



A Smoky Matter *AN ASSESSMENT OF THE USE OF STOVES AND FUEL AND THE ROLE OF DEVELOPMENT PROGRAMMES IN MAGINA, KIAMBU COUNTY, KENYA*

Helle Henriksen: xbk624

Mirja Matilde Crone: zpk928

Ida Folden Brink: pxt239

Sofie Mortensen: bhq494

Supervisors

Martin Skrydstrup, KU

Ebbe Prag, RUC

WMI Nairobi University

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Table of Authors

Section	Responsible Author
Introduction	ALL
Methodology	ALL
Theoretical Perspectives	ALL
Results	ALL
Discussion	ALL
Conclusion	ALL
Perspectives	ALL

Mirja Matilde Crone

Helle Henriksen

Sofie Mortensen

Ida Folden Brink

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List of content

Table of Authors	1
Acknowledgements.....	2
List of figures	5
List of tables.....	5
Abstract	6
1. Introduction	7
<i>1.1 Operationalization of objective</i>	<i>8</i>
<i>1.2 Research questions</i>	<i>8</i>
2. Methodology.....	9
<i>2.1 Research Design.....</i>	<i>9</i>
<i>2.2 Positioning and prejudices.....</i>	<i>10</i>
2.2.1 The presence of KENVO.....	10
<i>2.3 Data-selection</i>	<i>11</i>
2.3.1. Participatory observation.....	11
2.3.2 Questionnaire.....	11
2.3.3 Focus group interview	14
2.3.4 Forest walk and expert interviews.....	14
2.3.5 GPS mapping.....	15
<i>2.4 Measurement validity and generalisation</i>	<i>15</i>
3. Theoretical perspectives	16
4. Results.....	17
<i>4.1 Stoves and fuel.....</i>	<i>17</i>
4.1.1 Use of received development stove	18
<i>4.2 Access to fuels</i>	<i>19</i>
4.2.1. Kenya Forest Act.....	19
4.2.2 A heavy burden	20
4.2.3 The issue of illegality	22
<i>4.3 The role of socio-economics.....</i>	<i>24</i>
4.3.1 The value of gas	24
4.3.2 Time is money	26
<i>4.4 Cultural perspectives.....</i>	<i>27</i>
4.4.1 “Becoming African women”	27
4.4.2 The role of heating	28
<i>4.5 Sub-conclusion</i>	<i>29</i>
5. Discussion.....	29
<i>5.1 Political agendas versus needs.....</i>	<i>29</i>
<i>5.2 Challenges when using the participatory approach.....</i>	<i>32</i>
<i>5.3 Sub-conclusion</i>	<i>34</i>

6. Conclusion.....	35
7. Perspectives.....	36
8. Bibliography.....	37
<i>8.1 Collected data</i>	<i>41</i>
9. Appendices	42
<i>Appendix 1 Map of Kiambu County and Magina.....</i>	<i>42</i>
<i>Appendix 2 Background information on KENVO and CO2balance</i>	<i>43</i>
<i>Appendix 3 Overview of applied methods and timetable</i>	<i>45</i>
<i>Appendix 4 Questionnaire</i>	<i>47</i>
<i>Appendix 5 Synopsis.....</i>	<i>54</i>
<i>Appendix 6 Drawn map of Magina</i>	<i>64</i>
<i>Appendix 7 Expert interviews.....</i>	<i>65</i>
<i>Appendix 8 Categorization of stoves</i>	<i>70</i>
<i>Appendix 9 GPS Waypoints.....</i>	<i>72</i>
<i>Appendix 10 Livestock and gas</i>	<i>73</i>

List of figures

<i>Figure 1</i> Magina divided into four sub-villages.....	12
<i>Figure 2</i> Distribution of respondents according to sub-village	12
<i>Figure 3</i> Age.....	13
<i>Figure 4.</i> Charcoal jiko and three stone stove	17
<i>Figure 5</i> Main cooking stoves in Magina.....	18
<i>Figure 6</i> Firewood collections and forest walk.	20
<i>Figure 7</i> Indigenous branches cut off during collection in Kereita	22
<i>Figure 8</i> Illegal pruning in Kinale Forest.....	23
<i>Figure 9.</i> Modified and original CZK stove	31

List of tables

<i>Table 1</i> Average in age.....	13
<i>Table 2</i> Number of received development stoves	18
<i>Table 3</i> Use of development stoves.....	19
<i>Table 4</i> Education and gas	24
<i>Table 5</i> Education and type of house	25
<i>Table 6</i> Type of house and gas	25
<i>Table 7</i> Part of an association and gas	25
<i>Table 8</i> Gas and source of firewood	26
<i>Table 9.</i> Village and source of firewood	27

Abstract

Issues concerning domestic energy have been debated on the international scene for decades. In Kenya the use of traditional stoves is said to influence large parts of the population and the environment in a negative manner. To address these challenges this report addresses women's use of stoves and fuels in Magina, Kiambu County. It shows how forest management and socio-economic status affects the women's access to fuel, resulting in a majority of the women using firewood when cooking, since it is cheap and accessible. Furthermore we have shown that cultural aspects and the social life when cooking also influence the women's use of stoves and fuel. In addition to this the report looks into factors influencing the adoption of improved stoves donated by CO2balance, an organization working in the area. It is illustrated that most of the donated stoves are rarely used or have been modified by the women to fit their needs. Following this, we do an assessment of the programme carried out by CO2balance and discuss how it has affected the women's use of the improved stoves. We argue that the political agenda CO2balance legitimize their project within and implications in the participatory approach can be seen as an explanation to the low adoption of improved stoves in Magina.

1. Introduction

The issue of domestic energy has been central in the global development debate since the 1970's when it came into attention that the large consumption of fuelwood² for cooking in rural areas in developing countries led to critical deforestation (Gill 1987, 135). In the 1990's indoor air pollution (IAP) and health-related issues became a central focus point (WB 2011, 4) and in the last couple of years climate change has become a major international concern, which have put focus upon the emissions of greenhouse gasses (GHG) from domestic energy in developing countries (WB 2011, 1-2, Bailis et al. 2003, Ochieng et al. 2013).

Looking at the biggest sources of cooking fuel in Kenya, firewood (65%), charcoal (17%) and paraffin (12%)³ (KBNS 2015, 1) the numbers support a large amount of fuelwood used. The environmental problems are seen in several counties in Kenya, among these Kiambu where our field site Magina is situated (appendix 1). Here there is a deficit in the supply and demand balance of fuelwood on -41,7 % (Githiomi et al. 2012, 103). Looking at the numbers for the use of cooking fuel in Kenya it shows that even though there are initiatives to promote fuelwood substitutes the number of people relying on firewood and charcoal is not decreasing (GACC 2013, 16). Regarding climate change it is estimated that the global technical saving potential for improved stove programmes is 1-3 ton CO₂e per stove and 1 gigaton of CO₂e in total each year (SEI 2013, 3). In comparison this amount equates to the CO₂e emissions from 210 million cars (U.S. EPA 2014). It is though important to consider the political agendas these numbers are a part of, as well as the level of uncertainty of such calculations.

For these reasons different development programmes distributing improved stoves have emerged with many different agendas. Most of the programmes are focusing on women, since cooking is mainly considered the responsibility of women (WB 2011, 7). In Magina two programmes from the organizations CO2balance and KENVO have been present (appendix 2). Fernando R. Manibog (1984) and Jas Gill (1987) bring attention to how different development programmes fail to solve the problem of the extensive use of firewood and it is interesting to notice how contemporary articles also bring the failed development programmes into attention (Sesan 2014, Rhodes et al. 2014, WB 2011). Many of the recent programmes have been funded through carbon offsetting, as in the case of one of the programmes in

² Fuelwood is defined as charcoal and firewood

³ Calculated from (KBNS 2015): $5.666.216/8.767.954*100=64,6$; $1.483.901/8.767.954*100=16,9$; $1.014.446/8767954*100=11,6$

Magina (SEI 2013, 3). Adding these perspectives together it is interesting to look into how the different agendas affect the outcome. In the literature, the gap between theory and practice and the inclusion of local knowledge has also been discussed by among others David Mosse (2001, 2004), Robert Chambers (1997) and Trevor Parfitt (2007).

Taking our point of departure in this introduction we seek to answer the following objective:

How do legislation, socio-economic status and cultural aspects affect women's use of stoves and fuel in Magina and which factors influence the adoption of improved stoves from development programmes?

1.1 Operationalization of objective

Socio-economic status is inspired by human, natural, financial and social capital (Ellis 1999).

Cultural factors are based on the definition of culture as the behaviour and perceptions people acquire being part of a community (Eriksen 2010, 15) and in our report specified as social practices and customs centred in the kitchen and around the use of stoves.

Improved stoves are identified as the Carbon Zero Kenya (CZK) stove from CO2balance, which reduces the amount of smoke produced, GHG emitted and firewood used (CDM 2012, 2, CO2balance 2003).

Factors are understood as the influence of policy agendas and participatory approaches (Mosse 2001, 2004, Parfitt 2004)

1.2 Research questions

1. What type of stoves and fuels are the women using?
2. How is the women's access to firewood affected by the Forest Act 2005 and how does this affect their use of fuel?
2. In what way does socio-economic status affect women's use of stoves and fuel?
4. What are cultural factors influencing the women's use of stoves?
5. How is the adoption rate of the CZK stove affected by the political agenda CO2balance is a part of?

2. Methodology

In the following we will present our applied methods and discuss advantages and shortcomings in our methodological choices. We will start by introducing our research design, reflect on our positioning and then discuss our data selection. Finally we will reflect on the measurement validity and possibility of generalisation of the research. For an overview of applied methods and timetable, see appendix 3.

2.1 Research Design

This research is a single-case study of the village Magina in Kiambu County (Flyvbjerg 2006). The location was chosen by KENVO because of its relevance in relation to domestic energy. Our fieldwork was conducted over 12 days and during our stay we were hosted by three local families. The role of KENVO and our positioning will be reflected on later in this section.

The purpose of first part of our objective is to gain an overview of the types of stoves and fuels being used and to account for *why* the women use them. Altogether this will be used when answering the second part, where we will discuss the role of CO₂balance, the main donor of improved stoves in the area. During the report we will use supplementary theoretical perspectives though they are not used as a framework for the entire report, but in our discussion to explain certain patterns we have found in our empirical data.

To answer our problem statement in the best possible way we use a mixed methods research design combining quantitative and qualitative approaches from social science (Johnson et al. 2007, 123). Using these methods we have mainly focused on the demand side for stoves and fuel. Initially it was planned that the qualitative approaches should include in-depth interviews with respondents from the questionnaire. It was agreed by our Kenyan counterparts, interpreter and village elder⁴ that this would take too much of the women's time and make them suspicious to why we were coming back, why we merged the prepared questions with our questionnaire (appendix 4). For this reason we chose to rely on the two focus group interviews for more in-depth information.

⁴ A village elder is a person with a certain amount of authority in the local community.

In addition to using mixed methods from the social sciences we have also worked interdisciplinary using natural science method in the form of GPS mapping. Our initial plan was also to include a forest resource assessment, but found that it was not supportive for our research topic. We chose to do a forest walk with a forest expert from KENVO to look into the supply of firewood. We have chosen not to go in depth with the production of charcoal since we are focusing on improved stoves that use firewood.

2.2 Positioning and prejudices

As a social researcher carrying out a fieldwork, it is important to take your own position and the general politics of doing social research into account (Sullivan 2003, 72). As researchers we are not objective before entering the field but bring with us different assumptions and prejudices (Juul 2012, 122). As stated in our synopsis (appendix 5) we assumed that there would be a gap between the agenda of the development programmes and the context-specific needs. We are aware that this might have affected our observations. Additionally we are aware of the importance of our positioning which at all times will be as a part of the world being researched (Juul 2012, 121). This was especially the case with our three host families, who became our friends during the time we spent there, while they at the same time were research objects giving us important information concerning the daily routines and use of stoves and fuel. We have entered the field with different prejudices and positions which is not necessarily viewed as a disadvantage as long as it is taking into account throughout the analysis and discussion.

2.2.1 The presence of KENVO

Both in the preliminary stages of our fieldwork and during our stay we found that the presence and decisions of the dominating community based organization KENVO was influential. Since KENVO selected our point of destination is it important to consider their reasons for doing this, e.g. that they can use the findings in this report for developing new projects in the area. Furthermore we experienced that the community assumed that we cooperated with KENVO, which gave us a position as actors within a development programme context. So even though we explained our purpose and the fact that we were not connected with any NGO: “(...) *our presence might have told another story*” (Lund 2014, 3). For further information about KENVO we refer to appendix 2.

2.3 Data-selection

A factor important to reflect upon when analysing our data is the language barrier. Throughout our fieldwork we communicated with our respondents in English, Swahili and Kikuyu – with both our interpreter and our counterparts translating. This could possibly result in a framing effect that has been out of our hands, since we were not able to ensure whether the choice of word in either Swahili or Kikuyu was biased (Buur 1999, 60). This has limited the level of verbal nuances we were able to capture, but on the other hand allowed us to have more time to observe the non-verbal actions (Buur 1999, 69).

2.3.1. Participatory observation

During our fieldwork we have participated as much as possible in the daily lives and chores of our host families, as well as other respondents. Participant observation is an essential component of a field study, since it allows the researcher to gain a more tacit knowledge than can be obtained from interviews and other methods (DeWalt and DeWalt 2002, 10, Mikkelsen 2005, 88). Our participation in the daily activities of our host families and other respondents has provided us with a bodily understanding of aspects of their lives.

During the fieldwork we participated in firewood collections. Our village elder played a crucial role in the selection of women because he would not let us go with randomly chosen women, as we then could be involved in illegal or dangerous activities when collecting. This made it seem a bit arranged and both forest walks ended up being public events, the entire village was aware of. Despite of this, we experienced that one of the women we walked with did illegal collecting. For this reason we still presume our results to be useful, even though we were not able to do random selection.

2.3.2 Questionnaire

One of our first priorities was to conduct a questionnaire to obtain an overview of Magina and our area of interest. After merging our survey with our counterparts' we conducted a pilot test with two respondents, followed by an evaluation and a few changes were made. We have made a questionnaire with a sample of 30 people, 28 women and 2 men. Since our main focus is women and cooking practices are an area dominated by women we have decided to code our two male respondents as missing and not use the responses from them.

Our interpreter and village elder helped us draw a map of Magina, showing how it is divided into five sub-villages, which was changed to four after our pilot-test, since we found no distinction between Majengo A and Majengo B, with a total of 1250 households (appendix 6). Based on this and characterizations when we walked around in Magina, we have created the following map:

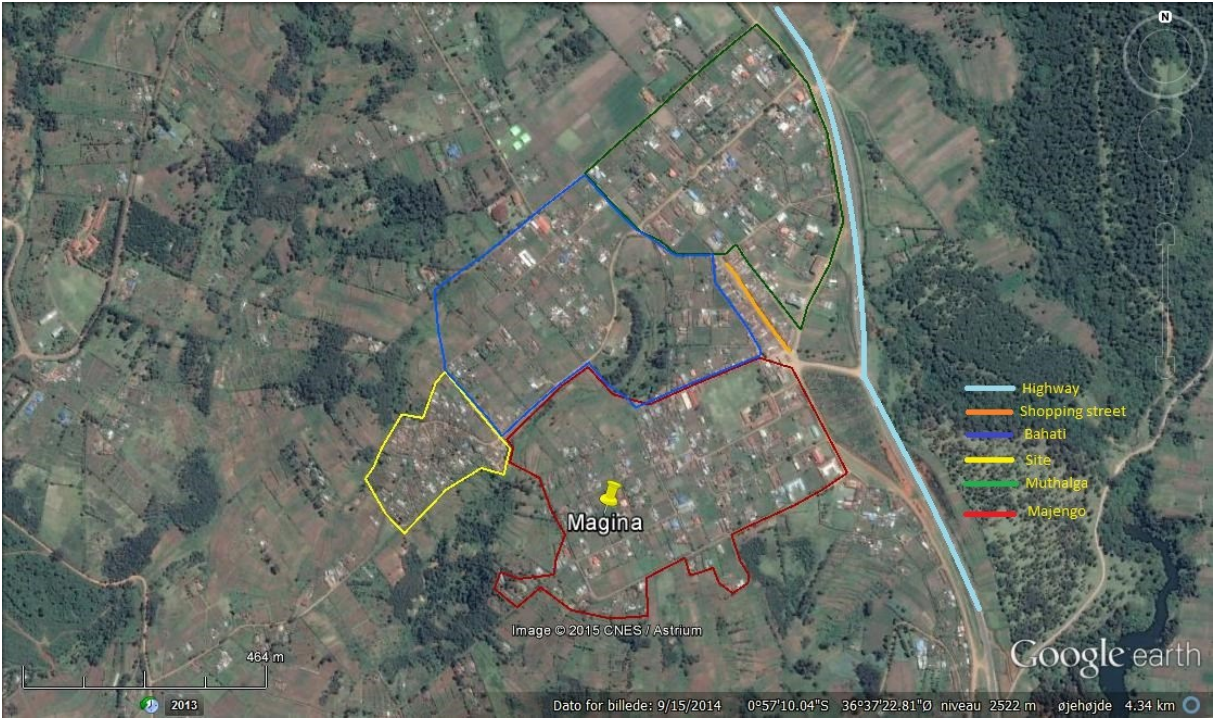


Figure 1 Magina divided into four sub-villages.

To select our sample size within each sub-village we used proportional stratified selection (Thomsen 2012, 327), using the household amounts our interpreter and village elder had given us⁵.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Bahati	10	33,3	33,3	33,3
Muthalga	6	20,0	20,0	53,3
Majengo	11	36,7	36,7	90,0
Site	3	10,0	10,0	100,0
Total	30	100,0	100,0	

Figure 2 Distribution of respondents according to sub-village

⁵ Total population of households: 1250
 Bahati: $400/1250 \times 100 = 32$. $30 \times 0,32 = 9,6$
 Site: $100/1250 \times 100 = 8$. $30 \times 0,08 = 2,4$
 Majengo: $500/1250 \times 100 = 40$. $30 \times 0,4 = 12$
 Muthalga: $250/1250 \times 100 = 20$. $30 \times 0,2 = 6$

We aimed at having simple random selection (Thomsen 2012, 327) within the sub-villages, but since we were dependent on our village elder who knew the area, we are aware of possible selection bias. We tried to avoid bias in the field by emphasizing to him the importance of having respondents who varied in different parameters such as age, types of stoves and fuel, family size and socio-economic status. We did most of our questionnaires in the morning, which can have influenced that most of our respondents are older women, since younger women might have been out working. As seen the average age of our respondents is 51,54 years.

	N	Minimum	Maximum	Mean
Age	28	20	83	51,54

Table 1 Average in age

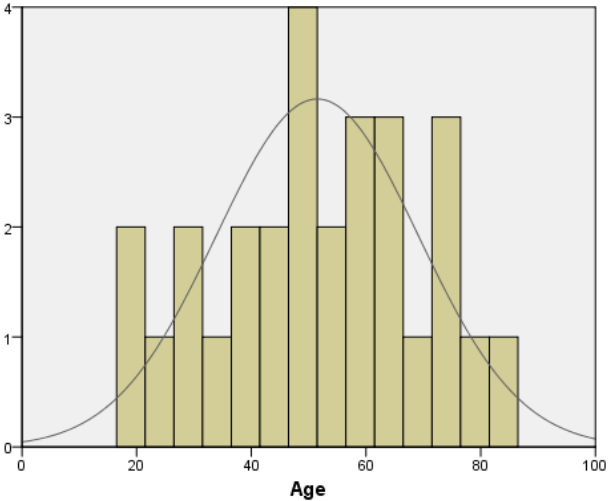


Figure 3 Age

Generally since we used in-home questionnaires, we are aware of the possible bias grounded in the fact that we were present during the interview. In some cases we experienced that men or older women watched when we interviewed other, which could affect the respondents' answers. On the other hand in-home questionnaires offers the possibility to explain questions and put up some more complex questions, which can help giving more precise answers (Hansen 2012, 289). Furthermore our village elder was sometimes present and the respondents often turned to him when in doubt of question concerning development

programmes and he helped them reply KENVO. We are not aware of any link between him and KENVO, but our observations and our presence could indicate a tendency to respond to questions in a socially acceptable manner (Spector 2004, 1045). For example our aforementioned possible association with KENVO could have caused our respondents to answer that they use the stoves they have received from development programmes, since they assume this is the answer we are looking for.

2.3.3 Focus group interview

When selecting participants for focus group interviews random sampling is seldom useful, why we used segmented sampling (Morgan 1997, 7). This sampling method is closely linked to emphasize the homogeneity in the group which allows for a more free-flowing conversation (Morgan 1997, 7). We invited five younger women to the morning session and five older women to the afternoon session, to give the younger women the opportunity to speak more freely and to test if we would experience a difference in answers between the young and the elders. This should be seen in relation to that focus group interviews can be useful in producing data concerning power relations, interactions and norms (Harrits et al. 2012, 150). The reality was that nine women, two of who we had invited, attended the morning session and four women came to the afternoon session. As this shows some women might have found it beneficial to attend to the focus group expecting that we could help them, e.g. asking if we could help them assessing gas stoves. As Lund (2014) puts it they did not come to focus group: “(...) *to make polite conversation; they were here to have their issue recorded*” (Lund 2014, 4). It should be mentioned that a shared lunch for the two groups were provided.

2.3.4 Forest walk and expert interviews

To get a perspective focusing more on the supply-side concerning fuel and to investigate in a possible discrepancy between development programmes in distributing of stoves and the women’s demand we included four expert-interviews and a forest walk. The purpose of expert interviews is to gather specific, qualified and in-depth information about a certain topic (Harrits et al. 2012, 150) (appendix 7).

In order to look into whether the collected firewood was legal or illegal we went on a forest walk with KENVO through the same routes as used when collecting firewood. Supplementary we had an informal interview with an employee from KENVO regarding pruning, but as

sensitive issues were brought up we have chosen not to mention these two informants by their name. Furthermore we used Professor Mary Njenga as expert to validate, through photos, if the tree we had collected was indigenous and illegal cut down.

To add more information about the regulations concerning the collection of firewood and laws on this area we did two interviews with KFS in respectively Kinale and Kereita. These interviews were used to get an overview of the state of the forest and the role of pruning and firewood collection.

To investigate the possible discrepancies with the development programmes' agenda and the women's needs we did an expert interview with a representative from CO2balance, Mary Njoki. She was hired by CO2balance during the programme, but her contracts had ended, why we assumed that she was in a position where she could talk freely and critical concerning the programme. Initially we also conducted an interview with Leah Mwangi, a project manager from KENVO, regarding their stove and fuel projects in Magina.

2.3.5 GPS mapping

We used a GPS to map the houses of our different respondents to, in Google Earth, make a spatial analysis of how the households were distributed in the area and if there could be any obvious differences between the household's locations and their choice of either collecting or buying firewood. We mapped the two firewood collections in the forest to measure the distances and compare changes in the firewood resources from before and now. The maps are made from Google Earth version 7.1.2.2041 using a satellite picture from September 5th 2014.

2.4 Measurement validity and generalisation

Looking into the measurement validity of this study, i.e. if we have answered the questions we sought to, we have used methodological triangulation and to some extent investor triangulation by dividing us into two or three groups (Mikkelsen 2005, 96). Furthermore we are doing field research which often provides measures with greater validity since "being there" can provide a more in-depth understanding of the life of the informants (Babbie 2002, 298). On the other hand fieldwork are often characterised by a high degree of bias which effect of the study since the relations with the research objects can obscure the results (Babbie 2002, 299).

In this report we have looked into a concrete case, with some specific events concerning the women's use of stoves and fuel (Lund 2014b, 226). We argue that formal generalisation can be done from our 28 respondents whom are used to say something general about the area of Magina and according to Lund this form of generalization is inevitable since you will rarely have the opportunity of interviewing everyone (Lund 2014b, 226).

Generalization can also be done at a larger scale why it is interesting to see if it relates to other inquiries which enable considerations about generalizing, abstracting and theorization (Lund 2014b, 226). As discussed in section 2.3 there are some challenges connected to our data selection, but we argue that it is possible to see some patterns in our results, which also relates to previous studies as stated in the introduction. We are though aware of not overreaching our results, especially since there are several context specific factors influencing the results (Lund 2014b, 226-227). Looking into the possibility for abstraction it is related to analytical generalization, as an identification of fundamental properties (Lund 2014b, 226). In our discussion of the implementation process and adoption of stoves, we will generalize to existing theoretical perspectives and herewith use abstraction.

3. Theoretical perspectives

This section will briefly account for the theoretical perspectives used in section 5. Mosse looks into explaining the gap between policy models and practice and criticizes many current development programmes for the focus on creating good policies on the paper without taking the actual implementation of the programme into account (Mosse 2004, 646). Existing literature regarding the unsuccessful projects on improved stoves have focused on the lack of participatory approaches taking the local specific and cultural implications into account (Sesan 2014, Rhodes et al. 2014, WB 2011). Chambers argues for the importance in including the knowledge of local people in the policy forming through various participatory tools so that the policy is formed bottom-up and not top-down (Chambers 1997). Mosse questions whether the participatory approach can actually challenge existing knowledge systems and power structures and hereby the elitist technocratic forming of development programmes. He points out that when using the participatory approach, instead of the local knowledge shaping the project outcome, the pre-existing project objectives shape the local knowledge, and the project outcome will be presented as local needs. Thereby the process is used to legitimize the pre-planned project objectives (Mosse 2001, 22-24). Parfitt and Chambers highlight how the

participatory approach can be useful, but that it will require a shift in the focus of the developers from output to process and capacity building (Parfitt 2004, 549).

4. Results

In the following section we will analyse and discuss some of the findings we made during the fieldwork. Introductory we will present our findings concerning the respondents' use of stoves and fuel. We will then analyse to what level socio-economic status, legislations and cultural factors influence the women's use of stove and herewith fuel. From this both the demand side through analysing the needs of the women concerning use of stoves and the supply side by analysing the access to fuels will be taking into account.

4.1 Stoves and fuel

The main stoves we found used in Magina are the three stone stove for cooking and the charcoal jiko for heating. For further pictures of the stoves we found in Magina we refer to appendix 8.



Figure 4. Charcoal jiko and three stone stove

To get an overview of how our respondents are distributed and what their main stove is we have mapped the different stoves from our GPS-waypoints (appendix 9). The map illustrates that no link can be seen between use of main stove and location of household, e.g. in relation to distance to shopping centre or the two forests Kereita and Kinale where firewood is sourced. For picture of the distance to the forests we refer to figure 6.

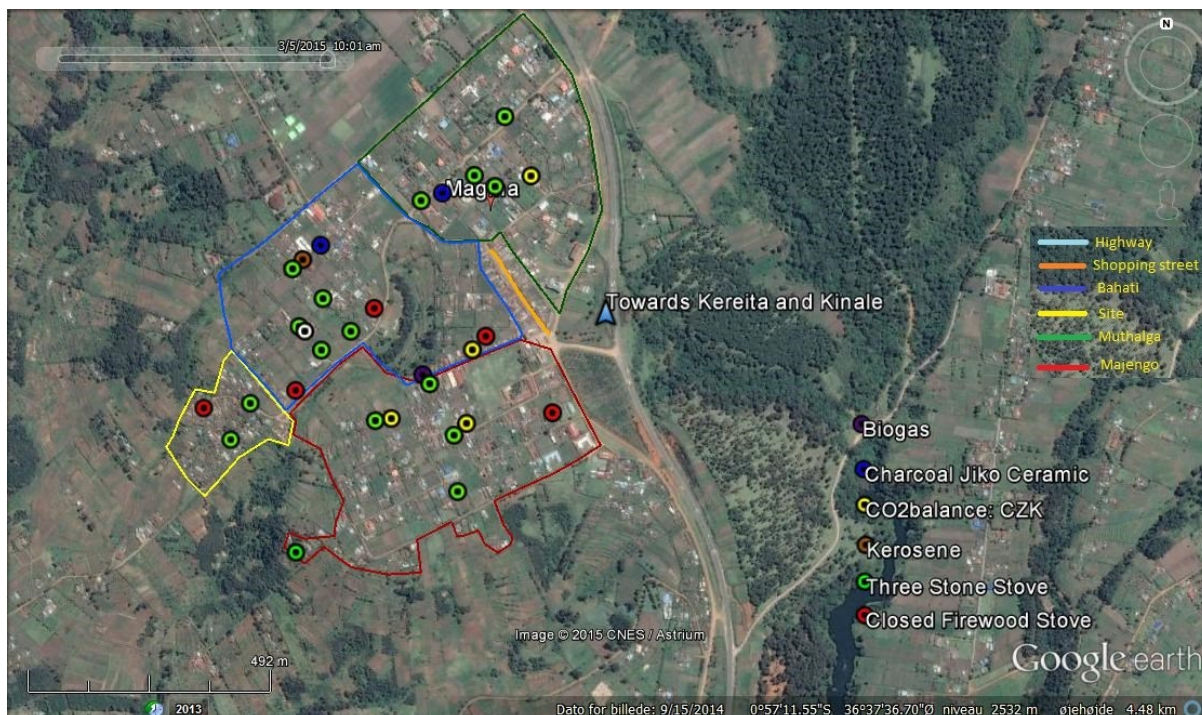


Figure 5 Main cooking stoves in Magina

It is important to emphasize that most of our respondents used several different stoves for cooking, but the map shows the one they use the most. As illustrated in the map the most used stoves are the three stone stove, the closed firewood stove and CZK, all using firewood.

4.1.1 Use of received development stove

In this section we will shortly account for the distribution of improved stoves in Magina. As table 2 shows, most of our respondents have received improved stoves.

		Frequency	Percent	Cumulative Percent
Valid	Yes KENVO	1	3,6	3,6
	Yes CO2balance Pilot	1	3,6	7,1
	Yes CO2balance CZK	19	67,9	75,0
	Yes Both KENVO and CO2 red brick	1	3,6	78,6
	No	6	21,4	100,0
	Total	28	100,0	

Table 2 Number of received development stoves

The table shows that CO2balance has been the most widespread programme, but interesting to notice was how most of the households which had received a stove from CO2balance referred to it as a stove from KENVO. It was though possible for us to distinguish between them by using our observations and pictures, checking the respondents' answers with the stoves received whether the stove was from CO2balance or from KENVO.

Out of the 19 respondents who had received a CZK stove from CO2balance only 21,1 % use it regularly. Moreover it is shown that 36,8 % are not using their stove at all.

		Frequency	Percent	Cumulative Percent
Valid	Yes regularly	4	21,1	21,1
	Yes sometimes	8	42,1	63,2
	No	7	36,8	100,0
	Total	19	100,0	

Table 3 Use of development stoves

After establishing the types of stoves and fuel used in Magina as well as the development programs and the donated stoves, we will now explain factors influencing the use.

4.2 Access to fuels

In general, the access of different fuels in Magina is good with Kereita and Kinale in relatively short distance supplying firewood, and the shopping centre providing charcoal, gas, kerosene and paraffin. Although the access is good, the problem is that price of the different fuels are considered to be very high, according to our questionnaires and focus group interviews. As showed many of our respondents use firewood, and many reasoned their use with the accessibility and cheap price of firewood. For these reasons this section will focus on the legislations regarding firewood collection and how this is affecting the use of stoves.

4.2.1. Kenya Forest Act

Although firewood is still widely accessible in Magina legislations passed the last thirty years prohibiting the cutting of trees have highly affected the supply of firewood making the women walk longer distances than before (figure 6) (Firewood Collection 1, 04.03.15, Forest Walk, 07.03.15, Focus Group 1 & 2, 07.03.15). Both Kereita and Kinale are state-owned

forests and hence administrated by respectively KFS Kereita and Kinale with additional local legislations in the form of Forest Management Plans. The main national legislations affecting the firewood collection today is the Forest Act from 2005. The act is recognizing the importance of sustainable forest management but at the same time acknowledging that it is the main source of domestic fuel in Kenya (Forest Act, 2005: 4). Both the forest manager from Kereita and Kinale emphasised the mutual beneficial partnership between the community and KFS which has brought with it a great awareness from the communities that now know the importance of protecting the forest (Kinale 2015, Kereita 2015).

4.2.2 A heavy burden

57 %⁶ of our respondents collect firewood, stating that they in average collect two-three times a week using 2-4 hours each time, paying 100 KSh each month for a licence (Interview KFS Kereita, 06.03.15, Interview KFS Kinale 10.03.15). With ropes and pangas we participated two and two in the collection in accordingly Kinale and Keireta forest, walking between 5-7 km.



Figure 6 Firewood collections and forest walk. Firewood collection Kinale: 7,1 km. Firewood collection Kereita: 5,1 km.

⁶ $16/28 \times 100 = 57,14$

Feeling like the centre of attention as we walked through the village, we speculated how we would be able to endure this, as did everyone else. As time went by and we walked deeper into the forest it became obvious that the branches the women are allowed to collect were not in excess. After finally finding a place where branches were lying on the ground, the women split up and the sociality ended. The collected branches were painstakingly put into separate piles, and the distribution scene we witnessed during and after the collections indicated the scarcity and necessity of firewood. The bundles were gathered and neatly tied together in ropes soon to be rubbing against our foreheads. Some of the women carried more than 40 Kgs. while we, the *mzungus*, were only allowed to carry 20 Kgs. In the beginning it felt like a defeat, but after carrying it for one hour through the woods the neck was in so much pain that it was a relief that we did not carry a heavier load. The women explained how they would rather save time by carrying a bigger load than going twice (Observations 04.03.15, Observations 06.03.15).

The women also explained how they would rather buy than collect if they had the financial power. When they buy it is mostly from men pruning and then collecting firewood with carts with donkeys where one cart costs 1000 KSh. lasting 1-2 months depending on the family size. Different laws apply to the two forms of collection. According to the law all the firewood sold should be sourced from pruning of the plantations. 55,3 % of Kereita (UNDP 2012, 6) and 15,6 % of Kinale (Interview KFS Kinale, 10.03.15) are commercial plantations where the trees need to be pruned in order for the trees to become as good quality timber as possible (Reid 2002, 2). This is done by giving out certificates for free to Community Forest Associations who then have the right to prune a given area. Because of the enhanced timber value when a tree is pruned, pruning is seen as part of a mutual beneficial process (Interview KFS Kereita 06.03.15, Interview KFS Kinale 10.03.15, Forest Walk 07.03.15, Interview KENVO 06.03.15). Regarding the women collecting firewood they are not allowed to cut trees or branches, but only to collect what is left after pruning or branches that naturally have fallen to the ground. The Forest Act 2005 also states that punishment will occur if people collecting firewood is caught, using other cutting equipment than a machete, e.g. a chain saw or an axe (Kenya Forest Act 2005, 46). As this shows the women are highly dependent on the pruning processes which determine where the women can collect.

4.2.3 The issue of illegality

In the interview with KFS Kereita all questions regarding the issue of illegal collection were rejected (Interview KFS Kereita, 06.03.15). The KFS Kinale admitted that few illegal activities were going on but that they would be terminated in five years (Interview KFS Kinale, 10.03.15.) However, our firewood collections, the forest walk with KENVO and our focus groups all revealed how illegal activities are rather common. One of our expert-interviews supported these observations by stating that when dead wood is not available, the women will cut off from the trees (Interview Mwangi, 09.03.15).



Figure 7 Indigenous branches cut off during collection in Kereita

When participating in the firewood collections we soon noticed the scarcity of deadwood, which even made us want to cut the branches illegally why it is somehow understandable why it is done. As one woman on the walk said “*Firewood is our electricity*”, outlining the importance of firewood (Firewood Collection 2, 06.03.15). Our collection in Kereita took place in the indigenous part of the forest and on this branches were cut off indigenous trees (figure 7). This was supported by our forest walk and interview with Njenga as an illegal act highly damaging to the state of the forest. For the location of illegal collection see figure 6.

Amongst other illegal activities collecting without licences was raised as rather common in our first focus group interview, where one woman freely told how she once was caught and taken to the police station. Additionally there seems to be some uncertainties with the process of pruning and hereby how the firewood sold is sourced. According to KFS Kereita and Kinale the “men with donkeys” can themselves access licences, while Leah Mwangi from KENVO mentioned how they gain access to pruning trees by paying the community groups

(Interview KFS Kereita 06.03.15, Interview KFS Kinale 10.03.15, Interview Mwangi 09.03.15). We met two men with donkeys who did not seem comfortable when we approached them, but they told us that they had paid 500 KSh. to access the firewood – but not to whom. The murkiness of these areas was supported by different informal interviews stating how it is not unusual that the men selling firewood made deals under the table with the rangers from KFS. Here it is mentioned how the rangers allow the men to enter the forest and prune while paying the rangers. This results in unsystematic pruning in areas that might not need to be pruned, where it should be done systematically, cutting the three technically right (Interview KENVO, 06.03.15, Forest Walk, 07.03.15, (Reid 2002, 7). In the area we did the firewood collection in Kinale pruning had been done in an unsystematic manner, which according to the expert on the forest walk implies illegality.



Figure 8 Illegal and legal pruning in Kinale Forest.

In short term the illegal pruning makes it easier for the women to access firewood. If the illegal pruning was stopped the women might be forced to walk longer distances as the location of the areas pruned might be far into the forest which can also make the prices on firewood increase. On the other hand, illegal pruning might influence the supply of firewood in the future, since the trees can be killed or at least damaged by being exposed to diseases if not pruned at the right season and in the accurate timespan (Reid, 2002:7).

In the above section we have showed that the legislations especially concerning the pruning of trees, as well as the violations of these laws, highly affects the women's access to firewood, since they can only collect from the pruning. Depending on how the legislations are carried out in the future it might end up being more beneficial for the women to switch to other types

of fuel than firewood. Thus this could end up affecting the adoption rate of the improved stoves as will be discussed in section 5.2.

4.3 The role of socio-economics

In this section we will analyse how the socio-economic factors are influencing the women in decision-making concerning use of stoves and fuel.

When asking the women about preferences in stoves and fuels the most important issues mentioned were price and time. We experienced that monetary value was very explicit, but when assessing the socio-economic status of the household it is important to take several assets into account (Ellis 1999, 1). Therefore we have determined the socio-economic status from the financial, human, social and natural capital. The financial capital has been identified from the type of house and quantity of livestock, while the human capital is seen as education and the social capital identified through membership of association. The natural capital is seen in the form of access to the forest and will be touched upon in the next section (4.3.2). Additionally we experienced that the women mentioned gas stoves as their ideal way of cooking since it is fast, but they added that it was too expensive. Because of that we argue that those having gas can be used as an indicator of a higher financial status. Looking at the different indicators some correlations can be seen between the socio-economic and use of gas.

4.3.1 The value of gas

Firstly we looked into the correlation between gas and education where it can be seen how the ones without education do not have gas although the general picture shows that only a small amount of the women actually can afford it.

		Gas			Total
		Biogas	LPG Gas	No gas	
Education	None	0	0	3	3
	Primary	1	3	12	16
	Secondary	0	3	6	9
Total		1	6	21	28

Table 4 Education and gas

In regards to the quantity of livestock no correlations between this and households with gas were seen (appendix 10). In relation to observations in the form of type of house (e.g. timber,

iron sheet, bricks) some correlations can be seen. In these observations it is assumed that houses built in bricks are better off than houses built in tree and iron sheet. Here it is shown how households where the women have completed secondary school are more likely to live in houses of bricks as well as the people living in these types of households are more likely to use gas as shown from the tables below.

		House built in			Total
		Stone	Tree	Iron sheet	
Education	None	0	2	0	2
	Primary	4	9	3	16
	Secondary	5	2	2	9
Total		9	13	5	27

Table 5 Education and type of house

		Gas			Total
		Biogas	LPG Gas	No gas	
built in	Stone	0	4	5	9
	Tree	1	1	11	13
	Iron sheet	0	1	4	5
Total		1	6	20	27

Table 6 Type of house and gas

Concerning social capital we found that most of the women having gas also were members of an association, mainly loan-group, where they support each other when facing financial difficulties.

		Part of an association		Total
		yes	no	
Gas	Biogas	1	0	1
	LPG Gas	5	1	6
	No gas	12	9	21
Total		18	10	28

Table 7 Part of an association and gas

As this shows some correlations between the socio-economic status of the household and gas can be seen, although it should be taken into account that only six respondents out of 28 can

afford gas. In terms of the women using gas six has completed either primary or secondary school, four out of six live in a stone house and five out of six is part of a loan group showing how they score high at all the assets accounted for.

4.3.2 Time is money

A predominant response we got when asking into the reasons for using firewood was that it was cheap and easily accessible, hence a high natural capital in the form of firewood both in terms of buying and collection. The women mentioned they would prefer to buy firewood in order to save time and drudgery if they could afford it (Firewood Collection 1, 04.03.15, Firewood Collection 2, 06.03.15). Looking into our data it shows that the women having LPG gas are all buying their firewood, which could support the argument that women of a better socio-economic class are capable of choosing whether they will buy or collect firewood.

		Source of firewood				Total
		Collects	Buy	Both collect and buy	Do not use firewood	
Gas	Biogas	1	1	0	0	2
	LPG Gas	0	4	2	0	6
	No gas	13	5	1	3	22
Total		14	10	3	3	30

Table 8 Gas and source of firewood

Studies show how the opportunity cost of spending several hours collecting fuelwood is a main social implication (Ochieng et al. 2013, 258). When looking into calculations where time is included in cooking cost, traditional three stone is the most expensive form of cooking with wood (WB 2011, 12). This could argue for a greater incentive to replace traditional stoves with improved stoves. It is though important to state that these calculations are on long term and additionally should refer to cultural cooking practices (Ibid:12).

When comparing figure 2 to the distribution of firewood collectors in the different villages (table 9) distance to the forest does not seem to have an impact on whether the women collect firewood or not, since all of our respondents in Site, which is furthest from the forests, collect themselves. Here it should be noted that the area of Site was defined as the poorest within

Magina, mostly consisting of rented houses, also supported in our focus group interview (Focus group 2).

		Source of firewood				Total
		Collects	Buy	Both collect and buy	Do not use firewood	
Village	Bahati	3	4	1	2	10
	Muthalga	3	1	0	1	5
	Majengo	5	4	1	0	10
	Site	2	0	1	0	3
Total		13	9	3	3	28

Table 9. Village and source of firewood

That expenses play an important role in Magina is supported by the fact that the abovementioned women from the focus group interview simultaneously told that the increase in distance walked had not limited their use of firewood, since firewood was still the cheapest source of fuel when collected, although they would prefer to buy firewood, or even buy gas. As this section show, the economic status of the households seems to play an important role when determining the stoves and fuel being used. Since the CZK stove use less firewood one should think that it would be beneficial for the women to use the stove, but as will be seen from the next section other factors play a role regarding the adaption of improved stoves.

4.4 Cultural perspectives

In this section we wish to account for how cultural aspects in form of practices centred around the stoves affect the women’s use of stoves in Magina.

4.4.1. “Becoming African women”

In the household where two of us stayed all the cooking took place in a small wooden shed with walls almost entirely blackened from sod, placed within a stone’s throw from the rest of the house. On the evening of our arrival we sat down on tiny benches placed around the three stone stove. The 19 year old girl responsible for most of the cooking in the house welcomed us with a surprised and slightly worried gaze and an excuse of how smoky it was in there. Enthusiastic and ready to engage in participant observation we disregarded her warning and sat down. After only a couple of minutes tears were running down our faces from the heavy smoke and we had to take turns on excusing ourselves, while we escaped outside to grasp for

fresh air and release. During the evening we were accompanied by two women from the neighbouring house, the house cat and a comment made from the kitchen threshold by the local pastor about how happy he was to see that we were already “*becoming African women*”. Shocked about the uncomfortableness of this identity and the seemingly unaffectedness of the other women who had sat in the kitchen, we went to bed that night accompanied by the smell of smoke and hurting throats. But as time went by we got a bit more used to the smoke and actually started to appreciate this outwardly murky space for its warmth and cosiness. It became more than just a kitchen, but a place that allowed us to spend time alone with the women who otherwise were running around between different work tasks (Observations 27.02.15).

4.4.2 The role of heating

From our observations it became obvious how the stoves are not only important in relation to cooking, but also in relation to the social life. This should especially be seen in the role of heating which was something a lot of our respondents emphasised as an important quality. In general they emphasized how this area is special in Kenya because of the cold conditions and it was mentioned as a reason for almost all our respondents that they used a charcoal jiko for heating inside their house in the evening.

What we observed from staying with our families was that the warmth from the stoves enabled the social life in the evenings, also mentioned by one of our respondents who explained how the jiko was important inside since her and her family then would sit and talk for many hours.

Furthermore we found a tendency of link between type of stove and type of “traditional” dish along with other research (Rhodes et al. 2014, 10316), but also seem to be a matter of personal taste and would need further research to be fully confirmed. In one of the focus group it was mentioned how the women would prefer gas, but when asked how they then would cook the traditional dishes they for example mentioned that they then would use a jiko for making *chapatis*.

As such our findings indicate that cultural aspects centred around the stove and cooking practices play a role when it comes to the women’s use of stoves and fuel. Previous studies have found a similar link between culture and cooking practices and emphasise how this

might affect the adoption rate of improved stoves from development programs (Sesan 2014, WB 2011, Person et al. 2012, Rhodes et al. 2014).

4.5 Sub-conclusion

From the previous sections we are able to conclude that the legislations regarding firewood collection only affect the women to a small extend, since we found that a lot of the firewood is sourced illegally. Here it was showed how cheap and easy access to firewood highly affects the women's choice of fuel. In extension to this we identified how the socio-economic status plays a crucial role in terms of determining the type of stoves and fuel used. Lastly we found that cultural aspects centred around the stoves are playing an important role in the social life. As this shows we have identified several context-specific factors determining the use of stoves and fuel in Magina, which must be taken into account when doing development programmes.

5. Discussion

In this section we will apply the theoretic perspectives presented in section 3 and discuss how the political agenda that CO2balance operates within and their participatory approach relate to the adaption of CZK stoves in Magina.

Regarding the adoption rate of the stoves we have experienced that is has been rather low. The women not using the stove explained how it was not emitting enough heat and that the hole for firewood is too small, so that they have to check the fire all the time, increasing the time spend in the kitchen. Other reasons were practical such as lack of space in the kitchen and that the stove broke. Taking point of departure in this gap we will discuss the adoption rate.

5.1 Political agendas versus needs

Organizations working within international development work to maintain coherent representations of their actions, since they have to operate within a current policy regime (Mosse 2004, 639). Mosse states that success in development programmes not only depends on good policies on paper, but is highly affected by the implementation process which is often not taken into account. Mosse suggests that *"(...) the operational control which bureaucracies or NGOs have over events and practices in development is always constrained*

and often quite limited. (...) power lies in the narratives that maintain an organization's definition of the problem" (Mosse 2004, 646). Therefore we find it interesting to look into how CO2balance operates within the definition of those problems they address. For CO2balance the political agenda they are working within is the mitigation of climate change and the build-up of GHGs in the atmosphere. Since they are a privately financed organization that creates funding through carbon offsetting it is even more plausible to assume that they have an interest in strengthening the narrative of carbon offsetting as a successful climate change mitigation policy, as this is what funds the programme (CO2balance 2003).

On their webpage and their monitoring report CO2balance writes about the Aberdare project that 7946 households are using the efficient cook stove out of 9311 recorded cook-stoves, and emissions have reduced by 24191 tCO₂e in the monitoring period (CDM 2012, 1,7). Additionally it is mentioned how the implementation has been successful (Foukaras 2015). These numbers indicates a very high adaption rate. On the contrary it can be discussed if this is reasonable in relation to our results since we found that approximately 37 %⁷ of our respondents' CZK-stoves were broken and only 21 %⁸ used the stove as their main stove. What is then questionable is how the use of the stoves is measured by CO2balance or how they define a successful implementation. As general problem pointed out is that there is a lack of sufficient methodologies that can account for uncertainty in the fuel usage (SEI 2013, 20). Here it should be noted that the adoption rate plays a crucial role in carbon offset projects since the rate accounts for the CO₂-emissions that can be sold, putting into question the whole idea of carbon-offsetting (Ibid). Therefore it could be argued that there are some conflicting interest between the donor in this case and the beneficiaries, where it seems like the CO₂-emissions CO2balance claims to reduce are more a narrative strategy to validate their work rather than a reflection of the actual situation.

⁷ $7/19 \cdot 100 = 36,8$

⁸ $4/19 \cdot 100 = 21$



Figure 9. Modified and original CZK stove (CDM 2012, 6)

It is additionally interesting to look into how some of the used stoves had been modified by the women to fit their needs better. Our results show that the women in most of the cases had expanded the inlet for firewood.

When comparing the two stoves it is assumable that the amount of firewood used, the IAP and the following level of CO₂ emitted will be higher than the measurements of CO₂balance calculating with a non-modified stove. On the other hand CO₂balance states in their monitoring report that they are aware of the modifications, but have not considered it to negatively affect the consumption of firewood (CDM 2012, 7). Contradicting to this Njoki explained that the reason why they had not taken these modifications into account when creating the stoves was that it did not conform to the goal of the project as the moderation means that the stove emits more CO₂ (Njoki 5.3.2015). Again indicating that CO₂balance has been more driven by “good” policies instead of focusing on how the project actually works in practice (Mosse 2004, 639, 643). Ultimately this has affected the adoption rate, both in terms of women that are not using it and the ones that modified it, since their needs were not met. As such this follows Mosse’s statement that “good” policies are often un-implementable (Mosse 2004, 639).

Another point to make regarding the policies is that they are rarely moderated by analysis from earlier experiences (Mosse 2004, 640). In line with this both Mwangi and Njoki confirmed that KENVO and CO₂balance had not co-operated even though they were working with the same topic in the same area (Interview Mwangi, 06.03.15, Interview Njoki,

05.03.15). This supports the view that focus is on satisfying the project agencies and donors by providing outcomes in terms of stoves donated. Additionally it is supported by our results where some of our respondents had received improved stoves from both KENVO and CO2balance (respondent 22 and 25), which in a development context should be looked into before entering a field.

Looking into the agenda of the programme we now wish to look more into the preliminary and implementation process itself to identify how this has affected the adoption rate.

5.2 Challenges when using the participatory approach

Since many studies have suggested that the participatory approach will diminish the gaps between policy and practice we find it necessary to discuss the approaches used by CO2balance. Both pilot-projects, community meetings and regularly monitoring were held (CDM 2012) and looking at the implementation process, CO2balance states that the beneficiaries has been directed in correct use by local community groups involved in the programme (CDM 2012, 5). From these initiatives they can be said to have used parts of the participatory approach, but as pointed out by both Mosse and Parfitt several factors must be taken into account when using this approach in order for it to improve the adoption rate.

When preliminary research in development programmes is made through public meetings the needs that are mentioned can be inaccurate since authorities and powerful men in the village are present, making it difficult for the women to speak (Mosse 2001, 19, Parfitt 2004, 640) In the case of the CO2balance project the village elders were given an important role in terms of mobilization of the women and their role within the project might have affected the outcome of the needs mentioned. Another problem affecting the success of the participatory approach, mentioned by Chambers, is that of age. In the case of Magina the stoves were donated without targeting any specific age-group which is an important factor to include when using participatory approach. Njoki mentioned how she, if she should make a new project, would target the younger generations instead (Interview Njoki, 05.03.15, Parfitt 542). However, what seemed to be the biggest issue with the meetings were the low attendance rate of the women, who were out in their *shambas* or doing other businesses (Interview Njoki, 05.03.15). This could also be related to the role of the village elders since distrust to CO2balance was seen amongst them, as some thought that the project was used to cut their access to the forests (Ibid.). For this reason it might be suspected that the village-elders had other incentives than

the promotion of the CO2balance projects, as Mosse exactly states often is the case (Mosse 2004, 644).

Since it is the women who are the main users of the stoves it is problematic if they have not participated sufficiently in the workshops. On the contrary Magina is an area where the women are very busy and as we experienced it was difficult to mobilize women for focus-group interviews, why you could imagine challenges in mobilizing community feedbacks as well. What Njoki told in relation to this was also that some community members may not have bothered to know more about the sources of stoves because it was distributed for free (Interview Njoki, 05.03.15). As this shows the use of the participatory approach cannot only be seen as the responsibility of the projects, but also requires a willingness from the community to participate.

When Mosse criticizes the participatory approach it is mostly regarding how the livelihoods in communities are simplified so that it matches the project objective and in that way the projects are focused on: “(...) *a fixed set of standard interventions, limiting the potential creativity of participatory problem solving*” (Mosse 2001, 24). In the case of Magina the modification of the stoves can be mentioned as an example of how the needs are not being met from the project and how it cannot be changed in the course of the overall agenda. This can also be related to the issue of heating where the stoves had a higher adaption rate in warmer areas, showing the importance of the local conditions (Interview Njoki, 05.03.15). Another local factor to take into account is the fuel-supply where the adoption rate in areas with scarcer firewood-sources were higher (Interview Njoki, 05.03.15), a statement also supported in the literature where fuel efficiency is seen as a key determinant for the adoption rate especially in areas where people pay or walk long distances to obtain it (Ochieng et al. 2013, 259). From both the interview and the monitoring report it seems that CO2balance were aware of most of the local issues although still not taken into account in the project which could indicate that the participatory approach has been more used to legitimize the programme than involving the communities in the programme. Njoki also confirmed that she did not feel they had had enough time to fully implement the stoves (Interview Njoki, 05.03.15) which corresponds to the point made by Chambers that the donors and governments should move away for quantifiable product and focus more on the processes and capacity

buildings of projects (Parfitt 544-545). This though, would be difficult to match with the overall agenda of CO2balance which is strictly focused on selling carbon credits.

5.3 Sub-conclusion

As such it can be concluded that the adoption rate of the CO2balance have been affected by overlying political narrative which has constricted the focus to be on the outcome instead of on the actual process of saving fuels and improving health and environment. Additionally it is shown how there are several factors that have to be taken into account when using participatory approach. We have discussed some of the challenges CO2balance probably met in their work mainly concerning their cooperation with the village elders and mobilization of women. At the same time it seems that CO2balance has overlooked context-specific factors which add to the explanation of why the adoption rate of the stoves is as low as it is.

6. Conclusion

In this report we have sought to answer how legislation, socio-economic status and cultural aspects affect women's use of stoves and fuels in Magina and additionally which factors influence the adaptation of the CZK stoves from CO2balance.

First of all we found that the women use several types of stoves and fuels, but that the three stone stove is the most used for cooking. Since the choice of stove is highly interlinked with the choice of fuels, firewood is also the most used type of fuel and preferred by the women due its high accessibility and low price. It has been showed how the national and local legislations are important in terms of regulating the supply. Our results though show that the laws are not fully followed why a lot of the used firewood seems to be sourced from illegal cutting or pruning. If the laws are to be enforced to a higher extent the future supply of firewood will be affected. Price also plays a crucial role why we conclude that their socio-economic status is a factor influencing their use of stoves and fuel. The distance the women have to walk to collect firewood has increased in the last decade, but the longer distances have not meant that the women have limited the use of firewood, which leads to the finding that economy plays a bigger role when choosing fuel than time. Even though the socio-economic status seems to play a crucial role, we also found that the social practices especially in the form of heating was important for the women, since it is a relatively cold area, and the stoves allows the social life to emerge around the use of stoves.

Moreover we have shown that 19 out of our 28 respondents have received a development stove from CO2balance. We have found that many of these stoves are to not being used to the degree it was intended. Some of the used improved stoves have been modified by the women to suit their needs, some broke after a while and some have almost never been used. We have argued that the political agenda CO2balance is operating within, i.e. carbon offsetting as a strategy to mitigate climate change, can be seen as one of the reasons for a low adoption rate of improved stoves in Magina, since it overlooks the context-specific needs. This relates to the application of a participatory approach and although it can be stated that CO2balance has used it, the local needs have not been taken sufficiently into account. What we from the discussion can conclude is that CO2balance might have met obstacles in Magina, but their aim at the same time never was to meet the needs of the women, but to legitimize their programme. Thereby it can be concluded that the overall political agenda and implications in

the use of the participatory approach have affected the adoption rate of the CZK stoves negatively in Magina.

7. Perspectives

During our study in Magina it came into our attention that the household economics play an important role in terms of choice of stoves and fuel. Here a deeper understanding of the economic conditions and the allocation of these among the household could be a very fruitful aspect. When looking into dynamics and decision-making processes in the households the role of gender and intra-household inequality is a central aspect. Looking into these perspectives it is important to notice is that the households cannot be seen as *one* unit, but as unit composed of different hierarchies and power relations (Folbre 1986, 245).

As mentioned in the introduction the harmful effects of traditional stoves is one of the main issues emphasized by development programmes working with domestic energy – often presented under the statement that cook stoves are a “*silent killer*” (GACC 2013, WB 2011). During our fieldwork we experienced a hint of the effects of the use of different stoves and were puzzled about the lack of complaints from the women. It would be interesting to look into how knowledge, agency, or rather a lack hereof, and cultural factors such as expectations to the female identity influence the women’s use and hereby the health risks they are exposed to. Additionally it could be interesting to use more natural science approach to measure the actual improvement of IAP that improved stoves have.

A third perspective that could be included further is the supply of fuel which as concluded plays a crucial role in terms of the use of stove. For this reason it could be interesting to look deeper into other types of fuel as well and in that way investigate the supply chain of e.g. charcoal which as before mentioned is a much used fuel source in the area. In relation to this, other projects in Kenya are focusing on examining alternatives fuel types such as briquettes made from dust from the charcoal production and the benefits these projects can have on local communities in terms of the locally based production (Njenga 2013). For further research it could be interesting to look into whether this fuel could apply to Magina, especially in terms of heating.

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8.1 Collected data

Firewood Collection 1, 04.03.15, Kinale

Firewood Collection 2, 06.03.15, Kereita

Focus Group 1, 10.03.15, Magina

Focus Group 2, 10.03.15, Magina

Forest Walk, KENVO, 10.03.15, Kinale & Kereita

Interview KENVO, informal, 06.03.15, Kimende

Interview KFS Kereita, 06.03.15, Kimende

Interview KFS Kinale, 10.03.15, Kinale

Interview Mwangi, Leah, Project Manager KENVO, 09.03.15, Kimende

Interview Njoki, Mary, former employee CO2balance, 05.03.15, Kimende

Observations, 27.02.15, Magina

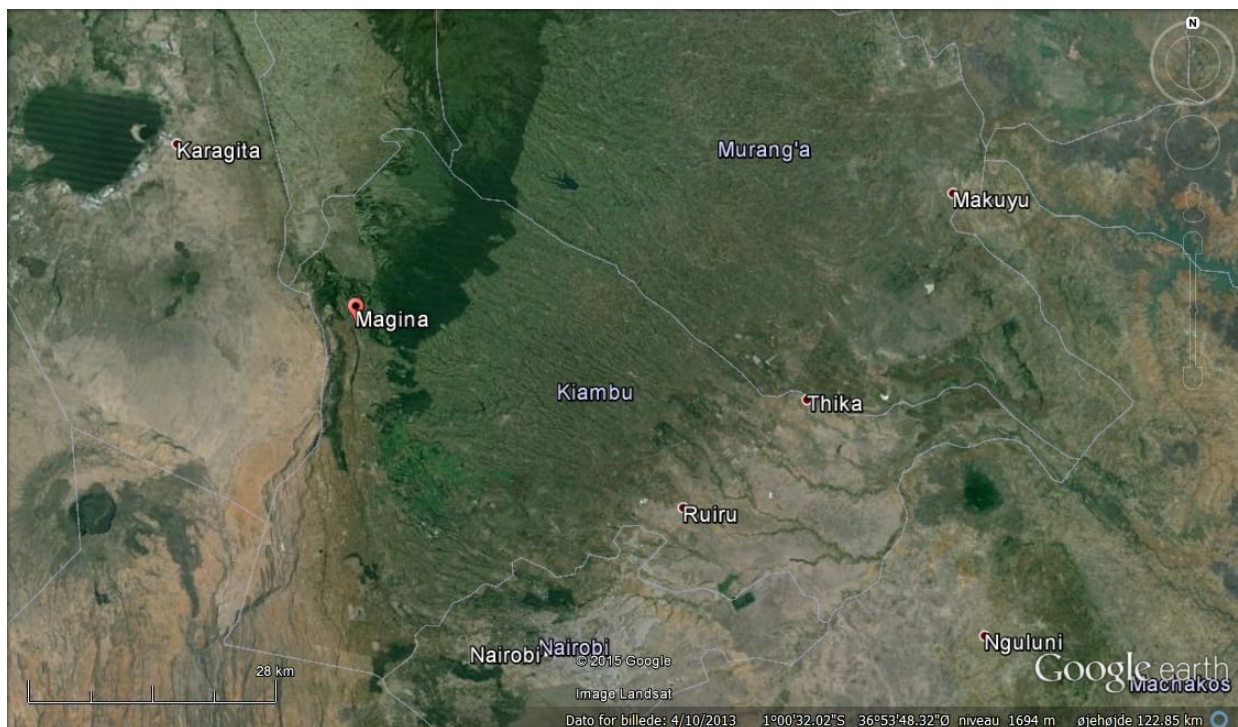
Observations, 04.03.15, Kinale

Observations, 06.03.15, Kereita

Questionnaires (28), 02.-05.03.15, Magina

9. Appendices

Appendix 1 Map of Kiambu County and Magina



First picture showing Kiambu within Kenya and the second showing Magina within Kiambu

Appendix 2 Background information on KENVO and CO2balance

KENVO

KENVO is a community based NGO focusing on conserving: “(...) the biologically rich Kikuyu Escarpment Forests and other natural resources in Lari Division for their biodiversity importance and support to the livelihoods of the local community” (KENVO 2008, Mwangi 9.3.2015). KENVO has introduced two projects in Magina, one with improved clay-stoves and one with biogas. In collaboration with GIZ, a German federal company advising the government, KENVO sold cheap improved stoves in Magina from 2009-2010. The first mentioned focus on women collecting firewood as the target group was women and the overall goal of the project for both KENVO and the cooperation German federal company GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit) was to decrease the use of firewood from the forest. The stoves were not given out freely but sold for 300 Kshs., and were installed by young volunteers from KENVO so that the clay-stove was attached to the ground. The project ended when CO2balance.com entered the area since they now provided similar free cook-stoves for all, but made follow-ups until then. Now they are mainly focusing on biogas-plants in the area supported by Danida, but this is more costly, and only four have been installed in Magina (Mwangi 9.3.2015). Picture showing the stove.



CO2balance

CO2balance was established in 2003 in the United Kingdom, and is a company enabling carbon offset⁹ projects for businesses (CO2balance 2003a). They own a Kenyan company called Carbon Zero Kenya, which is the vehicle for project implementation in East Africa. Carbon Zero Kenya work together with local NGOs in order to implement the carbon offsetting projects in East African communities (CO2balance 2003c). The donation of stoves in Magina was part of a project called Aberdare Improved Cook Stoves where around 9.000 stoves were donated in that Aberdare area. The intention of the project is to attempt some of the issues threatening the Aberdare Range as illegal human activities among others charcoal production, the extensive use of firewood and the illness caused by smoke emission (CO2balance 2003b). And at the same time reduce CO2 emissions that can be sold to companies. CO2balance have been doing projects in Kenya since 2006, distributing more than 50.000 improved cook stoves and currently are they running eight projects concerning improved cook stoves with three more projects under development (CO2balance 2003b).

CO2balance stove – pilot test



CO2balance - CZK



⁹ Carbon offsetting is “funding of an activity outside of one’s own organisation that reduces emissions elsewhere, by the same amount as the emissions that need to be offset” (The golden standard: 5)

Appendix 3 Overview of applied methods and timetable

Friday 27 th February	Arrived at Magina in the afternoon.
Saturday 28 th February	Merged the questionnaires with our Kenyan counterparts. Did 2 pilot test of the questionnaires.
Sunday 1 st March	Went to church with our host families in the morning. Discussed the pilot test, and finalised the wording of the questionnaires.
Monday 2 nd March	Conducted questionnaires all day. Went on firewood collection on a private plot.
Tuesday 3 rd March	Wangari Maathai day at KENVO.
Wednesday 4 th March	Went on firewood collection in Kinale Forest. Conducted questionnaires.
Tuesday 5 th March	Conducted the last questionnaires. Did an expert interview with CO2balance. Did a pilot test of an in-depth interview
Friday 6 th March	Went on firewood collection in Kereita Forest. Had an expert interview with KFS Kereita and an informal conversation with KENVO. Meeting with supervisor professor Mary Njenga.
Saturday 7 th March	Conducted two focus group interviews. Went on a forest walk in Kereita and Kinale forest with KENVO.
Sunday 8 th March	Excursion all day.
Monday 9 th March	Did an expert interview with KENVO. Prepared the community feedback.
Tuesday 10 th March	Did an expert interview with KFS Kinale. Presented our community feedback.
Wednesday 11 th March	Left Magina in the morning.

Overview of applied methods
2 Pilot test of questionnaire
30 Questionnaire
1 informal interview
2 Focus group interviews
4 Expert interviews
3 Firewood collections
1 Forest Walk

Appendix 4 Questionnaire

We are a group of students from University of Copenhagen, Denmark and University of Nairobi, Kenya. We are doing a project on domestic energy with a focus on the use of cooking stoves and fuels. We will use this questionnaire to gain general information about the problems and benefits of different types of stoves and fuel. The information gathered will be used in a university report.

1. Name of village in Magina

Bahati

Muthalga

Majengo

Site

2. Name

3. Year of birth

4. Gender: Male () Female ()

5. Level of education

What is your completed level of education?

None

Primary

Secondary

College

University

6. How many people are currently staying in the house?

(how many people are you cooking for/permanent staying here)

Gender Male _____ Female _____

7. Occupation (in case they list something else than farmer and if appropriate ask how much they earn from it on a monthly basis)

8. Occupation of spouse

9. If farmer, which types of crops

10. Are the crops for selling or consumption?

Consumption

Selling

Both

11. Livestock, type and quantity

a. Are the livestock for selling or consumption?

Consumption

Selling

Both

12. Do you receive any remittances from emigrated family members?

Yes

No

13. Are you the main cook in the household? - If no, ask who is

Yes

No

14. How much time do you spend on cooking each day? (using firewood/charcoal, etc.)

morning

midday

evening

heating water

15. Do you receive help with the cooking?

Yes

No

16. From who?

17.

<p>What do you use for cooking (stove) Rank, no. 1 is the one they uses the most</p>		
<p>Type of Fuel</p>		
<p>Source of Stove (Ask explicitly if they have one from a NGO, bought, present from family etc.)</p>		
<p>Cost of cooking tool (stove)</p>		
<p>Used for Morning, midday and evening food. Warming, Heating of water</p>		
<p>Preference for the stove (rank)</p>		

18. Why are these your preferences?
(Dizziness for charcoal, quicker, CO2)

19. What do you consider as the ideal stove for you? (why?)

20. Are you aware of any improved cookstove development program(s)? – if yes, which one(s)?

Yes

No

21. Have you ever received a cooking-tool (stove) from an improved cookstove development program?

Yes

No

**a) If yes,
How many and which ones?
Are you using it or not (if not, why not)?**

22. If they have answered firewood, how do you get it?

Collecting myself (how long does it take you pr. Trip, and how many times each month?)

Buying

Both

Collecting with my children

My children collects

My spouse

Other (bicycle, donkey, wheel barrel)

23. If buying, how much do you spend on a monthly basis?

22. Where do you collect the firewood?

Kinale

Kereita

Other (trees on farm) _____

23. If using charcoal are you buying or producing?

Buying

Producing

Both

24. If producing, how much time do you spend producing monthly?

25. Ask to price in case they have mentioned other fuels.

26. What is your preference for types of fuel?

(List in order of preference from most preferred to least preferred and give reasons for the ranking)

27. Are you part of any association/sacco? If yes what are the benefits?

28. Do you experience any of the following problems from cooking?

Itchy eyes

Burns

Back pain

Lung/Breathing problems

Coughing

Fire

Headache

Makes house dirty (soot on walls)

: Other impact (list them in case of other)

Observation

What is the floor type?

Mud +

Cement

Other

Have the walls and/or roof where they cook been blackened from the stove/soot?

Yes

No

House built in (note a few lines)

Tree

Stone

Iron Sheet

Other

Type of gate

Are there more than one kitchen?

Presence of a chimney in the Kitchen

Is the kitchen well ventilated kitchen?

Do they have a drying shelf for firewood?

Appendix 5 Synopsis

Contents

Introduction..... 55
 Effects of fuelwood use.....55
 Rules and regulations.....56
 The success of development programs56
 Operationalization of key words57
 Additional research questions58

Assumptions..... 58

Methodology 58
 Research design.....58
 Positioning59
 Prejudices.....59
 Data collection59
 Social Science.....59
 Natural Science.....60
 Reliability and measurement validity61

Cooperation with counterparts 61

Literature..... 62

Synopsis

Introduction

Domestic energy has for decades been a central issue in international development policies, with an emphasis on health-related issues and impacts on both local and global environment and climate. For this reason the UN Secretary in cooperation with the World Bank have introduced the initiative ‘Sustainable Energy for All’, where one of three goals for 2030 is to ensure universal access to modern energy services (UN Foundations, 2013). Moreover a large global public-private partnership chaired by the UN called *The Global Alliance for Clean Cookstoves* has recently been established and has set a goal of 100 million households globally adopting clean cookstoves by 2020 (GACC, 2013:14). The accessibility of affordable and sustainable domestic energy is one of the main priorities for improving livelihoods in Sub Saharan Africa (SSA) since it relates to health, household economy, forest and agricultural resource management and climate change (Mwirigi et al., 2013:22; WB, 2011:v).

The biggest sources of cooking fuel in Kenya are firewood (65%), charcoal (17%) and paraffin (12%)¹⁰ (KNBS, 2009:1). Firewood is mainly used in rural areas, whereas charcoal is considered the main source of cooking fuel for urban residents (Njenga et al., 2013:360). The national distribution of cooking fuel sources is reflected in the case of Kiambu county where 35,3 % of households uses firewood, 26,4% charcoal and 22,5% paraffin (SID, 2015). Paraffin is often considered too expensive for rural households and it is estimated that approximately 90 % of rural households use fuelwood¹¹ (Githiomi et al., 2012:103). This can be illustrated by looking into the rural area of Lari where our fieldsite Magina is situated. 74% of the households here use firewood, 19% charcoal and only 2,5% use paraffin¹² (KNBS, 2009:1). Looking at the numbers for the use of cooking fuel in Kenya it shows that even though there are initiatives to promote fuelwood substitutes, such as Liquefied petroleum gas (LPG), the number of people relying on firewood and charcoal is not decreasing (GACC, 2013:16).

Effects of fuelwood use

The combination of fuelwood use and traditional stoves means that the sustainability of cooking-practices in rural areas has been questioned. In the 1980’s this critique was primarily linked to deforestation, whereas health-related implications due to air-pollutants additionally came into focus in the 1990’s (WB, 2011:1). The local environmental problems are seen in several counties in Kenya, among these Kiambu where there is a deficit in the supply and demand balance of fuelwood on -

¹⁰ Calculated: $5666216/8767954*100$, $1483901/8767954*100$, $1014446/8767954*100$

¹¹ Fuelwood is defined as firewood and charcoal

¹² Calculated: $22790/30779*100$, $5950/30779*100$, $776/30779*100$

41,7%, which leads to deforestation (Githiomi et al., 2012:103). Due to deforestation women often have to walk longer distances when collecting firewood and spend time which could have been used on acquiring monetary income (WB, 2011:xii). In terms of health-issues indoor cooking smoke exposes women to unhealthy particulates at a level that is twenty times higher than what WHO recommends (WB, 2011:ix). According to WHO the household air pollution (HAP) are related to 26% of all deaths reported in Kenyan hospitals (GACC, 2013:3). It is important to emphasize that the illnesses linked to HAP can be difficult to isolate and furthermore that these numbers may be used deliberately by organizations in order to raise money for different energy projects.

Rules and regulations

The collection of fuelwood and partly the supply of fuelwood and production of stoves in Kenya is controlled by both local and national laws. Regarding the supply of fuelwood the government in Kenya intends to increase the forest cover to 10% by 2030, including proposals of enacting laws that require landowners to plant trees on minimum 10% of their land holdings (Githiomi et al., 2012:108). If the government enacts laws similar to the above mentioned it could affect the livestock and area for farming, which could influence the livelihood of households.

In the Aberdare Conservation Area (ACA) there has been a high degree of decrease in the forest cover among others because of fuelwood collection and illegal charcoal production, which lead to an expansion of the Rhino Ark Aberdare Fence (Thenya, 2011:11). This means that the area where women are able to collect fuel has been giving some physical limitations. Since 1999 the Kenya Forest Service (KFS) has collected royalties, among these monthly fuel wood licenses (Thenya, 2011:95).

The listed regulations indicates that there are conflicting interests between politicians and the households which make it interesting to examine how households are influenced by both local and national policies.

The success of development programs

Another interesting external factor to consider is the role of development programs on implementing new stoves. The projects are often criticized for not taking the local context into account which most research indicate is necessary in order for the projects to be effective (Sesan, 2014:143, WB, 2011:v). This has meant that the improved stoves are still not being widely used by the populations in the developing countries (Sesan, 2014:143). Furthermore, conflicting political issues might be at stake, since the production and use of e.g. charcoal in some cases are associated with higher GHG emissions compared with firewood, but on the other hand offers public health benefits (Ballis et al., 2003:2057). Because of that, the projects and agenda from external actors, such as NGOs, political institutions like the World Bank and producers of charcoal are of significance when we investigate the development of the use of stoves and fuels in the Kiambu county.

From these perspectives it is in our interest to examine the behavioral, socio-economic and political aspects of the use of stoves and fuel in the Kiambu county and analyze if there is an inconsistency between the needs of the households and different development projects in the area. This leads to the following problem statement:

How do behavioral, political and socio-economic aspects concerning the use of stoves and fuel affect the daily lives of women in Kiambu, and how does this conform to development programs of improved stoves in the area?

Operationalization of key words

Behavioral aspects are identified as the social practices and customs centered around the kitchen and the use of stoves.

Political aspects are identified as the local, regional and national formal laws concerning stoves and fuel as well as informal laws of fuel-collection.

Socio-economic aspects are identified as the financial composition of the householding including assets such as land and farm-equipment. Further it relates to the education and jobs of family members as well as access to social groups and loan-institutions.

Development programs are identified as development programs in Kiambu County concerning more efficient stoves and fuelwood.

Additional research questions

Throughout the paper we will answer our problem statement through the following research questions (RQ):

1. What type of stoves and fuels are the households using?
2. What are the social/behavioral practices centered around cooking in the kitchen?
3. How are the women's use of and access to different types of fuel affected by local/regional/national policies?
4. How does the socio-economic status of the different households affect their use of stoves and fuel?
5. What are the discrepancies of the needs of the women and the agendas of development programs of improved stoves?

Assumptions

Our starting point is built on the assumption that the variation in fuel is related to type of stove, why it is important both to investigate the use of stoves and fuel, which is supported by existing literature (Ochieng et al., 2012:263). Further we have restricted our target group to the women, since we assume that women predominantly collect fuel and do the cooking (GACC, 2013:15). We are aware of the possibility that we might expand the target group to households more generally if our investigation indicates that e.g men or children play a significant role in our study. Even though there are much awareness on domestic energy there is still an ongoing discussion on the methods to improve the livelihood for households in developing countries. It is therefore plausible to assume that it is a very complex area to investigate. As one voice amongst many, the focus of this study will be to illuminate whether there is an inconsistency between the socio-economic opportunities, the behavioral preferences and the discourse and intentions from different development programs.

Methodology

Research design

To answer the problem statement in the best possible way, we will use a mixed methods research design. This means that we will combine elements of qualitative and quantitative research approaches (Johnson et al., 2007:123). Moreover we will use an interdisciplinary approach where we combine different methods from natural science with social science.

We will do a single case study of Magina, a cluster in Kiambu. Our target group is the women in Magina, which we presume is possible to compare because of the expected low variance in number of meals cooked, types of dishes and number of people in the household (Ochieng et al., 2012:264). The field site Magina has been chosen by a Kenyan organization, Kijabe Young Volunteers (KENVO)

working in Kereita Forest, why we will try to investigate if there could be a bias in the selection of our topic ‘Domestic Energy’ which could result in measurement errors in our analysis.

Positioning

In relation to our perception of knowledge production it is important to note that our overall positioning, inspired by the social constructivism, is that there exists not *one* truth but that research-findings always relate to the constructed perception of reality (Pedersen, 2012:188).

As a social researcher carrying out a fieldwork, it is important to take your own positionality and the general politics of doing social research into account (Brockington & Sullivan, 2003:72). With inspiration from the philosophical hermeneutic approach we stress the importance of our positioning which at all times will be as a part of the world being researched. It is as such not possible for us to view the research subjects objectively from the “outside” (Juul, 2012:121). In our situation we are also aware of our position as a group of partly western university students and that we might be associated with different development programs which can affect the incentives of the answers. In addition to this our status as short-termed guests and women might limit our access to the field, but on the other hand our gender might be an advantage since a big part of our research is situated in the domestic sphere.

Prejudices

As researchers we are not objective before entering the field but bring with us different assumptions and prejudices (Juul, 2012:122). According to the philosophical hermeneutics this should not be considered an obstacle since the prejudices are productive for the recognition and without these one would not be able to ask the right questions which are important for the interpretation of the research areas (Juul, 2012:122). Our main prejudice is that the development projects do not take the behavioral and cultural factors sufficiently into account. Therefore our overall assumption is that there is a gap between the scope of the development projects and the context-specific requirements in the local communities regarding types of stoves. This also relates to a theoretical debate within development studies regarding the relationship between development and technology where: *“the successful application of technology for human development is contingent on specificities peculiar to the local contexts in which it is deployed”* (Sesan, 2014: 143) and further the debate between the western perceptions on development, and how it is actually implemented (Mosse, 2004).

Data collection

Our data collection will be in Magina and in the Kereita Forest. In this section we will briefly sum up the methods we will use, for a more detailed overview please see appendix 1.

Social Science

With our quantitative survey and qualitative interviews we will mainly look at the demand side, understanding the motivation and needs of the consumer, in this case the women. In the beginning of the field trip we will do an in-home survey where we will do the interview at the respondent's residence (Hansen, 2012:189). We will use random selection to the extent that it is possible. Moreover we will aim at getting respondents who vary in different parameters as age, types of stoves and fuel, family sizes, distance to forest, socio-economic status. We are aware of the difficulties in especially measuring socio-economic status, why we have listed some different indicators in our survey, appendix 2. We will do a pilot test of the survey and revise our questions accordingly. The use of survey in the beginning of the fieldtrip contributes in giving us an overview of the area and use of stoves and fuel. Moreover to establish contact with women in Magina and identify relevant informants for in-depth interviews.

We will do semi-structured interviews and focus group interviews. The first informants we assume to find through the survey and thereafter we will primarily use the snowball effect. We will combine interviews with cultural mapping of the households. By using in-depth interviews we will gain more information and follow more complex problematics. With focus-group we create a more informal dialogue where we can follow interesting topics through an interactive discussion. Focus group interviews makes it possible to produce data concerning power relations, interactions and norms (Harrits et al., 2012:150).

As a supplement to our interviews we engage in participatory observation throughout the fieldwork, by taking part in women's daily activities as much as possible such as the preparation of meals, the actual cooking-process, collection of fuel and other relevant activities.

Natural Science

With the natural science methods we will mainly focus on the supply side. We will collect data to analyse the preservation of the local environment, which we will measure by calculating and comparing the biomass in Kereita Forest.

In order to do so we will do a before and after analysis. We will make a Forest Resource Assessment to identify the deforestation. It is though a condition that we will be able to find information on the level of biomass from before, to have something to compare it with. We will also compare the weight of collected fuels from different households with the type of stove. This can further be compared with the biomass and the regeneration of the forest and enable us to estimate the future development of the biomass.

Further we will GPS-map the distances women have to walk to collect fuel and compare this with the rates of deforestation to see if it has changed over time. When collecting data to our GPS-mapping and

weight of consumption of fuel, we will aim at having spatial variation to get a more exact measurement of the differences of distances. These methods make it possible for us to compare statements from the women with collected data.

Reliability and measurement validity

Since we will use different methods from the social sciences and natural sciences we will make use of triangulation. This should ensure the reliability of our project, reliability defined as when repeated applications of a given measurement yield consistent results (Adcock & Collier, 2001:531). Regarding the measurement validity we have conceptualized our overall topic into different research questions to capture the different aspects within our problem statement. Furthermore we are doing field research which often provides measures with greater validity since “being there” can provide a more in-depth understanding of the life of the informants (Babbie, 2002:298), though we are aware of different pitfalls since our field study is limited to two weeks.

As stated we emphasize the importance of collecting representative data from the area we are investigating, so our results can contribute in the ongoing discussion on domestic energy. We are though still aware of the limitations in doing single case studies, why our aim is not to state something general for all of Kenya.

Cooperation with counterparts

At the time of writing we are in contact with our counterparts Sara Lilian Kongani and Anne Majani. We have sent our research questions which they overall agree on and have planned to do some interviews together on the 1st of March. Additionally we are in contact with Mary Njenga (PhD) who will visit us in the field and have agreed on doing an interview.

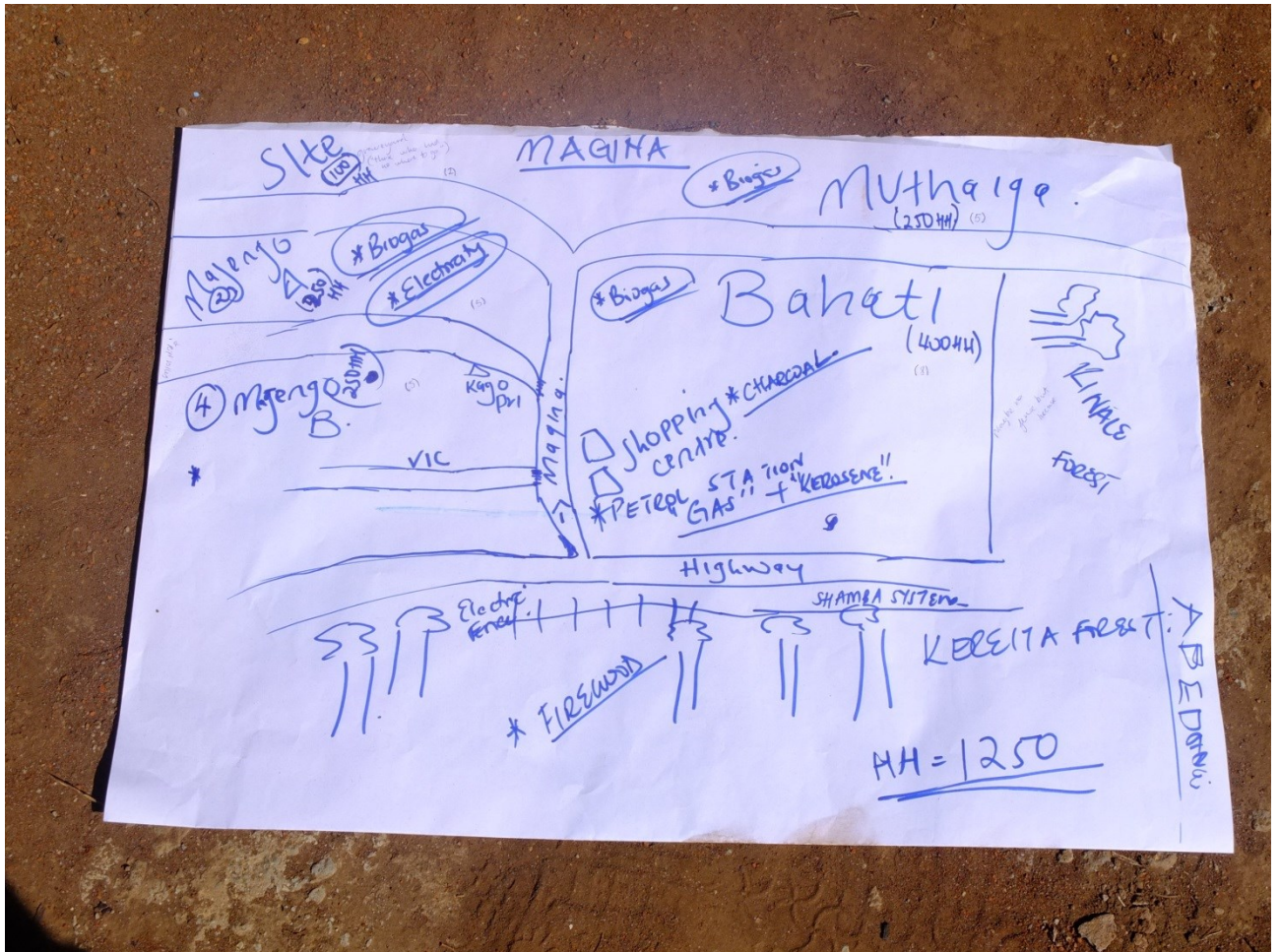
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Appendix 6 Drawn map of Magina



Appendix 7 Expert interviews

DOMESTIC ENERGY EXPERT INTERVIEW with KENVO

DATE OF THE INTERVIEW: _____

Background Information of SLUSE

We are a group of students from University of Copenhagen, Denmark and University of Nairobi, Kenya. We are doing a project on domestic energy with a focus on the use of cooking stoves and fuels, and in relation to this the role of development programs of improved cooking stoves. We will use this interview to gain general information about the problems and benefits of different types of stoves and fuel, and development projects. The information gathered will be used in a university report.

PART A:

1. Name of the respondent _____
2. Gender: Male () Female ()
3. Level of education: _____
4. Name of organization: Kenvo
5. Duration of engagement with the organization:
6. Designation in the organization:

PART B:

7. Brief background of the organization:

i)	Name of Founders of organization and year of establishment?	
ii)	Type of organization (<i>Private/ NGO-international, Regional, Local/Governmental</i>)	
iii)	Source of Funding	
iv)	Aim/Vision of the organization	
v)	What is the organization currently involved in (if (s)he knows)?	
vi)	Number of employees and volunteers?	

8. What kind of projects in relation to energy (stove and fuel) do you have, or have had in Magina?

PART C: Cook stoves

i) Name of the project	
ii) Duration of the project (Start and End)	
iii) Name of the donors	
iv) Target group	
v) Name of partners involved in the intervention	

9. Why did the project focus on Magina?
10. Describe the design and development of the cookstoves for Magina? (*what factors political, economic, socio-cultural influenced the development of the stoves and issues around fuel types*)
11. When were the stoves distributed?
12. How many were distributed?
13. How were they distributed?
14. What was the basis of selection of the target group?
15. Was there a consultation process with the community /partners before the distribution of the cookstoves? (YES _ NO _)
If Yes, describe the process
16. Did the cookstoves have a cost implication on the beneficiaries? (YES _ NO _)
If yes, how much in Kshs.? _____
17. In the course of our survey, we noted that most of the recipients of the improved stoves have no knowledge of the programme and the source of improved stoves, Why do you think this is the case?
18. Did you conduct any follow ups? (YES _ NO _)
 - i) *What were the outcomes of the follow ups, and were there any responses from your organization?*
19. Were there any discrepancies of the community on the improved stove and what was your response to the issues?(*if no follow ups were conducted?*)
20. Describe the adoption rate? (*households reached and using the improved stoves*) versus the target of the project)
21. What factors affected the adoption rate? (*political, socio-cultural, economic*)
22. What were/are the Opportunities in adoption of improved stoves?
23. What were/are the Challenges in the adoption of improved stoves?
24. Describe the Impact of the stove on the livelihood of the targeted population(health, monetary, time etc)
25. What were/are the Achievements of the project?
26. Do you think the needs of the target group were met? (YES _ NO _) Explain
27. What are the other benefits of the project to the local community? (e.g. employment)
28. What are your future Plans for this project in Magina?
29. Do you know of any programmes/organizations that were focusing on improved stoves in the last five years in Magina area?
30. Were there any other similar programmes carried out by the organization in other areas and were there any successes?
31. Lessons learnt (what would she recommend be done differently)

Other remarks:

PART D: Biogas

i) Name of the project	
ii) Duration of the project (Start and End)	
iii) Name of the donors	
vi) Target group	
vii) Name of partners involved in the intervention	

32. Why did the project focus on Magina?
33. Describe the design and development of the fuel project for Magina? (*what factors political, economic, socio-cultural influenced the development of the stoves and issues around fuel types*)
34. When were the biogas plants established?
35. How many were established?
36. How were they established?
37. What was the basis of selection of the target group?
38. Was there a consultation process with the community /partners before the establishment of the biogas plants?
(YES _ NO _) If Yes, describe the process
39. Did the biogas plants have a cost implication on the beneficiaries? (YES _ NO _)
If yes, how much in Kshs.? _____
40. Did you conduct any follow ups? (YES _ NO _)

- ii) If yes, *Describe how the follow ups were conducted-frequency, when were they conducted after the establishment of the biogas plants*
- iii) *What were the outcomes of the follow ups, and was there any responses from your organization?*

41. Were there any discrepancies of the community on the biogas plants established and what was your response to the issues? (*if no follow ups were conducted?*)
42. Describe the adoption rate? (*households reached and using the biogas plants*) versus the target of the project)
43. What factors affected the adoption rate? (*political, socio-cultural, economic*)
44. What were/are the Opportunities in adoption of biogas energy?
45. What were/are the Challenges in the adoption of biogas energy?
46. Describe the Impact of the biogas energy on the livelihood of the targeted population(health, monetary, time etc)
47. What were/are the Achievements of the project?
48. Do you think the needs of the target group were met? (YES _ NO _)

Explain

49. What are the other benefits of the project to the local community (e.g. employment)?
50. What are your future Plans for this project in Magina?
51. Do you know of any programmes/organizations that were focusing on biogas energy in the last five years in Magina area?
52. Were there any other similar programmes carried out by the organization in other areas and were there any successes?
53. Lessons learnt (what would you recommend be done differently)

Other remarks:

PART E: Firewood collection

54. What is Kenvo's opinion of firewood collection in Kinale and Kereita Forest?
55. How has the impact of collection of firewood changed on the forest over the years?
56. How has the introduction of the improved stove and energy projects affected the firewood collection in Kinale and Kereita?

DOMESTIC ENERGY EXPERT INTERVIEW with CO2balance

DATE OF THE INTERVIEW: _____

Background Information of SLUSE

We are a group of students from University of Copenhagen, Denmark and University of Nairobi, Kenya. We are doing a project on domestic energy with a focus on the use of cooking stoves and fuels, and in relation to this the role of development programs of improved cooking stoves. We will use this interview to gain general information about the problems and benefits of different types of stoves and fuel, and development projects. The information gathered will be used in a university report.

PART A:

- 57. Name of the respondent _____
- 58. Gender: Male () Female ()
- 59. Level of education: _____
- 60. Name of organization affiliated to: _____
- 61. Duration of engagement with the organization:
- 62. Designation in the organization:
- 63. What was/is your relationship with KENVO?
- 64. Current engagement/occupation:

PART B:

65. Brief background of the organization:

vii)	Name of Founders of organization and year of establishment in general and in Kenya?	
viii)	Type of organization (<i>Private/ NGO-international, Regional, Local/Governmental</i>)	
ix)	Source of Funding	
x)	Aim/Vision of the organization	
xi)	What is the organization currently involved in (if (s)he knows)?	




PART C:

66. Details of the initiative/project on stoves and /or fuels in Magina:

i) Name of the project	
ii) Duration of the project (Start and End)	
iii) Name of the donors	
viii) Target group	
ix) Name of partners involved in the intervention	
x) What was the relationship of KENVO with the organization?	

67. Why did the project focus on Magina?
68. List the stoves they are/were promoting and/or fuel types.
69. Describe the design and development of the cookstoves for Magina? (*what factors political, economic, socio-cultural influenced the development of the stoves and issues around fuel types*)
70. When were the stoves distributed?
71. How many were distributed?
72. How were they distributed?
73. What was the basis of selection of the target group?
74. Was there a consultation process with the community /partners before the distribution of the cookstoves? (YES _ NO _)
If Yes, describe the process
75. Did the cookstoves have a cost implication on the beneficiaries? (YES _ NO _)
If yes, how much in Kshs.? _____
76. In the course of our survey, we noted that most of the recipients of the improved stoves have no knowledge of the programme and the source of improved stoves, Why do you think this is the case?
77. *What were the outcomes of the follow ups, and was there any responses from your organization* If yes, Describe how the follow ups were conducted-frequency, when were they conducted after the distribution exercise
78. Did you conduct any follow ups? (YES _ NO _)
79. Were there any discrepancies of the community on the improved stove and the response of the developer to the issues?(*if no follow ups were conducted?*)
80. Describe the adoption rate? (*households reached and using the improved stoves*) versus the target of the project)
81. What factors affected the adoption rate? (*political, socio-cultural, economic*)
82. What were/are the Opportunities in adoption of improved stoves?
83. What were/are the Challenges in the adoption of improved stoves?
84. Describe the Impact of the stove on the livelihood of the targeted population(health, monetary, time etc)
85. What were/are the Achievements of the project?
86. Do you think the needs of the target group were met? (YES _ NO _) Explain
87. What are the other benefits of the project to the local community? (e.g. employment)
88. Do you know of any programmes/organizations that were focusing on improved stoves in the last five years in Magina area?
89. Were there any other similar programmes carried out by the organization in other areas and were there any successes?
90. Lessons learnt (what would she recommend be done differently)

Appendix 8 Categorization of stoves

Name of stove	Pictures
Three stone cookstove	 A photograph of a traditional three-stone cookstove. It consists of three large, flat, grey stones arranged in a triangle on the ground. A large, dark, cylindrical metal pot sits on top of the stones. Several pieces of firewood are scattered around the base of the stones, and a small fire is visible between them. In the background, there are other kitchen items like a white bucket and a black pot.
Improved firewood stove	 A photograph of an improved firewood stove. It is a brick structure with a circular opening on top. A metal pot is placed on a small platform inside the opening. Firewood is visible inside the stove, and a small fire is burning. The stove is built into a wall or a semi-enclosed structure.
Charcoal jiko with ceramic lining	 A photograph of a charcoal jiko. It is a metal structure with a circular opening on top. The interior of the opening is lined with a light-colored ceramic material. A metal pot is placed on top of the opening. The jiko is supported by a metal stand with four legs. The background shows a red floor and a wall.

**Charcoal metallic
jiko**



Kerasene stove

Interview 3



Appendix 9 GPS Waypoints

Page 1. Respondent 1-15. Waypoint number 2-16

(Gruppe 3: Uda, Helle & (Ida). Gira) 6: Site 8 Uda & (Ida)

Sample No.	Date	Waypoint ID	Coordinates	Photo No.	General description
1	2/3	002	S 00° 57.230' E 036° 37.555'	1.1	Note 1.1 Gruppe 1's first site
2	-11-	003	S 00° 57.261' E 036° 37.456'	3.1	3.1 Gruppe 3's first site
3	-11-	004	S -11° 20' E -11° 424'	2.1	Gruppe 2's first site (near Uda)
4	-11-	005	S -11° 249' E -11° 469'	1.2	Group 1, place 2
5	-11-	006	S -11° 218' E -11° 469'	3.2	Group 3, place 2
6	-11-	007	S -11° 245' E -11° 372'	1.3	Group 1, place 2
7	-11-	008	S -11° 247' E -11° 375'	3.3	Group 3, place 3
8	-11-	009	S -11° 162' E -11° 488'	2.2	Group 2, place 2
9	-11-	010	S -11° 176' E -11° 475'	2.3	Group 2, place 3
10	-11-	011	S -11° 210' E -11° 431'	3.4	Group 3, place 4
11	-11-	012	S -11° 017' E -11° 497'	5.1	Group 5 P. 1
12	-11-	013	S -11° 002' E -11° 533'	6.1	Group 6 P. 1
13	-11-	014	S -11° 56.413 E -11° 507'	6.2	6.5 P. 2
14	-11-	015	S -11° 57.001' E -11° 477'	5.2	
15	-11-	016	S E	4.1	

Page 2. Respondent 16-30. Waypoint number 36-49

9. Same 38 site
10. Helle & Gira

Sample No.	Date	Waypoint ID	Coordinates	Photo No.	General description
16	4/13	036	S 00° 57.018 E 036° 32.445'	7.1	
17	4/13	037	S -11° 026' E -11° 423'	8.1	
18	4/13	038	S -11° 071' E -11° 322'	8.2	
19	4/13	039	S -11° 085' E -11° 204'	7.2	
20	4/13	040	S -11° 094' E -11° 293'	7.3	
21	4/13	050	S -11° 152' E -11° 298'		
22	-11-	043	S -11° 136' E -11° 321'	8.4	
23	4/13	041	S -11° 124' E -11° 323'	7.4	
24	-11-	051	S -11° 134' E -11° 375'		
25	-11-	042	S -11° 157' E -11° 351'	8.6	
26	-11-	044	S -11° 153' E -11° 304'	9.1	
27	-11-	045	S -11° 217' E -11° 243'	10.1	
28	-11-4/3	046	S -11° 241' E -11° 236'	10's camera	Border between site 8 & 9
29	5/3	047	S -11° 230' E -11° 244'	9.2	
30	5/3	049	S -11° 268' E -11° 228'	9.3	

Appendix 10 Livestock and gas

number of cows * Gas Crosstabulation

Count

		Gas			Total
		Biogas	LPG Gas	No gas	
number of cows	0	0	2	19	21
	1	1	1	1	3
	2	0	2	1	3
	3	0	1	0	1
Total		1	6	21	28

number of sheep * Gas Crosstabulation

Count

		Gas			Total
		Biogas	LPG Gas	No gas	
number of sheep	0	0	0	9	9
	1	0	1	2	3
	2	0	1	4	5
	3	1	2	2	5
	4	0	1	2	3
	5	0	1	0	1
	7	0	0	2	2
Total		1	6	21	28