the street sweepers. She reacts on the interviewers' observation:

> Interviewer: 'The ladies that sweep didn't put the waste in the bins but left it on the road.'
> Interviewee: 'Yes. We leave it there because it is only sand. Sand only.'
> Interviewer: 'Thus when it is only sand you can leave it on the street?'
> Interviewee: 'Yes, whatever can't be taken by wind can be left on the road.'
> (Worker of the municipalities' street sweeping team)

Observation of the street litter show besides sand, cans, chips bags, cell phone recharge cards, corncobs, tree leaves, etc. If the disposal of waste by throwing over wheelbarrows is a spontaneous act of the ladies or was instructed by one of the managers didn't became clear.

5.4.3. Regulations

Legislation on waste is written down in the municipalities' *Codigo de posturas.* In the code waste is part of the regulation on public hygiene and environmental protection. Education and monitoring of the norms in the code are perceived as the means for the municipality to guarantee public health. In the document is described that citizens are responsible for domestic waste:

> Article 92 – Domestic waste has to be deposit in closed 'holders' and put in receptacles from where the public cleaning service will collect it or in case there is no existing public cleaning service, has to be brought to the dumping sites.

Article 88 prescribe that waste has to be put in receptacles between 21.00 hours and 06.00 hours. The same article mentions the municipalities' obligation of creating and promoting of the creation of waste collection points in all inhabited zones. The *codigo* includes a fining system. For littering a fine of 100 Metical (€ 2,40) will be given. For not removing waste a 50 Metical (€ 1,20) can be given (Municipality of Xai-Xai, 2003).

According the head of the municipality department the regulations are limited:

> 'There [in the code] you only have a few things. We are thinking about another document that will help us in the management of solid waste.'
> (Head of sanitation department, municipality of Xai-Xai)

Rules for waste collection and disposal are indeed poorly formulated. The *Codigo de posturas* doesn't inform citizens about collection schedules and how the waste has to be organized. Also the defined violations and fines seem to be outdated. Possible is the document so outdated that the councilman in a first interview disclaims the existence of a code. In the follow-up meeting he notes that the existing *Codigo* is not very clear and rigid, that the document has to be revised. The councilman expresses that the municipality on that point could need some assistance.

The head of the municipality police is still using the *Codigo de posturas*, and indicates that the fines have been raised. Nowadays the fines vary from 200 Metical (€ 4.80) up to 16.000 Metical (€ 384). However the fulfillment of the code isn't yet optimal, he perceives that the system is working nicely. An opposite view is presented by one of the key-informants:

'The municipality police never monitor the management of waste. Because people do litter, that kind of things, leave the waste outside. We do not have fines.'
(Head of environmental studies at the university in Xai-Xai)

Control and monitoring on waste and littering seems to be limited. The insufficient control and monitoring in combination with a limited communication could be a possible explanation for the limited knowledge of citizens on regulations. The *Codigo de posturas* is pretty unknown by the citizens as could be read in subchapter 4.4.2 on the cleanness of the city. A few citizens remembered that Xai-Xai had legislation on waste and littering in colonial times. Only technical staff that directly is involved in municipalities' regulation is aware of the existence of actual regulations.

5.4.4. Communication

Waste is a communication topic between municipality and citizens. From municipality side the focal point of the communication is on waste and the prevention of related diseases. From citizens' side the payment of a tax without receiving the waste collection service seems to be the main topic. The perspectives of different actors were described in the chapter on framing in respectively subchapter 4.4.1 and 4.4.3. The emphasis of this subchapter is about the municipality methods of communication.

Community meetings
For waste and health related issues the municipality employ the existing lines of communication with the appointed and chosen community leaders. As could be read in subchapter 5.2.3, the city is divided in administrative zones, subsequently subdivided in neighborhoods, *quarteirões* and blocks of 10 houses. Communication and instruction about governmental issues follow the administrative lines; the representatives are the nodes in the network. They receive the information and are responsible to transfer it to a lower level. For that community meetings are organized. An example of how a citizen received instruction:

> Interviewee: 'In this zone they tell us to clean because of the mosquitoes that could grow.'
> Interviewer: 'Are that the representatives of the neighborhood?'
> Interviewee: 'Yes. '
> Interviewer: 'They instruct already for a long time or are the instructions of a more recent date?'
> Interviewee: 'It isn't recent. When we have a meeting we always talk about those things. You have diseases such as cholera that can cause death because of the dirty water, thus we have to boil the water to kill the insects and then we can drink it.'
> (Eliza, housewife and farmer, Inhamissa)

The recent establishment of a city sanitation commission is another example of how communication and instruction is organized. The commission on city level with participation of both administrative as chosen community leaders will have to instruct the commissions on neighborhood level.

> 'I like to say that the municipality works in the sense that we try to influence the behavioral change of the citizens in the management of solid waste and sanitation. As a consequence we decided last year to create health and sanitation commission on the level of the *bairro*. The functioning of the neighborhood commissions is one of the objectives of this commission on city level. '
> (Councilman of the municipality of Xai-Xai, sanitation commission)

Illustrative in this perspective of spreading information through representatives was the remark of the mayor in a preliminary discussion about one of the participants of the city commission:

> 'That lady, she is not qualified. She will not walk from neighborhood to neighborhood to spread the information.'
> (Mayor of the municipality of Xai-Xai)

In community meetings the waste tax and the limited or non-existence of a collection service are topics of discussion. Unclear though is to what extend the complaints and remarks of citizens are debated at higher administrative levels. Only when the mayor participates in a community meeting a direct confrontation can take place between lay-people and the mayor. According the representative of one of the isolated neighborhoods in the Cidade the mayor visits the neighborhood 3 till 4 times per year. The mayor also can visit on invitation of the neighborhood in case of a situation:

> 'The population invited the mayor because of the waste tax and because life is expensive. The government said that when you go to downtown Cidade, you enter with waste in *machimbombos* and leave it in the Cidade. Thus you have to pay.'
> (João, retired, head of neighborhood, Cidade)

The meeting ended with an agitated community and a premature leave of the municipalities' representatives.

Besides the issues of the waste tax and garbage and health, no other waste topics could be distinguished as themes in community meetings. No information could be found or was dispersed on collection schedules, how to hand in the waste or other regulations.

Communication on individual level
So far the examples have been of communication between the municipality and a group of people. The administrative and executing workers do also have individual interactions with citizens. Although the communication of municipality workers on individual not was studied specifically, a few situations turned up. On individual level citizens speak to the mayor about waste, such as in the case of Abdul, the company manager who suggested a bigger role for the municipality police in educating people on littering. Already mentioned were the phone calls from directors to the councilman and the head of the department with requests for waste collection at a certain place. Assumable there must be other phone calls with garbage related issues.
During the fieldwork period the municipality received one formal complaint. A lady was upset with the waste collectors that didn't want to help her out with moving branches of the coconut tree from her garden to the street. The workers had told her that it was not there responsibility to do that kind of work; they had to carry the waste from the street, not from her garden.

Radio
Another platform where issues of waste tax are discussed between municipality and citizens is on the radio. During debates, citizens can call and contribute to the debate. The key-informant of Radio Mozambique notes:

> 'We have contributions by the phone [of citizens]. 'We pay tax, the waste is here in front of my house and the municipality is not coming to collect it.' It would be good when the municipality starts worrying with the waste collection. The municipality responds with 'We are dealing with it, we are dealing with it.'
> (Journalist, Radio Mozambique in the province of Gaza)

The municipality utilizes the radio as a communication channel nevertheless the use is erratic and incidentally. The head of the sanitation department mentioned that the last time the municipality informed the community about waste issues had been 4 months ago. The municipality has to pay for the broadcasting. Because of the payments a request of a municipality department to inform citizens through the radio has to be authorized by the councilman of Administration and Finances.

Written information
The communication between municipality and citizens is as the examples show essentially verbal. The transfer of information is predominantly by conversation. Besides the outdated *Codigo de posturas* no written materials could be found.
One citizen mentioned that she wrote a letter to the municipality to solicit for a higher frequency of waste collection for her company garbage. The letter was send two years ago but so far she didn't get a response.

5.4.5. Analysis of municipalities' waste management

The municipalities' waste management is successively analyzed by using the concepts of the enabling environment and automatic behavior.

Analysis of the enabling environment
The municipality waste management is on one hand characterized by a restrictive and irregular service. On the other hand there are examples of a regular or improved service by the placement of more and more waste bins and the expansion of services to new neighborhoods.

In the former subchapters on the municipality waste management several examples were given of problems the municipality faces in relation to its' services. Tractors brake down, fuel for tractors is limited, the city doesn't have a landfill, waste is dumped by municipality workers on the roads, citizens do not deliver waste in an organized way, the number of waste bins are limited, the *Codigo de posturas* is outdated and the existing not monitored, the communication with citizens limited, the education of municipality workers is low, the costs of the existing service do not cover the expenses, etc. The list of reasons for a restrictive and irregular waste management is long and appears to be infinite. Interesting in this perspective is the municipalities' position. In particular, the top of the municipality seems to be aware of the actual situation and acknowledge the complications they face. They seem to be motivated and willing to improve the situation and ask openly for help. But the environment in which they work doesn't seem to enable and support the municipalities' tasks. Worse, the environment of Xai-Xai even appears to hamper and restrict certain activities. Carnegie paraphrases environment as a combination of many factors such as policy and legislation, service provision, education system, cultural factors, religion, socio-political and socio-economical factors, the physical and the organizational environment (Carnegie et al, 2000). Most of the named factors seem to influence the limited and restricted waste management service of the municipality of Xai-Xai.

A broad number of factors that influences the municipality activities were discussed in the former subchapters. The dominant littering behavior of citizens in the public space can be mentioned as well as the communities' lack of a felt responsibility for the public space (subchapter 5.3.1). The bad access of roads as an environmental factor was named in subchapter 4.4.4. The following explanation will mainly focus on other not yet analyzed factors as the socio-political, socio-economical and educational factors of the constraining municipalities' environment.

A social-political factor that could be a constraint in municipalities' waste management is the relative young institute of the municipalities in the Republic of Mozambique. Municipalities were created in

1998 after the first municipality elections and only from that moment obtained administrative and financial autonomy. From independency in 1975 till 1998 the central state had governed the provinces and districts. The former Minister of State Administration in Mozambique, Cuereneia remarks that 'the creation of municipalities, local governance and de-concentration of resources is still in its embryonic phase (Cuereneia, 2001)'. The former Minister points out several existing problems on municipality level such as the weak knowledge on legislation, the limited technical competence, a low service, delays in budgeting and lack of investment funds.

The two latter issues bring the discussion to the social-economical factors of the municipality. Mozambican municipalities do not have sufficient financial funds and revenues do not cover the costs of municipalities' activities. Like the population, the municipality seems to be poor. A study executed in four medium sized municipalities in Mozambique concludes that municipalities continue to be constrained in their ability to deliver effective services by extremely low resource levels, both in terms of financial and human resources (Harding et al, 2004). According the researchers the municipalities do not collect all the taxes and even in well managed municipalities the revenues remain extremely low. They established that the major expenditure is on human resources of the municipality. Last but not least, municipalities depend heavily on financing by donors. This picture sketched by Harding assumable is applicable for the municipality of Xai-Xai. The top of the municipality council stated that the revenues of the waste tax do not cover the costs and the lack of revenues is perceived as one of the weaknesses of the municipalities' organization (Municipality of Xai-Xai, 2009). In different platforms municipality representatives asked for help of the community as well of (potential) donors. The position the municipality of Xai-Xai holds, is not unique in Mozambique. All the urban municipalities have a waste management problem and as can be read in the newspaper Noticias they all try to find means for the garbage problem in their city.

The municipalities' lack of means and funds is assumable largely affected by the impact of the two wars. Klees described the damage of the countries' infrastructure and the collapse of the economy due to the liberation war followed by the civil war (Klees et al, 1997). For a poor municipality with no existing infrastructure and limited, it is complicated to provide any service.

The education level of the staff is another factor that assumable influences the municipalities' activities. In former subchapter 5.3.1 the general low education level and illiteracy of the Mozambican population was discussed profoundly. This low education level seems to be applicable for the municipality staff. Where the administrative and political top of the municipality had a certain level of education, the majority of the staff appears to have low education levels. The lack of sufficient and qualified staff and the deployment of the staff are described as constraints in the strategic plan of the Municipality (Municipality of Xai-Xai, 2009). It implies that initiatives and activities such as the development, implementations and monitoring of policies, the *Codigo de posturas,* a tax system and communication activities with the population depend on a few persons at the top of the organization. The limited number of capable staff in combination with the hierarchical culture in which subordinates in general wait for instructions doesn't make the institute of the municipality decisive in service providing.

The combination of the diverse intertwined environmental factors such as the poor financial situation of an institute in a post war situation, the young municipality organization and the low educational level could explain municipalities' working method in which the managers prioritize certain areas. If means are limited and other factors such the physical environment constraining than the choice for a few priority areas could be a logic one. The chosen areas are the commercial area at main street of downtown Cidade, the part of downtown where the governmental services reside and zones where apparently the more important citizens live, such as in Praia and the directors' neighbourhood. These areas are the older neighbourhoods where the most tarred roads and an organized form of urbanization can be found, i.e. in which the environment is enabling to provide a waste management service.

The regularity of the collection service in the priority areas is possible caused by the a combination of factors such as the high quantity of produced garbage and thus visible necessity of collecting, the possible negative image of the city and its' administration when waste can be found in public spaces where many citizens pass by and because of requests of upper class citizens to collect the waste. As a consequence, waste collection and street sweeping in these prioritized areas seem to become frequent repeated actions.

Analysis of automatic behavior
In the analysis of an enabling environment a distinction came up between zones in which the municipalities' waste service is restrictive and irregular and zones where the opposite takes place. The waste in the latter prioritized areas seems to be managed on a regular and frequent basis. In the main street of downtown Cidade, Praia and the directors' neighborhood the collection of waste and for downtown Cidade the street sweeping seem to be constant.
The principal actors in waste collection and sweeping are the head of the department, the waste collectors and sweepers. In the main street of downtown Cidade, Praia and the directors' neighborhood they frequent repeat their activities. The question then is whether or not the frequent repeated actions of these actors can be considered as an automatic behavior? What could be observed where street sweeping ladies who didn't wait for the head of the team for instructions; they arrived at the municipality office to collect the broom and wheelbarrow and left immediately for an indicated location in downtown and started working. Also the second shift of one of the waste collection teams didn't hesitate. The tractor was started and off the collectors go. Assumable these actions can be described as automatic behavior. For these workers for that specific areas the collecting and sweeping appeared uncontrolled, effortless and almost unconscious i.e. an automatic behavior (Thaler et al, 2009).

The automatism of actions assumable can't be found for the collection in zones such as Inhamissa and Patrice Lumumba where the garbage is collected irregular and restricted. Furthermore it dissolves when one of the tractor wagon combinations brakes down. The opposite of automatic behavior can be described as a conscious behavior or reflective cognitive system. In the conscious process people careful evaluate situations and pay attention to details. Specifically the head of the department appears to be involved a careful evaluation process. He has to makes choices where to collect garbage or not. Thaler describes the reflective cognitive behavior as a behavior that is characterized by control, effortful, self-aware, slow and rule-following (Thaler et al, 2009). Except for the collection in Praia and the second shift that collects commercial waste in downtown Cidade, the head of the department appears to decide on a daily bases where the collectors go to. He evaluates daily the collection schedule of the former days, the availability of means and is sometimes steered by the orders of mayor, councilman or certain important and influential persons. His decisions on the collection schedule seem to be taken controlled and conscious.

Where the behavior of the head of the department in particular possible is triggered by a conscious, reflective process, the garbage collectors possibly still seem to follow an automatic behavior. The interviewed waste collectors indicated that they receive daily instructions from the head of the department on their activities of that particular day. They just like yesterday and the day before yesterday wait for daily instructions of the head. The waiting for instructions seems to be a typical behavior for the authoritarian Mozambican culture. As already described in subchapter 5.3.1 in hierarchical cultures subordinates do not show too much initiative; they rather follow the rule. Akande cites that the Mozambicans in the tradition of the African culture are learned to respect seniority and obey elders and authority. The scholar describes mature adults as 'careful, cooperative, obedient and willing to help (Akande, 2010)'. Hofstede who established power distances for a number of countries concludes that in countries such as Portugal and Brasil high power distances exist. Mozambique assumable is comparable with these countries through their Portuguese colonial history. According Hofstede the power in these high power distant countries and organizations is

concentrated in de hands of a few. He remarks that subordinates in these cultures do expect instructions. Furthermore he mentions the low education level of staff as a characteristic (Hofstede, 1991). These paraphrases seem to apply for the case of Xai-Xai, in which the collectors, except for the second shift in downtown and Praia, literally seem to halt till the head of the department gives an instruction where to go to or what to do. The hierarchical culture assumable reinforced the waste collectors' automatic behavior of waiting instead of taking initiative or questioning issues.

6. Conclusions and recommendations

6.1. Introduction

The principal question of this MSc thesis is about the solid waste management perceptions and behaviors in the city of Xai-Xai. The research looked at the actual behavior of both citizens and municipality and tried to explain the rational of the solid waste management behavior. To answer the main research question three sub-research questions were formulated:

- What is waste according the citizens and municipality and is waste perceived as an urgent problem?
- How do citizens and municipality manage solid waste at home and on the street?
- What is the rational of actors' behavior?

This chapter starts with the findings on the sub research questions. In subchapter 6.3 an overall conclusion will be drawn and discussed. The limitations of the case study are described in subchapter 6.4. The chapter ends with recommendations for the municipalities' administration.

6.2. Waste perceptions, behaviors and management in Xai-Xai

Firstly, the findings on citizens' and the municipalities' frames on waste and waste problems are described. Subsequently the findings on the waste management behavior of actors will be recapitulated whereby a distinction is made for domestic waste disposal, citizens' behavior in the public space and the municipalities' waste management.

6.2.1. Waste is…

The citizens of the city of Xai-Xai were quit unanimous on what they consider as waste. For the large majority of interviewees it is the leaves of trees and secondly other organic materials. Changes in the volume of waste items were related to the planting or cutting of trees. Several respondents mentioned that waste is that what is swept in the morning; in this case it is the leaves of trees.

How waste is perceived seems to be the reflection of people standard of living. In Mozambique half of the population lives close to or below the poverty line. In the city 60% of the inhabitants live from agricultural activities. At least half of the group interviewed citizens seems to have a low standard of living in which they assumable do not have the means to buy commodities. That could explain why the majority of the citizens didn't see changes in the type of waste material over the last 10 year. Only two richer interviewees perceived that waste items had been changed from organic toward non-organic items.

Waste is considered as such when it is not longer usable; when an item losses utility. This decision whether an item is still of value of trash, useful or useless is a personal matter: what waste is for one person can still be usable for another person. In the case of Xai-Xai the majority of respondents only made a distinction between useful or useless. Concept as reuse, reutilization and recycle were not recognized. Only after an example of the researcher interviewees came up with several examples of items that they gave a second or third life.

Other almost unknown concepts are non-organic and organic waste and the environmental impact of waste. Citizens rarely spoke about and if so, then only the people that work in the field of waste collection or environment and by those that are in the top of the municipalities' administration. In the context of Xai-Xai these terms seem to belong to the technical area.

In the perspective of the interviewees waste causes problems in the city of Xai-Xai. The perceived problems are divergent and sometimes intertwined and focus on 4 themes, namely waste causing diseases, the cleanness of the city, the payment of the waste tax without a service and the complicated roads access.

A strong almost unique frame exists for the connection of waste attracting insects that cause diseases. The frame is for citizens the reason to treat garbage in a way that it limits the attraction of insects. Years of governmental health campaigning must have influenced this perspective.

Various, sometimes conflicting frames do exist for the other perceived problems.
For the cleanness of the city various frames exist of people who perceive the city as clean, cleaner or dirty. On this point citizens perceive different realities. The citizens who perceive a dirty city are the mayor, some interviewees with a higher income and the key-informants.

The payment of the waste tax without having a collection service is by citizens seen as an unjust action of the municipality. Citizens are agitated and do discuss the issue with peers and neighbors. The tax is discussed on the radio and in community meetings and leaded to some tense interactions between municipality and citizens. Only one person tried to reframe the discussion of the waste tax. The mayor explained publicly the importance and necessity for the payment of the waste tax.

The actors in the city of Xai-Xai perceive a number of road related waste problems. In some areas garbage is used by citizens and municipality for leveling eroded parts. Where some actors see that action as a solution, for other people is the use of waste as an erosion solution perceived as a problem since waste is attracting insects and causes diseases. In other parts of the city waste block roads or drainage systems and last but not least roads are not accessible for the waste collectors.

The limited number of interactions of actors with conflicting frames that came up in the research doesn't provide sufficient material to elaborate a finding on the urgency and build up tension around the waste management problems in the city. What can be established is that tension, agitation, critics and emotion does exist around the waste problems. So far, it seems that mainly people holding the same ideas and perspectives discuss the problems with each other.

6.2.2. Waste management behavior

Domestic waste disposal
Citizens employ a broad range of disposal methods for their domestic waste. The largest number of respondents uses a pit, some people make use of the municipality service and a few burn or dump the waste. Some citizens exercise a number of waste disposal methods that could include the use of waste to cover eroded parts in gardens or of the road.

The chosen waste method on household level depends on the existence and regularity of a municipality collection service, the instruction of the neighborhood representative, the existing habits and the necessity of waste for closing erosion pits. If one method is chosen, the majority of the interviewed citizens seem to use that form of disposal for a longer time.

For citizens that only employ one method, waste disposal can be considered as an automatic behavior. For a daily returning activity of getting rid of waste assumable citizens do not want to put too much effort in evaluating the activity. They want to dispose the garbage fast, effortless and skilled, all characteristics of an automatic behavior in which people make short cut decisions.

For the group of citizens that applies various methods, the disposal can depend on the occurrence of erosion or the arrival of the municipalities' waste collection team. For them, the waste disposal can be seen as a conscious process in which the central route of processing information takes place. Regularly those citizens consider and evaluate what to do with their waste. They control the process and put effort in their work for example by filling bags with sand to avoid further erosion. This behavior is typical for the central route of processing information and can be seen as the opposite of automatic behavior.

The majority of the interviewed citizens treat the waste in the same way as their neighbors. Especially in the smaller and more isolated neighborhoods of Praia and Cidade this collective behavior could be found. The phenomenon can be explained by the more practical reason of the availability of a waste collection service and the organization and the social cohesion of the neighborhoods. Mozambican municipalities seem to have a relatively high grade of organization. An instruction of the municipalities' administration goes through the hierarchical line of different community levels and ends at more or less street level. In community meetings on street level participants receive the same instruction. The social cohesion of a neighborhood or street assumable reinforces the following-up of the instruction.
Where citizens of the same neighborhoods employed different waste management methods on household level it could be explained by the occurrence of erosion and the relative short existence of a municipality service. In the latter case some people start to hand the waste in, while others hold on to the existing habits.

Citizens' waste behavior in the public space
In the public space of Xai-Xai citizens do litter. The examples of interviewed citizens, of street observations and the result of an experiment in which an average 92% of the citizens threw the sweet wrapper on the ground are overwhelming and lead to the finding that littering is an automatic behavior. The large majority of citizens just throw whatever kind of item they hold and want to dispose on the ground. The act is executed without paying attention, effortless and thus automatically. Assumable the behavior already exist for ages. Some interviewees remarked that the behavior was brought from the rural areas. In any case people and especially children were observed eating sugarcane, corn cobs and peanuts while walking on the street; the left-overs are spitted out or thrown away immediately. Nowadays the same behavior continued for non-organic waste items as chip bags, cell phone recharge cards and bottles.

The act of littering seems to be normal. In observation no corrective behavior could be established and only a few interviewees mentioned that they criticized the littering behavior of other citizens. Those criticized citizens had responded either arrogant or aggressive.

The use of waste bins doesn't seem to be an automatic behavior. In the experiments a minority used the waste bins. The act of using waste bins apparently is not frequently repeated and thus didn't become automatic. The absence or limited number of waste bins in the public spaces as well at home could explain the restricted use.

In two situations the apparent automatic behavior of littering almost stopped, namely when citizens travel to South-Africa and during the second experiment in which participants received a hand-out with the appeal not to litter. Interviewees who had travelled to South-Africa or have family members in that country mention the strict legislation what made them stop littering. In the case of the hand-

out experiment a possible explanation of the non-littering behavior can be the authoritarian culture in which citizens follow the given rules. In both situations the disposal of waste items suddenly became a conscious and thoughtful process in which people follow the central route of processing information.

The possible explanations for littering in the public space are diverse. The automatic behavior was already mentioned. The collectivity of littering behavior and the non-enabling environment can be seen as other rationales. The explanations seem to be intertwined and reinforcing the dominant behavior of littering.

In relation to the non-enabling environment can be established that the city of Xai-Xai has a limited number of waste bins. Only in downtown Cidade and Praia a number of waste bins can be found. Furthermore citizens do not know about the rules on waste and littering. The municipality doesn't communicate existing rules neither the rules are they monitored.
The collective behavior of littering can be explained by the loss of civilization and moral values and the lack of felt responsibility for the public space. Possible causes for the loss of civilization are the death of the first leader of the country Samora Machel who promoted stringent cleaning activities, the relatively high number of children that grow up in one parent families, migration from the rural to the urban areas and the quality of education.

If people do litter more in a dirty than in a clean environment couldn't be established by this research. In the two executed experiments, a slight difference could be found in which in the dirty environment more littering took place. Possible reasons for a higher number of people littering in the dirty environment neither the significance of the difference were studied.

Where the majority of citizens in Xai-Xai seem to litter, some of the citizens were observed in collecting waste items of the street. Especially plastic and non-refundable bottles were picked up from the street and beach, sometimes in considerable quantities. Whether or not the collection is for personal use or purposes of resale and the magnitude of the collection wasn't established.

Municipalities' waste management
The municipality waste management is characterized by a restrictive and irregular service as well a regular, expanding and improving service. The differences seem to be neighborhood related. A regular service of waste collection can be found in the downtown part of Cidade, the directors' neighborhood 9 of Cidade and in Praia. Other neighborhoods and zones undergo an irregular and restrictive service. The provided service is focusing on the collection of domestic waste. For the downtown part of Cidade the service includes the placement and collection of waste bins, the sweeping of the street and the collection of commercial waste.

Various reasons can be mentioned for the restrictive and irregular waste management of the municipality from tractors that brake down, the low education level of municipality workers, the limited resources of the municipalities' administration to the limited communication and monitoring of activities. In short, the municipality is not capable and doesn't have the capacity to create an environment in which a waste service is provided for all the citizens and neighborhoods.

Different interrelated factors contribute to the non-enabling environment. The automatic and collective behavior of citizens littering can be mentioned as well as the limited access of certain roads. A social-political factor is the inexperience of the municipality; the institutes were established in 1998. The liberation and civil war must have had its' impact on the lack of financial means and human resources of the municipality. After the wars the countries' infrastructure as well the economy had collapsed. Because the municipalities' revenues do not cover the costs, the administration is limited in contracting educated and capable staff. On this moment the organization

of waste management is in the hands of just a few educated people who are responsible for all the activities.

The various mentioned non-enabling factors could explain the choice of the municipality to select some priority areas in which a regular service is provided. The prioritized areas are the places where the amount of produced waste is considerable higher, where waste can have a large negative impact on the administration of the municipality and in places where the upper class citizens live and work.

In the prioritized waste management areas the municipality workers seem to follow an automatic behavior. When they start working, they collect the means to execute their work and off they go. The automatism can be explained by the repeating of actions and the absence of instructions. The decisions to start and execute the work seem to be unconscious and effortless.

The behavior of waste collectors in areas where the waste collection is irregular also appears to be automatic. The waste collectors arrive at the office and wait for instructions of the head of the department. The hierarchical culture reinforces the repeating action of waiting.

The actions and decisions of the head of the department are far from automatic. He decides on a daily bases where waste collection is executed. His decision is based on the collection schedule of the former days, the availability of means and requests or orders of the mayor, councilman and other influential persons. His decisions are careful evaluated and consciously taken.

6.3. Conclusion and discussion

The starting point of this thesis research was the remark of the mayor of the city of Xai-Xai heard by a representative of the Frysian Urban Sanitation Program Mozambique. The mayor framed her city as a dirty city and implicitly asked for a change. The study tried to establish what could be the actual problem of the solid waste management of citizens and the municipality. A broad range of data was collected and prevailing behaviors, frames and explanations could be discovered.

A main explanation for the behavior and frames that citizens and municipality of Xai-Xai hold is the non-enabling environment. The study results give strong indications that in many cases the rational of actors' behavior could be triggered by poverty. Both cities' administration and the majority of citizens seem to be largely influenced by a lack of means, inconsistent schooling and general low education levels.

Poverty triggered a whole range of interconnected and intertwined actions and behaviors. A possible example could start with the poor municipality who is not able to maintain the city roads. So after severe rains the municipality as well citizens start to level the eroded parts with what is available and for free, namely waste. The road reparation sometimes leads to the blocking of roads, so the municipality cannot collect garbage at certain places. In other cases people get agitated; the dumped waste attracts insects which cause diseases. Moreover the waste dumping is bad for the municipalities' image and gives citizens the impression that it is normal to leave waste on the street. The mayor is upset by citizens' behavior but doesn't have the means to change it.
Assumable poverty made the municipality decide to prioritize certain areas. Poverty made citizens angry to pay a waste tax, because every amount is necessary to cover the costs of daily life. Poverty leads to an unorganized delivery of waste because citizens are not capable to purchase plastic or former rice bags. The unorganized delivery delays the pace of the municipality collection service so that day the workers do not reach all the households. Poverty is characterized by a limited quantity of non-organic waste materials and a significant reuse of items, etc.

The given examples are typical for complex systems. In complex systems relations are not causal in the way that A causes B; the relations between different explanations seem to be part of a far more complex network of non-linear relations. 'In those complex systems no single factor is the cause of the problem (Morgan, 1998)'. Factors are multicausal and lead to certain behaviors and frames in a particular context.

Following the line of thought of complex systems we may conclude that the problems the municipality of Xai-Xai faces, such as the lack of means and the littering behavior of citizens, are assumable not resolvable by one single solution. Littering, for example, is seen as a normal behavior; a socially approved habit. If the mayor wants to change that behavior, she has to introduce changes beyond an action of placing waste bins. Just the placing of waste bins will conceivable not trigger other behaviors or perceptions.

In this perspective of a complex network of non-linear relations is the changing habit of citizens or family members of Xai-Xai that travel to their neighbor country South-Africa illustrative. The same citizen that apparently has an automatic behavior of littering in Mozambique is behaving differently in the context of South-Africa. The act of littering suddenly becomes a conscious phenomenon but supposedly it is not only the change of consciousness. In South-Africa waste bins are available, the legislation is known and monitored and assumable citizens educate their children not to litter, i.e. the whole system with its' complex non-linear relations is different. Scholar Benedict suggests that what is seen as normal in one context can be considered as abnormal in another culture. Where the littering appears to be socially approved in Xai-Xai, it isn't in the context of South-Africa. She deems that 'the vast majority of the individuals in any group are shaped to the fashion of that culture (Benedict, 1934)'. For the mayor of the city of Xai-Xai the former implies that she almost has to change the culture if she wants to halt the littering.

The question that can be asked is whether or not the mayors' desired change can be established in a complex system or culture where so many interconnected relations can be identified? The theory on chaos and self-organization considers two possible events. In one view the complex network can be seen as resilient, i.e. a change of one of interconnected relationships doesn't lead to a change of the system. Those resilient systems are according Gilchrist often characterized by a low number of interactions with the outside world. Forms of organization and thus behaviors are reproduced because they fit best in a certain environment (Gilchrist, 2000). The second view comprehends the change of a system by minor events. A small change triggers another change that leads to another. At the end, the system changes to a new pattern (Morgan, 1998). In this view instability and chaos of a system is seen as a resource for a change of a society or organization. Morgan mentions 'the need for a sufficient degree of internal complexity, randomness and diversity (Morgan, 1998)'. Situations of chaos lead to new forms of self-organization and thus order.

The thesis research couldn't give an answer on the question whether or not the mayors' desired change can be achieved. What could be observed where a number of interactions of actors holding different frames, such as some citizens who criticized the littering behavior of other citizens and the halt inhabitants of a neighborhood to the dumping of waste by municipality workers. According theorist Morgan, the change of a system is possible by creating a new context. This can be done be either changing mindsets or mobilizing a group of powerful key individuals (Morgan, 1998). The mayor of Xai-Xai together with some key-informants and richer citizens could become such a powerful attractor. What and how it will happen though will depend on the whole complex system and the action and reactions of all involved actors.

6.4.   Limitations of the study

In the first chapter a knowledge gap was identified in relation to the waste management behaviors of the citizens and the ambition of the municipality of Xai-Xai. To research the issue, a case study was elaborated and executed. For the case a social constructivist approach was chosen. Interviews, observation, focus group discussions and screening of documents were used as research method. The theoretical framework included 5 key-concepts on framing, chaos and order, automatic behavior, collective behavior and an enabling environment. In general the chosen approach and research methods as well the theoretical concepts were perceived as useful. Both research methods and concepts appeared to be complementary and could give various new and enlightening insights on the waste management behaviors of citizens and the municipality of Xai-Xai.

Some critical remarks can be made in relation to the study. Successively the limited period of field work, the limited time for observations, the experiments, the littering on household level, the absence of observed interactions and the language barrier will be discussed.

To study behavior and in particular the rational of a certain behavior, a three month field period to collect data is utmost limited. Peoples' behavior is influenced by many factors, so assumable the research brought up some issues but not all. For example, the possible impact of the relatively recent ended wars and the high number of HIV Aids infected people on perceptions and behaviors were not touched upon in this research. Around 12% of the Mozambican population is infected with the HIV Aids virus. For the city Xai-Xai the situation seems to be worse; in a research executed between 2002 and 2006 more than 40% of the pregnant women appeared to be HIV Aids infected (UNAIDS et all, 2008). In general citizens do not speak about HIV Aids infection and other taboo issues such as the wars. In the former subchapter an overall conclusion of the study was drawn: citizens' and municipalities' behavior are part of a complex system of non-linear relations. It is assumable that in those complex systems the 'taboo' issues as well other not yet recognized issues could have an influence on actors' perceptions and behaviors.

A second limiting time aspect is the short period spend at household and municipality level. The time for observation of waste management activities and the repetitiveness of those actions was limited. The actions on household were merely explained and not observed. If behavior can be observed on a day to day basis probably other, more profound data can be collected of the real behavior of actors.

Where in the Western context a large body of knowledge can be found on specifically littering behavior, almost no research has been executed in the African context. In this thesis research two experiments were executed based on the Broken Window theory of Wilson and Kelling. According the scholars a disorderly environment triggers other forms of disorderly behavior such as littering. The data of the executed experiments show that citizens of Xai-Xai do litter in clean as well dirty environments. A slight difference could be established between the two settings in which more littering took place in a dirty environment. Whether the littering is significantly distinct and the reasons for the littering are not researched. In the experiments the dirty environment for example didn't have a waste bin, while the clean environment had. It is recommendable to repeat the experiments in different forms and vary the circumstances in which for example also waste bins are placed in the dirty environment. Besides that, it would be interesting to further investigate the reasons for the behavior. Last but not least the data experiment should be part of a quantitative analysis to establish the significance of the behavior.

The results of the littering experiment with sweets were conspicuous. In the experiment an average of 92% of the citizens did litter in the public space. What couldn't be established is whether this behavior is typical for the public space as well for the domestic areas. There are indications that littering also occurs on household level, nevertheless doesn't become visible because the house and

garden are swept on a daily basis while the public space isn't maintained in that way. In a subsequent research the littering on household level could be studied and related to the littering behavior on the street.

To research the different frames around waste it is important to observe and follow interactions; preferable interactions of actors holding different frames in which stress, friction and anxiety appear. In the field period some examples came up of strained situations, agitation and ambiguity. The interactions of people holding different frames though were never observed only narrated. For the research it would have been of great value to observe the interactions of for example representatives of the municipality with the community about the waste tax. Further research on the tensions, agitations and conflicts between members of the community of Xai-Xai holding different frames could give more insights in the status quo or moving state as described in the theory on chaos and self-organization. People in general do not change; they hold on to the status quo, to the things they know. They only make a move when they start to feel uncomfortable or stressed; if there is a sensed feeling of chaos. The role of the mayor is interesting in this aspect. She is the one that feels urgency to resolve the waste problems but will she be capable to create a new context and organize a group of powerful key individuals with whom she can resolve her perceived waste problem? Further research on conflicting frames could include an analysis of the roles of different actors and the various possible changing discourses.

The case-study was executed in the Portuguese language. Where most citizens do speak and understand the language, for some respondents it appeared to be complicated to respond in Portuguese. The local language Shangaan is spoken at several households and specifically by the less educated citizens and the waste collectors. Assumable those interviewees were not able to understand all the research questions and express themselves in the way they wanted. To a less extent it was also the case for the researcher who masters the Portuguese language, but could have overlooked context specific details.

6.5.   Recommendations

The MSc thesis research aimed at analyzing the actual waste management perceptions and behaviors of both citizens and the municipality of the city of Xai-Xai in Mozambique in order to find a solution for the problem of the mayor who doesn't want to be the mayor of the dirtiest city of Mozambique. The findings and the conclusion of the research at least clarify that a single solution doesn't exist for the case of Xai-Xai. The encountered difficulties seem to be part of a complex system in which different problems are related and intertwined and multiple causes can be found for the perceptions and behaviors people hold. The system can be seen as resilient; one single solution doesn't lead to a change of it because all kind of factors hold the existing frames and behaviors in place.

The question then is what can be done in the context of Xai-Xai. Scholar Morgan suggested creating a new context for example by changing the mindsets of employers of by mobilizing a group of powerful key individuals (Morgan, 1998). The recommendations for the mayor and the municipalities' administration will be in line of thought of changing the context. To achieve changes in this complex network of non-linear relations, the municipality should elaborate and execute a package of actions. As already was concluded the placement of waste bins in public spaces will not change the littering. The placing as well other new waste management activities will have to be accompanied by information, training and instructions of both municipality staff and citizens. Moreover legislation and monitoring could be needed. Even road works could be needed to avoid the dumping of waste on the streets.

The mayor and municipalities' administration should furthermore seek for partners to increase the number of interactions around the waste management as well to influence the public discourse. Communication activities of the municipality can frame the waste problems in such a way that it can contribute to a change of perceptions and behaviors. Communication than becomes a tool to create a new reality (Ford, 1999).

As the desirable changes almost can be seen as a change of culture actors need to have strong ambitions and patience. In his book 'The Tipping Point' Gladwell describes the importance of the 'handful of exceptional' actors in social change; they can make a move. The change they can make largely depends on 'things like how sociable they are, how energetic or knowledgeable or influential among peers (Gladwell, 2000)'.

When the mayor and the municipalities' administration will succeed to make changes in the context of Xai-Xai, a new reality and a new order will be created. Changes can be discovered in the way different actors will talk about the new reality and act in a changed context (Ford, 1999).

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Annex 1   The citizens' interview schema

General information
- Name, age, profession, education, family compilation
- Neighborhood

Framing
- What is waste?
- When is waste considered as such?
- What do you do with your waste at home; where do you collect and dispose it?
- Do you reuse or recycle waste items and if so for which items?
- Does waste have an economical value?
- Is waste a problem in the city and if so, what is the problem and why it exists?
- Do you pay a waste tax and if so, what do you think about it?
- Do you use waste to close eroded areas? If so, when do you use it and how?
- Is the city clean or dirty and can you explain this?
- What is your responsibility in relation to waste?
- What is municipalities' responsibility in relation to waste?

Chaos and order
- Do you discuss waste with other people and if so what is discussed?
- Is waste an urgent problem in the city and if so, why?

Automatic behavior
- What do you do with the domestic waste and why?
- Do you treat waste always like that?
- Are there instructions given how to treat the waste and if so what are these instructions and who is giving them?
- When you are on the street, what will you do with a waste item? Why? Is it always like that?
- How do other people handle waste items on the street?

Collective behavior
- What do other people (family and neighbors) do with their waste? And is that what they always do?

Enabling environment
- Is waste collected in this neighborhood and if so who is executing the collection?
- In the case a waste collection exists, is it a regular service? Since when collection takes place?
- Do you think the municipality is doing a good job and can you explain this?
- What could you do to contribute to an improved waste collection?
- Do you know about regulations on waste and if so, what do they include?