Social Impact Evaluation Study of the Rural Electrification Project in Zanzibar, Phase IV (2003-2006)

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Preface and acknowledgements

Rural Zanzibar has, since the beginning of the rural electrification project in 1986, experienced a range of changes, both in terms of external influences and also due to the internal dynamics in any society. The question is; to what extent and how has the arrival of electricity, through Phase IV in particular, produced transformations that help combat poverty among the population of rural Zanzibar? Documenting social change is not a straight-forward task. Sorting out the specific transformations caused by one particular technical innovation can be even more challenging.

The author wishes to start off by pointing out that the arrival of electricity matters a great deal in terms of social and economic development in rural Zanzibar. Some effects are directly observable, such as the running of night classes at school before important exams. Other effects are indirect and more subtle. Most of the impact of electrification, however, is related to conditions that go beyond the electrification project itself. For example, in 2001, the author observed that electricity had very limited use in health clinics for storing medicines simply because there were no medicines available within the rural, public health sector. In 2006, the situation was improved. In all electrified hospitals visited, medicines for vaccines were stored in fridges, available on the spot when needed. What this study will conclude, is that people's new access to electricity has had a significant social impact. Electricity is a fundamental condition for development in almost every respect.

Electrification is also costly. In total, the Rural Electrification Project represents 110 million NOK (ca 16 mill USD) in investments (77 during phases I-III and 63 in Phase IV), provided by the Norwegian Government. This highlights the need - both from the perspective of the body that has financed electrification, but evidently also from the point of view of the Zanzibari Government and the people whom electrification is expected to serve – to document the results in relation to the projects' objectives. This report provides such documentation.

The field visit to Zanzibar took place from September 25th to October 5th 2006; at the time when Phase IV had just been completed. An extension of Phase IV will be implemented from 2006-08. The author acknowledges the time and effort provided by people who were interviewed. She also appreciates the kind assistance she received from Mr. Makame Hassan Juma from Uroa village and the staff within Phase IV, in particular Mr. Ali Abeid Haji, Ms. Wanja Khamis Hemed, Ms. Mwanaidi Silima Jaffar and Mr. Abeid Salim Makame. I also thank Research Professor Desmond McNeill at the Centre for Development and the Environment (SUM), University of Oslo, for proofing the English language used in this report.

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Executive Summary

This study has been undertaken to explore and document the social impact of the rural electrification project in Zanzibar, Phase IV. The goal of Phase IV, to which this evaluation directs its focus, was to reduce poverty in rural areas.

Electricity's immediate effects were observed during a two week's field visit at the same time as Phase IV proper was terminated (September-October 2006). Interviews were conducted to obtain potential end users' experiences and viewpoints. Recently electrified villages (EV) were compared with non-electrified villages (NEV) to observe electricity's immediate effects. In order to grasp the impact of electrification in a longer perspective, results from former studies in Zanzibar are included in the evaluation. This means that the evaluation, though focusing on Phase IV, also includes findings of the rural electrification project's earlier phases.

Before the rural project (which commenced in 1986), there were a few generators in rural Zanzibar, but considerable problems occurred as to maintenance and production, and electricity had a very limited distribution. As Phase IV is completed, 66 % of the rural population in Zanzibar have access to the electricity grid available in their environment. The current electrification coverage of 66% is expected to become 82% when the extension of Phase IV is accomplished (in 2008).

The study documents that people's new access to electricity has had a positive impact in relation to the goal or reducing poverty in rural areas. Public services have been given priority. The effects are observable in terms of the quality of the public services provided and the high speed and massive spread with which such improvements are made. As a result, people's health becomes enhanced. Firstly, people obtain access to clean water in sufficient quantities. Secondly, health centres that have electricity and piped water now have working conditions that enhance the potential for proper treatment (water, light, access to medicines that need storage at a low temperature, sterilized equipment, fans and electric microscopes). Also vital as seen from each household: improved health has indirect positive consequences in terms of costs and time saved.

Electricity's potential to improve children's secular and religious learning is strongly expressed in rural Zanzibar. In practice too, electricity is used for such purposes through the use of light, computers and television. Night classes are getting common. Electricity improves access - especially for girls - to these extra lessons. In general, girls attend school more frequently and perform better during exams than they did before electrification.

Access to electricity modifies people's time use, which produces a range of shifts in everyday life. Everybody living in electrified villages experiences significant changes. In addition, 20% of households in rural Unguja have become electricity customers. The new ability to control the effective length of the day increases people's level of production. Also due to the improved, electrified water supply, women (in addition to girls) obtain more time for other activities, which increases their production capacity. As a result, women gain more economic power and gender relations become modified. The arrival of light and television also affect what people do with their leisure time. As an aggregated result, the pace of time is speeding up. Worth noting

is that women continue to cook food with firewood after electricity's coming. However, in those villages with electricity, which at the same time provide possibilities for earning an income, women have reduced the number of meals cooked per day from three to two. Consequently, less fuelwood is needed and women gain time for other activities.

The positive impact of electrification is clear, and the new range of possibilities offered with the new technology is immensely appreciated by people in rural Zanzibar. At the same time, it is important to take into account the more difficult sides related to electrification. Firstly, electricity alone does not bring about poverty reduction. Investments and supply of other infrastructures as well as electrical devises and systems for their maintenance and administration are necessary in order for electricity, not being an end product in itself, to become useful. Electricity nevertheless remains a fundamental condition for the documented improvements.

Secondly, economic vulnerability is a fact in this region. People tie up a relatively large amount of their resources when obtaining electricity connection and successively engage in a dependency relationship with the central supplier. They are extremely exposed in the case of rises in tariffs. Had the costs of electricity been considerably higher than they are today, the conclusion of this report would have been quite different and less positive. Also, customers' difficulties in understanding and servicing their electricity bill is a challenge that deserves continuous attention.

Contents

Abbreviations used in the text

EV	Electrified village(s)
NEV	Non-electrified village(s)
NORAD	Norwegian Agency for Development Cooperation
RUREL	Rural electrification project in Zanzibar (1986 – 2006)
ZECO	Zanzibar Electricity Corporation (former State Fuel and Power Corporation)

1. Mandate and objectives of the study

The main objective of the study was to evaluate the social impact of electrification in rural Zanzibar, Phase IV. By focusing on public services as well as the private sector, the project should pay specific attention to ('impact indicators'):

- Health services
- Education
- Gender relations
- Demography
- Production and other income generating activities

In order to assess the effect of electrification, 1-2 electrified villages should be selected and contrasted with 1-2 villages without access to electricity. A two-week's field visit would be undertaken by the consultant. Also, in order to include an analysis of electricity's impact in a longer perspective, the consultant would draw on her earlier work. This has centred on the social implications of electrification in rural Zanzibar through two studies; a Master Thesis in power engineering (1991, including 3 months' of fieldwork) and a PhD-study in social anthropology (2005, including 11 months' of fieldwork in 2000-01 and a 2-weeks' follow-up visit in 2004). Finally, the consultant was engaged by Phase IV in 2005 to establish and follow up the Information Project of Phase IV, intended to increase potential customers' knowledge of electricity and improve the communication between customers and the electricity company. Related to this, she had the opportunity to visit Zanzibar for 5 weeks in 2005.

The project was to be completed by November 1st 2006.

2. Methodology

Seven villages were selected strategically in order to achieve the following spread:

- Electrified villages (EV) and Non-electrified villages (NEV)
- Inland villages and Coastal villages
- Pemba islands and Unguja islands

The three selected electrified villages (EV):

1. Kikungwi; Unguja inland, connected in June 2006 (Phase IV)
2. Uroa; Unguja coast, connected in August 1990 (Phase II)
3. Makombeni; Pemba coast, connected in September 2006 (Phase IV)

The four selected non-electrified villages (NEV), all to be included in the extension of Phase IV:

4. Tunguu, Unguja inland
5. Ndudu, Unguja coast
6. Pongwe, Unguja coast
7. Tundauwa, Pemba inland

The people selected for interviews included village leaders ("Shehas", all men), women's groups, teachers, health workers, Imams and men and women representing

ordinary households. A letter of information had been distributed to village leaders one day in advance of the consultant's/team's arrival. Upon arrival in the villages, the leader had prepared the relevant people of his choice who would meet up at the agreed hour. In consequence, the interviews were conducted efficiently, but with limited opportunity for the consultant to choose whom to talk to.[1] This was different in the villages of Uroa, Ndudu and Pongwe, where Winther has lived and where she selected whom to visit and interview. Normally, the interviews were conducted with one or two persons present at a time, but some of the women's and men's corporations preferred to come and answer questions in groups. In Makombeni, 38 people came to attend what took the form of a public meeting. Here, we first invited for general discussions and afterwards conducted interviews in small groups. Mr. Ali Abeid Haji assisted as the consultant's translator and facilitator in Kikungwi, Makombeni and Tunguu villages. In Tundauwa, Mr. Ali conducted the interviews together with colleague Mr. Abeid Salim Makame, and afterwards had them transcribed. In Ndudu and Pongwe, Mr. Makame Hassan facilitated the interviews.

In addition to the selected villages, one farm in Unguja Ukuu and two schools (one Teacher's centre) in the village of Kitogani were visited due to their recent connection to the grid and thus their fresh impression of what the change to electricity implies.

As mentioned, Winther's earlier work also serves as an important reference and source for the analyses and conclusions. Such references will be specified.

3. Objectives and Outputs of Rural Electrification in Zanzibar

Objective

The primary and short term objective for Phase IV was to make electricity available to the rural population in identified areas and villages.[2] The corresponding outputs are specified below.

Outputs

During Phase IV, 77 villages have been supplied with electricity; 43 in Unguja and 34 in Pemba. 140 kilometres of high tension lines and 202 kilometres of low tension lines have been constructed. The project has also included the installation of a range of transformers in order to make electricity accessible for use. Taken together with the outputs of RUREL's previous phases, in which 64 villages were electrified, the project (Phase IV, September 2006) estimates that 66% of the rural population in Zanzibar (Unguja and Pemba islands) today have access to the electricity grid, if not yet in their own homes. The corresponding degree of electrification for Zanzibar at

[1] Zanzibari villages tend to be divided into at least two political fractions (Winther 2005). Due to the way the interviewees were selected, it is likely that the team mainly received information from people in support of the leader. For the purposes of this study, however, this limitation of representation is not perceived to represent a major problem.

[2] Other objectives concerned the institutional development of the electricity company and maintenance routines, which will not be dealt with here.

large (urban included) is estimated to be 80%. With the forthcoming extension of Phase IV, the degree of rural electrification is expected to reach 82%,. In comparison, the degree of electrification in Tanzania (urban and rural) was 10% in 2001 (NVE 2006). In rural areas on the Tanzanian mainland today, the degree of electrification does not reach 5%.[3] These figures show that the RUREL project has provided an exceptionally high proportion of people in rural Zanzibar with the option to become connected to the grid.[4] What this means in terms of actual public and private connections will now be treated.

It is probable that 66% of the villages in Zanzibar today have (or soon will have, see below) their health centres and schools connected to the grid. It is also likely that their water supply has changed, or soon will change, from wells to electrified water pumps, pipes and taps. The conditions for and consequences of these changes in the public sector will be discussed under *4 Goal and Results* below.[5]

Electricity is also used extensively in rural areas by private customers, such as hotels, shops and notably also households. By September 2006, a total of 11 525 electricity customers were registered in rural areas in Unguja (ref. ZECO, customer office, September 2006). The proportion of domestic customers could not be stated exactly by ZECO, but employees in the customer office presume as a thumb rule that, after 5 years with access to electricity on a village level, domestic customers would constitute around 95% of the total group of customers in rural areas.[6] As a result, with reasonable expectation, there are today around 10 950 households connected to the grid in rural Unguja.[7] In comparison, in Unguja at large (urban and rural), there are 39 770 domestic customers (ZECO, September 06). This means that about 25% of domestic electricity customers in Unguja are found in rural areas.

Following the Tanzania Census Survey of 2002 (adjusted according to the annual population growth), the total number of households in 2006 in rural Unguja is 52 411. Thus the above mentioned number of rural household customers (10 950), implies that 20% of the total rural population have become connected to the grid. This figure is higher than what Phase IV assumed in its stated objectives (Project Document). Here, it was expected that the rural "connection rate" would reach a similar percentage (20%). However, this rate by definition compares the number of connections only with the number of households in electrified villages (EV) - and not

[3] Tanzania Poverty and Human Development Report 2005. The report does not include Zanzibar. http://www.repoa.or.tz/research_analysis_working_group/publications.php

[4] Before the rural electrification project started, some villages had generators running on diesel, but with documented difficulties as to maintenance, fuel supply and production capacity (Winther 2005)

[5] Such public services have been given priority throughout the implementation of Phase IV, not only in terms of the selection of low tension trasees and the erection of poles, but also through direct supply of electric meters. In July 2006, the project supplied 123 electric meters to newly connected villages (2-3 in each village) in order to provide them with electricity for communal services. At the time of this evaluation, another 173 meters were about to be installed for the same purposes in newly electrified villages. Formally, the Zanzibar Electricity Corporation (ZECO, former SFPC) has the responsibility to provide the electricity connections. However, ZECO has had difficulties supplying enough meters for more than a year (2005-06). In August 2006, the problem was reportedly resolved, but the availability of meters in Zanzibar remains a highly uncertain issue.

[6] Immediately after electrification, 75% of rural customers are thought to be on domestic tariff, and their proportion gradually increases (source: customer office ZECO).

[7] Corresponding figures for Pemba has not been obtainable. As a result, it is not possible to state the proportion of electrified households in rural Pemba.

the total number of households (EV and NEV).[8] On the condition that domestic electricity tariffs will not be increased, there is every reason to believe that the proportion of electrified homes in rural Zanzibar will continue to rise. Section 4 will treat the social effects of this development.

Connection rates for each electrified village (EV) vary to a great extent - and with time and the "aging" of people's access to the grid. By 1995, when RUREL's first three phases had just been completed, an average of 10% of private households in electrified villages in Unguja had become connected to the grid (Winther 2005:77). In comparison, villages like Uroa and Paje, located by the coast where people have more possibilities for income (fishing, seaweed farming, tourism) have far higher connection rates than what tends to be the case in inland villages. In Uroa, the connection rate was 23% only one year after village electrification (1990) and 33% in 2001. Today the rate is over 50% in both Uroa and Paje.

The physical spread of houses also influences the connection rate. Inland villages are much more spread in distribution, due to the fields for farming surrounding each house. This makes connection expensive, both for the electrification project (long distanced, need for several transformers) and the private customer who must pay the tee off to the grid. In Uroa, on the coast, by contrast, the houses lie so close to one another that the structure resembles a town. Connections can here be done to a relatively moderate cost.

From the perspective of the household who wishes to become connected, the installation cost is nevertheless substantial; around 300 USD with wiring included (but not including appliances).[9] This amount corresponds to 4-5 months of work for an average fisherman and is thus a considerable expense. In addition there is the cost of electricity consumption, which represents 2-5 day's of work per month to a fisherman.[10] Nonetheless, people continue to request electricity and ZECO has had difficulties providing connections fast enough. In July 2005, we met people from Makunduchi village who had sold some of their cattle and had waited 6 months for electricity. People's use of electricity at home will be treated below. At this stage, we note the relatively high proportion (20%) and growing amount of customers in rural areas, the substantial cost related to such installation and people's strikingly high willingness to pay for electricity connection.

[8] The connection rate describes the number of private households in electrified villages (EV) which have obtained electricity connection compared to the total amount of households in the actual villages (EV).
[9] The installation cost (inflation accounted for) has remained similar over the years from 1990 and up to today (Winther 2005).
[10] In 2001, the minimum bill (consumption up to 50 units) was fixed at 1680 TSH a month (2 USD, rate 850). In September 2006, the price had been raised to a service change of 1800 and, in addition, 32 TSH a unit, starting from zero. With monthly consumption of 50 units this implies a cost of 3720 TSH (3 USD, rate 1250). In relation to people's average consumption of 25 units a month (on this type of tariff and as found in 2001), the adjusted change means a monthly electricity cost of 2760 TSH (2,2 USD). The new tariff is thus higher than before, but easier to understand.

PHOTO GALLERY

School children in Uroa (2001)

Mother assisting in having her child measured at the health station (Uroa 2001)

Examination light, Uroa health station (2006)

Electric meter inside a private home (Uroa 2001)

Sterilising equipment Uroa health station (2006)

Customer coming to the CCM branch office in Uroa to pay his monthly electricity bill (2001)

Household with electricity and television antenna (to the left) and household without. House constructions change and social differences increase with domestic electrification (Uroa 2001)

Freezers in rural Zanzibar tend to be used for making sweet ice for sale (Uroa 2001)

Measuring the quantity of water that the thermos contains before boiling the appropriate amount of water. People in rural Zanzibar are very conscious about their electricity consumption. (Uroa 2001)

Most customers are aware that fluorescent lights consume less electricity than the bulb does. They are also perceived to bring a more pleasant environment. But due to higher purchasing cost, this light source is less frequently found than the bulb (Uroa 2001)

Evening gathering point in Uroa (2001)

Small businesses pop up as a result of hotels being established in coastal areas (Uroa 2001)

Street light and light from buildings are perceived to make the environment outdoor safer. People move around more after darkness after the arrival of electricity (Uroa 2004)

Private water source for irrigation on a farm in Unguja Ukuu (2006)

Basin providing cows with water in Unguja Ukuu. The use of a tap simplifies the farmer's work (2006)

On the farm in Unguja Ukuu, light bulbs are used day and night for three months for keeping the young chickens warm. This is also practiced elsewhere. Electricity is said to be a condition for breeding chicken (2006)

Farmer and her staff harvesting vegetables. Irrigation is necessary for accomplishing such harvests, and to this aim, the electric water pumps are a condition (Unguja Ukuu 2006)

The electric light is said to make early morning milking hours more efficient and pleasant. (Unguja Ukuu 2006. The picture is taken during daytime)

4. Goal and results: The social impact of electrification

Poverty reduction among the rural population was the implicit goal and justification for Phase IV.[11] Eradication of absolute poverty is the overall stated objective within Zanzibari long-term policies and the Zanzibar Poverty Reduction Strategy. In Phase IV, this goal was to be achieved through development of the economy through tourism, industrialisation of the agricultural sector, children's education and by providing women with new opportunities. Access to power, water and communication are specifically mentioned in the Zanzibar Vision of 2002 as necessary to promote a more enabling environment for poor people living in Zanzibar (NVE/ECON/E-CO partner June 2003).

In the light of the goal to reduce absolute poverty in Zanzibar, the results to be presented will have the following structure: I will focus on the five mentioned indicators (health, education, gender relations, demography and economical aspects) of the social impact of electrification. This is done with a focus on the micro (household) economic level and from a social and cultural perspective. I will start by providing a note about the connection between water supply and access to electricity.

4.1 Electricity conditions the water supply

There is little doubt that electricity is a fundamental condition for proper water supply in rural Zanzibar. In electrified villages, the use of electric water pumps provides people with access to deep and clean water sources. With a piping system and taps, electricity also conditions the transport of water to the areas where people live. Thus compared to the former situation, when village wells supplied people with water, this means *improved water quality* and *more effective time use*.

4.1.1 Water quality

In Makombeni (EV), a man described the change in the following way[12]:

> Before, we sometimes found the water dirty; there were stones, remains of copra and palm leaves and so on. Thus we had to empty the well and let the water go. We could only use the water for washing clothes. Then we had to wait until we could use the water for drinking again. Due to the poor quality (before), many people got diarrhoea, which also meant high costs for the family. In the dry season, people used to sleep by the well; there was so little water; they wanted to be there first. After the pump; it is clean (*safi*) and safe (*salama*).

Health workers in several villages confirmed that the change of water supply has reduced the number of diarrhoea cases. In Makombeni, when there were only wells, such infections used to be among the most common diseases in the village. Today,

[11] NVE's appraisal of 2003 mentions that this can be read from the Project Document's reference to the Zanzibar Poverty Reduction Plan (ZPRP) of 2002, the Zanzibar Vision 2020 of 2002 and the Tanzania Poverty Reduction Strategy Paper.

[12] Makombeni became connected to a pump in a neighbouring village in 2005. The village was electrified in September 2006.

according to the health assistant, this problem is much less frequent due to the improved water supply. Diarrhoea is now number 7 among all reported health problems in the village dispensary statistics.

Furthermore, in coastal villages such as Uroa, the well water contains salt to the extent that to a person not habituated with this kind of water, a cup of tea with sugar has a distinctive taste of salt. In the past, immigrant men (from town or other villages in Unguja and Pemba) would often go by bicycle and fetch water from Marumbi to avoid drinking the Uroa water (Winther 2005). When the village water system was connected to Chwaka and Marumbi in 2004, the quality became good (Swahili: *baridi*, cold).

4.1.2 Effective time use

In contrast to the few men who went to neighbouring villages and collected water in plastic containers on their bikes, it is normally a woman's job to fetch water. They carry the water in plastic buckets on their heads, which is a style perceived as inappropriate for men.

The arrival of village taps means that women and girls no longer must walk the relatively long distance (up to 500 meters) to the village wells. In 2005 there was a failure in the water supply in Uroa (due to a broken pump) which lasted for several months. People re-experienced how the conditions had been before electrification: 3 to 4 hours extra work daily walking the well, pulling up the buckets, and returning to the house. This corresponds to the amount of time people in Tunguu (NEV) and Pongwe (NEV) said they spend each day collecting water. In average, *each household saves about 20 - 25 hours per week* after the coming of electric water pumps.

This means that women obtain more choice as to how to spend their time. In villages with relatively good opportunities for income generating activities the improved water supply directly affects women's productivity (see under 4.5 Production and income generating activities). But even when there is not a significant potential for earning an income, the advantage of saving time should not be underestimated. In 1991 Winther observed with empathy women's 16 hours' working days with nearly no time to sit down and relax. A decade later, with taps in the village and three hours saved per day, the same women, little wonder, appreciated their reduced burden. The author has at various points tried to explore whether the social arena constituted by women's gathering at the well could have a particular value that became lost when the wells were abandoned. The material does not support such a hypothesis.

Furthermore, girls are expected to help their mothers with various chores in the household; collecting water being one of the most important tasks. After the arrival of water taps, girls have more time to rehearse their home work, attend Koran classes, help their mothers with other tasks, relax or be with their mates. In 2001, girls in Ndudu and Pongwe (NEV) attended classes in Uroa (the closest school available) to a less extent than their brothers (Winther 2005). Both the need for them at home as

well as the long distance to school (ca 5 km), reduced their chances to receive education.[13]

The coming of piping systems and village water taps also encourage people to obtain water inside their houses. The majority of households in Uroa now have access to water at home. In average, each household paid around 10 000 TSH (8 USD in 2004) to obtain such private connection. This trend eases women's and girls' burden further.

It is the author's clear impression that the availability of electricity induces local efforts to improve their own water supply. It is significant that in all the non-electrified villages (NEV) visited there were plans for improved water supply. The four NEVs will, as mentioned, be connected to the grid in the near future. They had all selected water supply as a target for their next development project (TASAF). In Ndudu (NEV) and Pongwe (NEV), pipes and taps were already installed in the village, waiting for the water pump to be connected.[14] In all the electrified villages (EV) observed, there are pumps and taps in operation. Furthermore, other non-electrified villages (NEV) sometimes benefit from the electrification of the water supply in neighbouring villages (Makombeni did so in 2005, as mentioned).

In conclusion, the arrival of stable electricity supply dramatically enhances the possibility for an improved water system. Access to clean water is an important goal within the overall objective of poverty reduction in Zanzibar and also a human right.[15] Electricity alone does not provide better water supply, but in practice, the technology constitutes an important condition to achieve such a goal. The impact has been noted in terms of access to sufficient and clean water and women and girls' reduced work load. The study confirms that taken together with other measures (supply of pumps, pipes and taps), electricity affects village water supply in a positive direction.

4.2 Health services

Water is also crucial to the running of hospitals and dispensaries. In Tunguu (NEV), with only wells available, the health worker said that the water is not safe. When asked how the staff handle this in practice he said they sometimes walk the long distance to get clean water. Normally however, they end up using the poor water in the village, with unfortunate effects. In addition to the poor water quality in question, it is also probable that hospitals located far away from water taps use a smaller amount of water than is the case when taps are located nearby.

[13] Winther observed a change from 2000 to 2004 in people's opinions about the appropriateness of girls riding a bicycle. In 2000-01, they would not be encouraged to do so, as girls/women going by bicycle would not "be appealing" ("*hawapendezi*"). In 2004, this code of aesthetics had changed and girls went to a great extent with a bicycle without producing any reactions.
[14] In Tunguu (NEV), the plans for improved water supply had still not been materialised into concrete activities.
[15] See Jackie Dugard 2006: "A rights-based analysis of water and electricity services in South Africa". Paper presented at the Annual Conference of the Norwegian Association for Development Research (NFU), Oslo September 13-15 2006. The parts on electricity draw from a chapter by Dugard, "Power to the People?: A Rights-Based analysis of South Africa's electricity services", which is to be published in a forthcoming book edited by David McDonald.

In electrified villages (EV), the dispensaries use *electric light* (fluorescent and bulbs). In Uroa (EV) there is a *special lamp for examinations*. At night time the dispensary is normally not in use, but in emergency cases such as when women are in labour or during cholera outbreaks, the building is taken in use and the fluorescent lights are switched on. In non-electrified villages (NEV), the staff may use kerosene during emergency cases at night time, but the working conditions, also during daytime without examination light, are poorer than what is the case in dispensaries equipped with electric light.

In Kikungwi (EV) there is no dispensary, thus people go to Unguja Ukuu for treatment. Both in Unguja Ukuu and in Uroa, the dispensaries *store medicine for vaccines in a fridge* at about 4 degrees Celsius. This is not an option in NEVs. In Ndudu (NEV) for example, they cannot keep such medicine and the population must go to the neighbouring village (5 km) to obtain it. Another important electricity driven device in a hospital is the *microscope* for measuring malaria and other diseases. In Unguja Ukuu there is such a device whereas in Uroa they lack such gear. Finally, *electric boilers for sterilising equipment* were observed in a couple of the hospitals. The alternative is to use kerosene stoves for heating the water, but there tends to be a lack of supply of kerosene. This points to one of the general characteristics of a distribution network, such as that in rural Zanzibar: the central organisation and maintenance of the system provide continuous and stable supply on the demand side.

Again, electricity alone does not improve the quality of health services, but its availability is a condition for its realisation; producing a range of new possibilities. We also note the close interrelationship between electricity, improved public services and the time and costs people spend on travelling to obtain such services. The shorter distances, that is, the higher density of pumps, taps and health stations, the better service people get and the less money they have to spend for such purposes.

In general, and not only connected to electrification, the health services appear to have improved in rural Zanzibar during the last 5 years. By contrast to what was the case in 2001, there is now supply of medicine in the governmental health centres. An anti-malaria programme has also proven to be effective. Mosquito nets have been distributed to every child aged 5 years and below and also to pregnant women. A spraying campaign addressing each house Zanzibar at large has been completed this year and will be repeated in 2007. In three hospitals asked about this issue, each independently confirmed that the number of cases have gone down by 2/3 since the malaria programme started in 2003.

4.3 Education

People in rural Zanzibar put tremendous emphasis on providing their children with education. In Uroa 2001, 93% of girls and 95% of boys aged between 7 and 18 (Std 11) attended school daily in the village (Winther 2005:37-8). In comparison, among the grown-up population interviewed, around 20% of the men and 25% of the women had never received secular education (ibid.). The trend towards more attendance and a higher density of schools in rural areas continues. For example, there are new schools both in Pongwe and Marumbi.

In 2006, people's expressed emphasis on education was equally articulated in NEVs and EVs. In the villages visited, all the children (girls and boys) were said to attend school.[16] However, the arrival of electricity improves the conditions for children's learning in at least four ways. Adults are also positively affected. The four changed practices will be dealt with in turn.

4.3.1 Night classes and rehearsals in the evening

It has become common to arrange night classes for pupils at the schools in rural Zanzibar. These go on for one month before important exams (Std 7 and Std 11). Electric light conditions such arrangements. Girls and boys attend classes up to midnight and sleep in separate rooms at the school together with supervising teachers. In the morning, the lessons start again. In 2006, this period coincided with Ramadan; the fasting month. In consequence, the rhythm was slightly modified and the pupils themselves prepared the evening meal, *Futari* (observed in Kitogani (EV)). The inclusion of meals makes the arrangement appear as a temporary boarding school. Apart from the meals and the particular eating schedule of Ramadan in 2006, the rhythm appeared similar to that observed in Uroa in 2004 (Winther 2005).[17]

This practice, of sending children, and girls in particular, out of the controlling surroundings of the home and into a public place at night time, surprised the observer when she first witnessed it in 2004. In this Islamic context there is great emphasis on modesty and sexual purity which is reflected in the segregation of the genders and women's concealment of their body and careful conduct. The practicing of Islam in rural Zanzibar is nevertheless flexible and dynamic. With the perceived importance of education and the availability of enlightened space which makes it morally more accessible, night classes became an option, also for girls. Successively, it appears that the night classes arranged at electrified schools became a model also for schools without electricity. In Tandauwa (NEV), there are night classes for boys but not for girls. The headmaster said that this makes boys perform better than girls at school. He significantly added that when electricity will be available, girls will also be able to attend.

Thus without the electric light, there might today be night classes, but the kerosene lamps for lighting implies reduced learning possibilities. Also, the limited representation (only boys attend) is worth noting.

The alternative or supplement to night classes at school is that the children individually study at home or gather in smaller groups in private homes with teachers hired by the parents. According to Winther's observations, neither is widely practiced (2005). The television is a strong competitor to other activities in the evening. And those who choose to send their children for private lessons tend to represent the more affluent part of the population. This is thus a limited group.

[16] The children's ages and other figures were not studied in detail, though. In Tunguu (NEV), there is a primary school only. Many pupils, and girls in particular, are said to drop out after Std. 7 due to the problem of transport.
[17] In Kitogani, parents were to pay 30 000 TSH (24 USD) for each child attending the month of night classes (Ramadan, 2006). From the material it is not clear if children with parents unable to pay such a substantial amount would be granted access. Parents are normally expected to pay their children's fees (from 1500 TSH to 5000 TSH (1,2 to 4 USD) per year. The government provides reading books in Primary school, which constitutes a change from 2001, when there were no such supplies. In Uroa, the night classes were financed by a school cooperative (see below), providing access to all children within the relevant age group.

In conclusion, electric light provides opportunities for learning that are morally acceptable, welcomed and immediately realised though the establishment of night classes. In Makombeni and Kitogani, where electricity had been available only for a couple of months, night classes for girls and boys were already institutionalised.

4.3.2 Laboratories, computers, the Internet and mobile phones

In all EVs visited, the possibility of obtaining and using *laboratory equipment* was underlined as one of electricity's advantages. "Instead of only speaking about chemical processes and so on, we will be able to demonstrate how it actually works", one teacher said, hoping that such a laboratory one day might be realised. He added that this option would also increase the status of the teachers in question.

The Personal Computer (PC) is another type of electrical appliance which was immediately brought up during the conversations. In the Uroa School there are three computers available for teachers and pupils to use. Some villages, also in Pemba, have *Internet connection*, and the consequences in terms of information access are probably worth a study in its own. In the same way as television (see below), there is little doubt that the new access to global information flows provided through computers and the Internet have far reaching consequences. Parents support such developments immensely.

In recently EVs, where domestic connections are still very few, the school sometimes provides a service where people can come and have their *mobile phones* charged for a fee. This was the case in Makombeni (EV), where the agreed fee was set to 50 TSH (4 US cents).[18]

All the schools in rural Zanzibar must handle and pay for their own electricity use. In villages like Uroa, it is common to organise communal labour (farming etc) to establish enough money for the bill to the electricity company (ZECO). Villagers' willingness and ability to provide such funding speaks of the high importance they contribute to having access to electricity for educational purposes.

4.3.3 Koran schools and religious education

For promoting Islamic teachings, electricity is welcomed by Imams as well as ordinary men and women. People in rural Zanzibar are Muslims, and electricity quickly becomes adopted for religious aims. *Electric light* provides an environment for reading the Koran at night. The Imam in Kikungwi (EV) said that before electrification, he usually did not read after darkness and went to bed at 9 pm. After electrification (June 2006), he now reads from 8.30 to 10 pm before going to bed. Also in accord with the findings from 2001 (Winther 2005), more people attend the mosque with the new type of light. The Imam in Kikungwi reported that only 7 people used to attend the morning prayers before electrification, whereas on the day before the interview, 29 people had come to the mosque for the morning prayers.[19] Increased attendance

[18] During the meeting in Makombeni (EV) the participants estimated that about 20 people (men and women with equal shares) keep a mobile phone. The number of households in this village is 365.

[19] One should here keep in mind that the interviews were conducted during Ramadan when people tend to attend the mosque more frequently than at other periods. Nevertheless, the figures correspond to Winther's earlier

during dark hours is also associated with the *improved safety at night time caused by electric light from various buildings outdoor*. The installation of electricity to the mosques is financed through villagers' donations. This is also practiced for servicing the monthly electricity bill.

Islamic leaders are overrepresented in terms of people who keep television sets (Winther 2005). This may reflect that they are among the more affluent part of the population, but they also praise the *new access to international Islamic worlds that television can provide* and the speakers that are introduced in EVs. *Tape recordings* made by famous Islamic leaders are also cherished by local religious leaders. In sum, the new access to electricity is used to amplify (in a double sense) Islamic teachings.

4.3.4 Television and information

People's new access to television programmes in rural Zanzibar is perceived to be an important step towards development. New ideas from elsewhere, either from Zanzibar Town, the Tanzanian mainland or abroad, are considered as a vital input in the ongoing process of changing one's life to the better. There are also educational programmes produced in Zanzibar and imported from abroad. The importance of television is realised by the government, who wish to provide education to its people. This idea dates back to the time of Zanzibar's first president Karume. Before his assassination in 1972, he initiated plans for constructing a TV station in Zanzibar (TVZ), which was the first station in Sub-Sahara to provide pictures in colour.

The impact of the influence obtained through television has been underlined in an evaluation report of the Bangladesh rural electrification project (Barkat et al. 2002). In line with their conclusions, it is clear that in Zanzibar too, increased access to information about health, education, gender equality and other human rights may have a long term and positive effect in Zanzibar. The range of available channels has expanded during the last 5 years due to increasing availability and use of various types of antenna. In 2001 most people in rural areas only had access to the Zanzibari governmental channel (TVZ). In 2004, a range of channels, such as ITV, Star TV and CNN were in use. This expansion has an impact on the types of programmes people watch and also the pattern of how people watch television (elaborated in Winther 2005).

In Uroa 2001, 10% of all households kept a television set, but 74% of men and 52% of the women interviewed watched television at least 3 times a week.[20] This reveals that the coming of such devices makes certain homes appear particularly attractive in the evening. On average, people who said they watched television in 2001 spent a little more than 2 hours per day on this activity (ibid.).

The merits of the broadcasted programmes are sometimes disputed, such as when immoral behaviour is displayed. Overall however, men and women, and also Islamic teachers, agree that the positive side far outweighs the negative impact. The

findings that electric light, particularly in combination with speakers, attract more people to the Mosque (Winther 2005).

[20] 186 people; 106 women and 80 men, were interviewed, which represents 23% of the households in Uroa village (Winther 2005).

unfortunate sides mentioned are that children will be exposed to bad influence (in particular, improper conduct and immoral sexual behaviour). They are also said to spend too little time doing homework because of the high amount of hours they watch television. Children, especially boys, are said 'to follow' (*fuata*) television even to neighbouring villages, when there is no appliance available in their neighbourhood. In NEVs people tend to say that the arrival of electricity and television will make the young stay more at home instead of disappearing in the evening. Interesting in this respect, is the explanation received as to why *girls, reportedly, obtain better results at school after electrification.* In Kikungwi (EV), girls ranged as number one, two and three in 5 out of 8 classes (Stds 1-8). The reason, according to the teacher interviewed, is that boys run away in the evenings to watch television instead of doing their homework. In comparison, he said:

> "The girls used to show poorer results than boys in the past. Before 2002, there was no school here in Kikungwi and girls often stayed in the village instead of going to school (one hour walking distance each way). Now they want to conquer the boys! They are also easier to control and must stay at home in the evening. Thus they perform better than boys do."

Here, we see links between travel distance, availability of television and questions of morality related to boys and girls' behaviour. In sum these elements affect the children's level of performance. Also important in this picture is the improved access to water, discussed above, freeing girls of a substantial proportion of their time spent on household chores.

It is generally acknowledged in EVs that people sleep less and become more tired during daytime due to television and electric light. Winther has shown that the introduction of television reduces the time husband and wife spend alone together, thus affecting the sexual pattern in the village (2005). On the other hand, television brings extended families together. Winther's findings confirm that consumption of television programmes is a very social issue in rural Zanzibar. This new practice also modifies codes of behaviour in that men and women tend to stay inside in the same room after electrification and the coming of television. Before electrification, men used to spend their evenings outdoor together with other men while women sat together inside or outside the house in small groups. Related to this reorganization of space, the relationship between men and women observably changed. The couple who could provide relatives and neighbours with access to television programmes gained a particular prestige, at the cost of former gender hierarchies and elders holding a particularly high status. Thus electricity contributed to a shift away from gender segregation towards the nuclear family model, notably thoroughly rooted within the extended family network. In this dynamics, Winther concluded that the modern wife had gained a position in which increased power could be obtained. Electricity's possible impact on gender relations will be summarized below.

Twenty years after electricity's introduction in rural areas, television has become normalised. The appliance is both a *common* thing to have, and something a household (normally a husband) *should* possess. There has recently been a shift in the trend as to what types of appliances people purchase and when they do so. This can be summarised as follows: Five years ago, most households first obtained lights

and a radio and then gradually expanded their range of possessions to include a television set (33% among electrified households in Uroa kept TV sets in 2001) and possibly a freezer (kept in 19% of the same homes). Today, both in earlier EVs and recently EVs, the trend is to obtain a television set at the same time as electricity is installed in the house. In some cases people are reported to have purchased the television set while waiting for the electric meter, thus before household connection. This speaks of television's importance in current rural Zanzibar.

In conclusion, television, though not a completely new object in rural Zanzibar, is rapidly gaining increasing distribution and influence. The author, based on reactions in Norway after having shared some of the above mentioned results, would like to stress that the appropriateness and evaluation of the impact of television in Zanzibar can best be judged by the rural population themselves. Access to television is highly valued. At the same time, the analysis shows that the new habit of watching television represents a potential for change to the better, i.e. development, in many respects.

4.4 Gender relations

During one of the interviews/focus discussions in Kikungwi, the men and women present were asked if women in general have less opportunity than men to decide on issues related to electricity. A woman rose and smilingly said that this is not the case: "In this village women possess more money than men, thus they can tell their husbands to go and get electricity!"

This quote reflects that women recently have gained increasing income generating opportunities, as will be discussed below. Nevertheless, and without having any further knowledge of the microeconomics in this particular village, the author would like to point to some problematic aspects connected to the gender relations in rural Zanzibar.

4.4.1 Hindrances to women's decision making: Islamic rules and electricity's organisation

An important premise for the gender relations in rural Zanzibar are the following moralities or regulations (partly contradictory), informed by Islamic teachings: Each individual is in principle free to decide how to spend his or her money, though husbands should provide for their wives and children. This implies that women, in principle, are privileged; with rights to dispose of their resources according to their likings (again, in principle). A man has a range of duties, but also freedom to decide over his assets and dispositions. However, *the rules of inheritance* (daughters should inherit half of the value of what their brothers inherit; in practice they get much less) and *rules for divorce* (it is harder for a woman than a man to obtain a divorce) make women much more economical vulnerable than men within the spousal relationship. In practice, men are owners of houses in rural areas, and women must move in case of a divorce or the death of her husband.

This highly problematic pattern, as seen from the women's side, directly affects the way electricity is adopted and used. As house owners, men become electricity customers and are responsible for paying for consumption. Through this, they also have a say, more than women, as to what appliances to buy and the frequency with which these should be used. Thus even though a woman would wish to - and have the ability - to buy a particular electric device, *the male organisation of electricity produces a barrier* for her to do so. The distance between women and electrical appliances is illustrated when one looks at the wedding gifts in rural Zanzibar. A woman's first marriage is the most important occasion in her life in terms of acquiring possessions for her household (given by her own kin). However, and noteworthy here; electric appliances are never given to a bride for her wedding. It is Winther's contention that this is not only linked to conservative elements embedded in 'tradition' but also the fact that appliances have the inherent characteristics that their use must be continuously paid for. And that is the husband's duty. Furthermore, it has been demonstrated (Winther 2005) that women in practice increasingly sustain their household through the money they earn, whereas men invest in houses and appliances. Women hence subsidise investments in appliances which they, in case of a divorce, have no right to.[21]

However, what I call the male organisation of electricity is not a static and predetermined hindrance for women to obtain what they wish. Indeed, the question is negotiated within the households. Sometimes spouses split the bill according to estimations of how much each contribute to the measured consumption.[22] The dynamics in these negotiations have been discussed elsewhere (Winther 2005). We here note that ownership to houses in Zanzibar tends to determine who become a customer and thus the power to decide which and how to use appliances.

4.4.2 Women: eager consumers of electricity

That being said, *women are to a large extent the users of electric appliances and the beneficiaries of the services electricity provide*s. This is particularly valid for the public services treated above but also in private homes. Women are present in the home more than their husbands, they manage freezers and small scale sales of frozen ice, and, as mentioned, they share in the consumption of light and television in the evening. Irons are found in some households. They are normally purchased and owned by men and used equally by men and women. Blenders also tend to be owned by men, but are used by women, substituting the former mortar. In 2001, no electric stoves were in use in Uroa, whereas in 2004, 12 women had taken up loans at the school and purchased two-plate cookers. Such shifts in practices include negotiations within the household and potentially influence the relationship between men and women. The position of equality of modern wives who can offer television view-time in the evening has been noted.

[21] The divorce rate in rural Zanzibar is about 40% (Winther 2005).
[22] In 2004 one man said that he normally goes to pay the electricity bill (in a public place in the village) after his wife has given him her share of the expenses. Such arrangements are still uncommon and he apparently did not want other villages to know about it. In this household, it was the wife's use of an electric stove that had made the couple come to the agreement to share the bill.

4.4.3 Men marry later, fewer wives – impact on demography?

Given the normalisation of electricity and its high installation cost (300 USD), young men sometimes wait for a long time before getting married. A house is not perceived as 'complete' until electricity is ready. And even though a complete house is more an ideal than fulfilled in practice, there is evidence to support the thesis that young men delay the point of their first marriage compared to before (Winther 2005).

Furthermore, with electricity it has become more difficult for men to have more than one wife. Until recently (2001), the electricity company accepted that men with two wives living next to one another connected the two houses to the same meter and main switch. This arrangement is now forbidden for security reasons, and the few men involved had to install separate meters in each house. Therefore, and again as a result of the high installation cost (as well as the perceived importance of treating one's wives equally), the number of wives per man (which may be 4), is likely to go down over time. Into this picture comes the expressed emphasis on children's education, which also represents a financial cost. In sum, there is reason to believe that people's wish to install electricity might reduce the number of wives per husband and also the number of children born in the village.[23]

According to the last census in Tanzania (2002), the population growth in rural areas increases by only 2,1% per year, whereas the growth in urban areas is 4,5%. The census rates have been stable during the last 10 years. Thus it is not likely that the signs of men having fewer wives and the possibility that fewer children are being born due to electrification (mentioned above) have had the aggregated effect to cause this low growth in rural areas. The census figures rather indicate that more people tend to move to town than vice versa. Half of the women in Uroa were born elsewhere and came to the village at the time of their wedding. The question is whether electricity has and will have an impact on where the majority of people, especially the young, choose to live.

In electrified villages, people claim that electricity makes the young stay. This was also one of the stated objectives of the rural electrification project when it started (Winther 2005). The quote 'It is like a town here now' was used by a man to describe the coming of street light in Uroa. Similarly, people in recently EVs and NEVs soon to receive electricity expected that the access to light, television, computers and improved education facilities and water and health services will make people stay in the countryside. Such opinions speak of the higher status EVs have compared to NEVs and the increasing level of comfort and progress people associate with electricity. The question of whether most people will continue to live in the countryside – or that electrified villages will attract more people from town and elsewhere – appears to partly depend on access to electricity, but also on other fundamental aspects of life such as the possibility for production and earning an income (to be treated below). From the perspective of each family in rural Zanzibar, a major concern is to ensure diversity in the various family members' means for making

[23] It is well known that increasing standard of living is likely to reduce infant mortality and death rates, with the probable effect that the population growth becomes higher during the decades to follow. Birth rates also tend to decrease with higher standard of living, but not as quickly. In Europe, the birth rate went down about 70 years after the decrease of the death rate, causing a high population growth in the interim period (ref. Benjaminsen 2002).

a living and also obtain geographical spread in where the members live. This is a risk strategy that increases flexibility and sustainability.

4.4.4 Reduced number of meals cooked per day – linked time use and also economical vulnerability?

The focus on time use is crucial to understanding women, men and their relationship in the present evaluation. The time women save through improved water supply has been underlined. This increases their possibilities for other doing other tasks. Furthermore, one can observe an interesting change in the number of meals cooked daily by the hearth. This is related to women's wish to have time for income generating activities as well as leisure time in the evening. Winther's findings conclude that after a certain time with electricity, *the number of cooked meals per day goes down from three to two*. This is reconfirmed through the latest interviews, where women prepare three meals on the fire per day. In Uroa and other long time EV, the number of cooked meals has been reduced to two. For the third meal, they serve leftovers. The implications of this in terms of nutrition have not been investigated. Thus is it not possible to conclude whether this shift implies that people in EVs over time eat less than before compared to NEVs. Given the significant investment electricity represents, as mentioned, and the normalisation of costly appliances like television and freezers, the question deserves further attention. To the author, the observation that poor people are binding up large amounts of their resources, with fluctuating and marginal incomes and rapidly increasing transport prices, is somehow worrying. And electricity prices (consumption) are also subject to increases (a rise in household tariffs was made in July 2006).

On the other hand, access to electricity makes people less dependent on oil and kerosene, which prices have dramatically increased during the last year (nearly doubled from 2004 to 2006). In 2005 the calculated pay-back time for investment in electricity was 9 years for an ordinary household. This is the point in time when using electricity in an ordinary household becomes cheaper than the alternative of kerosene for light and batteries for radio. In 2006, the pay-back time was reduced to 3-5 years due to the high kerosene prices. In sum, to people in rural Zanzibar there is a high economical risk embedded in whatever technology they choose. Electricity appears as the better solution given that people have the available means for investments. In any case, the author wishes to *underscore the extreme economical vulnerability* of the people in question. Energy policies in Zanzibar should accordingly be very carefully developed.

4.5 Production and income generating activities

4.5.1 Level if income determines who becomes a customer

As has been noted elsewhere (Foley 1990) the causal relationship between electrification and economic growth should be treated carefully. First of all, identifying a positive correlation at the micro-level between economic performance and household electrification does not mean that electricity was what caused the growth. It is likely to be vice versa; relatively affluent homes are those who first obtain

electricity connection.[24] Secondly, 'economic growth' at the macro level does not normally include subsistence production, the informal barter sector, or the complex exchange systems for gift giving and delayed reciprocity. In rural Zanzibar, this economic field is substantial. And thirdly, one should not take 'economic growth' to be synonymous to development and poverty reduction, which is the goal of the electrification project in the long term. As the discussion above has shown, electricity provides a range of both direct and indirect changes which improve the quality of life in the villages. Time use, flexibility, power to decide and impressions from elsewhere; these are examples of the variety of variables that are relevant when evaluating electricity's impact. This last section, however, treats the specific impact of electricity on people's means of production, income and finances. First, a note will be provided to indicate the way people's (existing) means of income affect who becomes a customer.

People's ability to sign up as private electricity customers depend on their possibilities for income generating activities. In Zanzibar, as mentioned, such opportunities tend to be better in coastal areas whereas inland villagers have fewer options for producing cash. Thus people's level of income determines their chances to become electricity customers. Whether electricity also provides improved possibilities for producing income is a more complex issue, which will now be dealt with.

4.5.2 Enterprises and activities where electricity is used directly to produce income

During the field trip, the team met several representatives for women's corporations (and a few men's) in every village. In Uroa, where we have data to make comparisons, 8 new groups had been established since 2001. In general, most of the groups are engaged in micro-credit projects and are concerned with small trade of various items. In some cases they also farm together and breed chicken (see below). It is still uncertain how electricity will affect the running of such work corporations. As long as they focus on trade, the effects are likely to be more indirect (access to water, more time for income generating activities etc) than direct.

The following activities involve the use of electricity. They are listed in a random way.

- *Shops.* Light are used in the evening, making longer opening hours possible. Also television sets are sometimes put up to attract men and children in the evening. Freezers and fridges are used for keeping cold sodas for sale, which is particularly popular during Ramadan and the celebration of Idd. The customers are mostly local, but in tourist areas one may also receive foreign buyers.
- *Frozen ice.* Women produce and sell frozen, sweet ice to neighbouring children from their homes. (During Ramadan, also to adults).
- *Frozen fish.* Often stated as one of electricity's important uses. Fishermen may keep fish in the freezer and sell it at times when prices are high at the market. In practice, though, there is seldom enough fish and otherwise resources to

[24] The mentioned Bangladesh evaluation, otherwise an important contribution to developing a methodology as to the evaluation of the social impact of electrification, is strikingly in lack of making such reservations.

benefit from such use. A few individuals make agreements with hotels and supply the tourist sector with supply of kingfish and tuna fish. In that case, the fish is stored in freezers.

- *Mobile phones.* Access to electricity conditions the use of mobiles, which are rapidly becoming common in rural areas. In 2001 there were only two mobiles in Uroa, whereas in 2004 there were 20. In 2006, people said "Now every house has a mobile". This is an exaggeration, but the trend is clear towards higher density of mobiles. "Without it, you do not make yourself available and cannot do business" a man said who is employed in the tourist sector. The consultant also met a man who stated that he now must get electricity in his house, by reference to his need to recharge the phone.
- *Hotels.* Electricity attracts investors of hotels and guest houses to the coastal areas. To the owners of five star hotels, electricity is the condition for establishing business. In 2004, hotels contributed to as much as one third of Unguja's total electricity use.

Potentially, this development in the tourist sector could also have meant a substantial increase of income to many people in the villages. Unfortunately, hotels (when owned by foreigners to Zanzibar) seldom employ local people to any great extent. Within an untypical joint project with local co-owners, jobs offered locally include management (man), cooks (men and women), bar keepers (man), housekeepers (women) and diving instructors (men). In comparison, foreign owned hotels sometimes hire people to provide tourists with massages, but that is about it. There are, however, secondary effects during the construction of new houses; either in terms of labour offered locally or, for local shops and restaurants, immigrant workers who come to buy food and so on. Also, some hotels buy parts of their grocery stock from local suppliers, such as eggs, fish and lobster. This increases some individuals' level of income in the villages. At the same time, the massive demand for fish and lobster from the hotels drives up the prices in Zanzibar at large. When the sea is bad (rough water in July) and the supply short, people in coastal villages now hardly eat any fish. "Local people cannot afford to buy kingfish and tuna fish anymore", said a man from town with regret.

- *Inland farming*. In inland villages, two farms were visited (one in a EV, the other in a NEV, but with a private generator). According to the owners electricity has a significant impact on the level of production. Electricity is used for providing light during milking hours (cows) in the morning, which simplifies the work and makes the staff do their chores more efficiently. It was also underlined that proper light makes it possible to keep the surroundings clean and proper. Furthermore, lights are used to keep young chickens and ducklings warm during their first three months. These kinds of baby birds used for large scale meat and/or egg production depend on artificial heat to survive. The alternative, kerosene, was considered much more expensive, and would not make it possible to have a return on the investment. The electrified farm produces 24 litres of milk daily, and they keep the milk in fridges until it is transported and sold. Water is obviously important for growing vegetables in a climate with rain (unreliable) twice a year is the natural cycle. Both farmers use irrigation and stressed the importance of stable water supply, for which electric pumps are a condition. They both had a private pumping system (one with a private generator). Important from the conversation with the farmer in the NVE

was that he expected other farmers in the area to be able to intensify their production when water and electricity becomes publicly available. His example appears important as a source of inspiration to other people in that particular locality.[25]

- *Chicken breeding*. In Uroa alone, 50 people (out of a total adult population of 2000) had plans to start chicken breeding in 2006. Again, electricity for lamps day and night is an important condition when people take on such tasks.
- *The governmental institutions* become more efficient and their services improved, with far reaching effects (see 4.1). In terms of labour available, the number and significance of positions depend on other factors than electricity.
- *Stone crushing.* In Kibele village (located close to Tunguu) two crushing machines were said to be in use. The stones, deriving from larger pieces of coral (lime) stone are used for road and house construction. In Tunguu (NEV), one man owns such an item run by diesel, and the village leader expected that he would switch to electricity supply when this is made available.
- *Brick production.* Cement bricks are produced in many places in rural areas. The blending process could potentially be used by an electric device, but non such was observed.
- *Production of coconut oil*. Some attempts were done in Uroa to process coconut oil by the use of an electric device, but with limited outcome.
- *Grounding mills*. There are some mills which run on diesel in rural areas. In some villages, people expressed anticipations for obtaining electricity driven mills in the future.

Finally, there are all the little shifts in people's everyday rhythm caused by the arrival of electric light which in sum have effect on the level of production. In the evening, fishermen may repair their nets and women may beat and remove sand from the dried seaweed. And they observably do. Sewing machines do not run on electricity, but they may now be used after darkness. Likewise, women sit down in the evening with other kinds of handcrafts (sewing kofias, making mats and other items) - in front of the television or not. The day has, after electrification, become 24 hours instead of 12. This implies a new full range of choices as to what to do when, which makes people become more efficient. At the same time, and perhaps paradoxically, these new choices make them feel more in a hurry than before. The pace of life is speeding up.

In terms of increased production and people's level of income, the most trusted effect of electricity's arrival is not yet realised, but contained as a hope for the future. Through education, and the virtue of 'getting new ideas', which development is all about, electricity is regarded as an investment in the generations to come and their ability to make a better life.

[25] This farmer is an agronomist and has a well-paid job in town. Some years ago he decided to move with his family to the countryside and establish a farm. When he first started to grow a particular type of green, long bananas, he said, the neighbours were skeptical that such crops would grow in the area. When they saw the good harvests, they also started growing these bananas.

5. Conclusion

This study has documented that the Phase IV of the rural electrification project in Zanzibar has achieved its goals by contributing substantially to improving poor people's lives. The 1 - 2 USD a household makes per day in this area makes most people balance on the margin to make ends meet. Subsistence production compensates to some extent for the low level of income, but a range of staples must be bought, school fees and uniforms provided, and kerosene prices (and hence transport costs) keep increasing. Against this background, and given that 1) electricity connection represents 4-5 months' of work to an ordinary fisherman, and 2) electricity has (so far) had a modest impact on people's level of production; how is it possible to conclude that the arrival of electricity helps combat poverty in rural Zanzibar?

The answer is two-fold. Firstly, electricity is used for public services, which benefit the population at large. After the additional part of Phase IV (06-08), about 80 per cent of the rural population are likely to have access to clean water and improved health services. These services are free of charge to the users and the effects of their qualitative improvement have been demonstrated. Electricity for schools and mosques must be paid for by villages in common, but represent a modest cost to each family. The local communities here choose to use electricity for educational purposes such as night classes because they have trust in its effects. Thus the first answer is that we must turn to other measures for reducing poverty than uniquely economic parameters to evaluate the social changes in question. Improved health is a primary goal, education the second.[26] However, it has also been shown that electricity is only one, though important, among several conditions for the public services to be improved and have effect.

There is also a second response as to why electricity is a step towards development despite the high cost its installation and use represent to private, economically poor households. Electricity's coming implies that a whole new range of options become available. Everyday life can be reorganised in terms of people's use of space and time. Efficiency, productivity and comfort are key words here. Doing things more efficiently in one area produces opportunities to invest in activities that bring a return, economical, social or otherwise. With electricity, new commodities, such as cold drinks, mobile phones and television programmes become a possibility, though they are introduced with modesty in the Zanzibari context. Relationships are modified in the process, creating potentials for redefinition of power hierarchies. Finally, perceptions of what it means to live a good life change. In rural Zanzibar, as elsewhere, people grasp the opportunity to find new solutions to meet their needs and fulfil their aspirations, and in that respect electricity provides a remarkable range of possibilities. At the same time, electricity is regarded as a less expensive alternative to kerosene and batteries in the long run. Thus the 20% of the rural population who have become connected to the grid also have quite pragmatic reasons for doing so.

[26] This is partly in accord with the sets of parameters defined by the United Nation Development Programme's 'Human Development Index', though the gross domestic product (GDP) here remains a central variable. See http://hdr.undp.org/statistics/ for further information.

This being said, electrification also has unfortunate social consequences. Some villagers benefit less than others and internal differences increase. Typically, elderly women living on their own might not afford to light a single kerosene lamp in the evening. Far less are they able to pay for electricity connection to their house. To benefit from electricity one has to have something to start with. Furthermore, and what has not been a focus in this report, are the problems electricity customers have understanding and paying their electricity bills. The continuous accumulation of debt to a governmental enterprise is a new phenomenon brought by electrification. Electricity causes considerable frustration.[27] Finally, through people's signing up as customers, the state obtains more control over its inhabitants. This makes individuals who are critical of governmental policies particularly vulnerable.

In sum, though, the concrete changes, indirect effects, and new opportunities produced by people's new access to electricity far outweigh the more problematic aspects. Phase IV and the previous phases of the electrification project have contributed to poverty reduction and increased life quality in rural Zanzibar.

The author wishes to add a personal comment towards the end of this report. She started the study of electricity's social impacts in rural Zanzibar in the early 1990s and onwards by putting aside, at least consciously, the expectation that electricity would bring 'development'. The academic critique of 'development', with the term's predefined notions of progress, influenced this choice. After having witnessed the way electricity has become implicated in life in rural Zanzibar, she has fewer objections to linking electricity and 'development' in the notion's sense of representing social change for the better as locally perceived and experienced. True, the introduction and uses of electricity sometimes create dilemmas. The conditions for successful implementation, organisation and use must be further worked on. However, the arrival of electricity is highly appreciated and an unquestionable source for improvement of the lives of the men, women and children in question. The author has no doubts as to the significance of this technology and the need for further electrification in dark places elsewhere.

[27] This point is elaborated in the report of the Information Project of Phase IV, and was an important background for the Information Project's initiation (Winther et al 2005).

Appendix 1 People interviewed September–October 2006

Kikungwi (Electrified Village, EV)
Mr. Chum Juma Chum, Imam
Mr. Amra Kassim Kombo, teacher
Ms. Ndiwaza Machano Mwindambo, health worker
Ms. Mwanakhamisi Abadi Nadhif, member of women's group "Tuelimishane" (*Let's teach each other*)
Ms. Salama Mwazi Vuai, member of women's group "Tuvumiliana" (*Let's be patient*)
Ms. Mwachuma Makame Rajab, member of women's group "Kwanini tushindwe" (*Why should we be defeated?*)
Repr.s of women's group "Uvivu kaina posho" (*Laziness doesn't make an income*)
Repr.s of men's group, grow mangroves

Tunguu (Not Electrified Village, NEV)
Mr. Khamis Saghrik Malim, village leader/Sheha
Mr. Abdalla Hassan Makame, Chairman CCM
Mr. Sudi Maulidi Sudi, Imam
Mr. Mlenge Rajabu Mlenge, Imam
Ms. Amina Mohamadi Yussuf, member of village development committee
Ms. Mwanaisha Shabari Ali, member of village development committee
Mr. Khamis Khatib Juma, health worker
Ms. Sahira Haji Abdalla, farmer
Mr. Bhai Khatibu Bhai, farmer

Kitogani (EV)
Mr. Omar Simai Omar, Coordinator, Kitogani Teachers' Centre
Mr. Zahor Seif Ali, Teacher Advisor Religion and Arabic language
Mr. Muhamed Rajab Khatib, Language Advisor, English and Swahili
Mr. Mohamed Sale Ali, Assistant Head Master, Kitogani School

Unguja Ukuu Kaebona (EV)
Ms. Farida Muhamed Ali, farmer

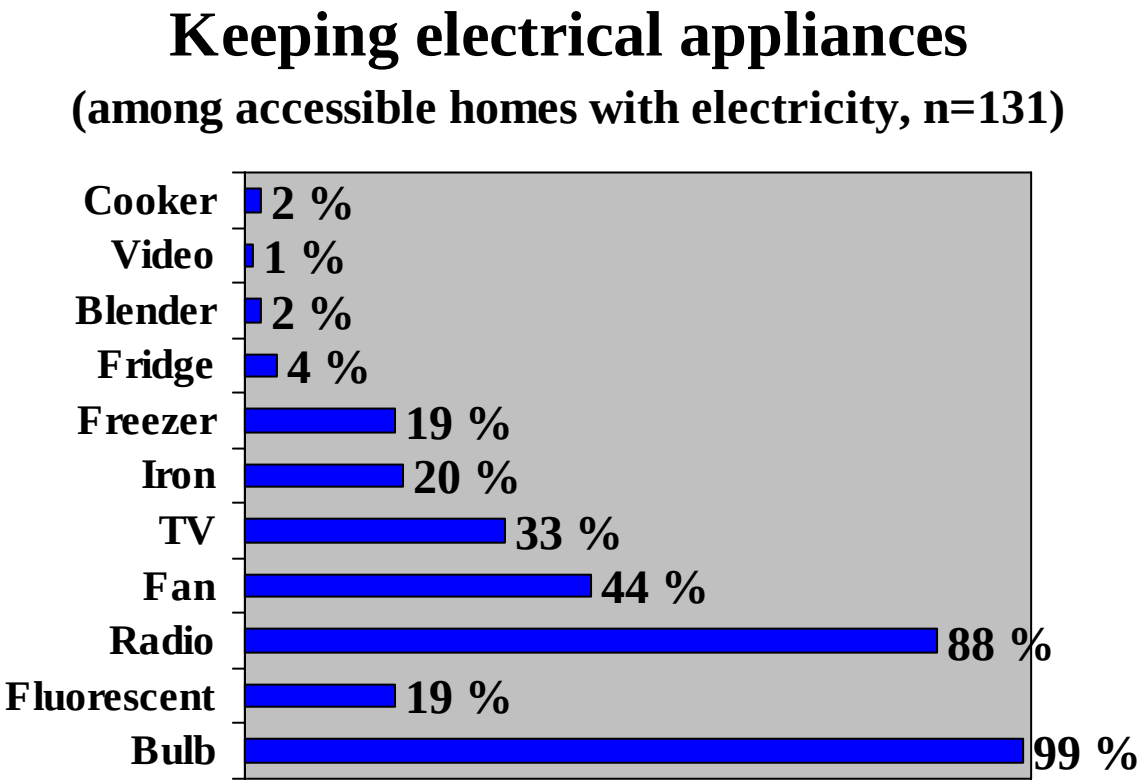
Uroa (EV)
Ms. Kazija Khamis
Mr. Fadhil Makame
Mr. Makame Hassan Juma, leader of village committee for electricity
Mr. Omar "Baomar" Khamis, meter reader Matemwe etc
Ms. Sijui Omar Khamis Community Health Nurse
Ms. Pricilla Fernandez, Front Office Manager, Safari Resort Hotel
Informal conversations with earlier acquaintances and friends

Ndudu and Pongwe (NEV)
Mr. Khamis Mrumwa Dyaku, Chairman CCM Pongwe
Mr. Omar Mohamed Shabani, teacher in Mpapa secondary school (close to Pongwe)
Ms. Mayasa Fakihi Vuai, health worker, Ndudu dispensary
Mr. Ame Juma Mrisho, Chairman CCM Ndudu
Mr. Vuai Faki, Secretary of Sheha Pngwe/Ndudu
Mr. Ali "Boti", partner, Pongwe Beach Hotel

Tandauwa (Pemba, NEV)
Mr. Abuu Abrahman Salim, village leader/Sheha
Mr. Saleh Omar Haji, Imam
Mr. Masoud Suleiman Salum, Imam
Mr. Hassan Abdalla Hassan, Senior Nurse
Mr. Abdalla Omar Muya, Head Master, School
Female representatives of 5 work corporations and one men's corporation

Appendix 2 Electrical appliances kept in people's homes

The figure shows various types of electrical appliances and the frequencies with which they were found in 131 electrified domiciles in Uroa village 2001, 10 years after village electrification.



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