



Report

Survey on social economic and agronomic impact of the installation of the Swiss Concrete Pedal Pump in Tanzania



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EXECUTIVE SUMMARY

The NGO W3W « Water for the Third World » deals with problems related to water in developing countries. This NGO has developed a feet driven pump, the Concrete Pedal Pump, mainly designed for agricultural irrigation. It is appropriate to small scale farmers but it can also be used for domestic uses. W3W has developed this project in several countries of the Third World, in Africa, Asia, and Latin America. This worldwide network keeps on growing. Thus currently the pump is operated in more than 10 countries like India, Nepal, China, Cambodia, Kenya, Tanzania, Senegal, Paraguay, Peru, Niger, Burkina Faso, Uganda, Mozambique ...

The aim of the installation of this pump is to improve working conditions, to increase the yields and cultivated areas, and consequently the small scale farmers' incomes.

PeP offers numerous advantages:

- it is built in simple production methods and with locally available materials
- it is easy to maintain
- it is economically interesting because it is low cost, creates employment, and has a good "cost/profit" ratio
- it is ecological: it does not pollute ground water or the surrounding area and it efficiently uses the scarce water resources.

To measure the impact of the pump on the farmers' life in Tanzania, a survey has been carried out in Magoma, a village of Korogwe District, where the pump has been implanted.

The survey revealed that unquestionably the PeP enables farmers to improve their conditions of life and work. First all the farmers are satisfied with the comfort of pumping operation. So they can draw water easily but also quickly thanks to the real efficiency of the pump, they do not need anymore to go to the river with buckets. Consequently, they can spend less time irrigating their fields but also the irrigation is much less labour intense, which enables them to irrigate a larger area.

In this way, they are able to increase their cultivated area thanks to the easy availability of water, and besides they save time and can use it to develop their social life which is important for them, or for other activities. These activities enable them to have supplementary incomes, and so to facilitate their life.

Moreover this possible increase of area enables farmers to have more income and also more profits that they use in order to improve their working conditions: investment in new materials, inputs or land, for example. Those increased profits are possible thanks to the increased quantity of water used for irrigation. Indeed, in addition to the increase of the cultivated area, the easy availability of water enables farmers not only to increase the yield of the crops but also to diversify their types of crops and improve the quality of the produces. With a bigger size and a better taste, they sell better.

The increase of the area and so of the quantity of work on the field has sometimes lead farmers to increase the size of the group, which implies the creation of jobs. Furthermore these increased profits are a means for each farmer to improve the life of their families i.e. send children to school and pay school fees, or buy more food or clothes for example.

However some recommendations can be put forward in order to improve the quality of the pump and its acceptability by farmers. At first it is important that farmers buy the pump themselves instead of receiving it as an aid. In this case the sustainability of the pump on the long-term is better because farmers feel more responsible for it and if there is a maintenance

problem, they will take the initiative to repair it more willingly, instead of waiting for another aid.

Moreover, this survey shows the importance of the presence of World Vision in Magoma in order to facilitate the installation and the maintenance of the pump. However the communication between W3W and World Vision seems sometimes limited. World Vision has to stay an intermediary between farmers and W3W.

Also World Vision is a good means to make the pump known. But advertising is also important and W3W has to develop it. Some farmers who use the pump have sometimes no idea about the name of the NGO which built it. In this case it is not possible to ensure its spreading.

Even if the PeP is easy to use and most of the time easy to repair, maintenance can be a problem if farmers do not know how to repair it or whom to call to get it repaired. So it would be easier if farmers could follow a training so as to be able to repair the pump themselves, or at least know the name of a technician who could come and repair their pump.

Finally one important point concerns the farmers, who do not take the initiative to look for information or even to ask for help if they have for example a maintenance problem which cannot be repaired by them: so they need to be followed-up and regularly informed. This can be done by World Vision, but preferably in collaboration with W3W.

Core findings:

Increase plot	X3
Increase profit per acre	X2
Increase yield	X1.8
Reduce work time	-2 hours per day
Satisfaction of farmers	100%
Main weaknesses	Weak networking
	Almost inexistant advertising
	Weak follow-up of farmers

INTRODUCTION

1. General context of the installation of the pump in Tanzania

The Concrete Pedal Pump (PeP) is a feet-driven pedal pump used to draw water for agricultural irrigation or domestic uses. It is mainly designed for small scale farmers. PeP was introduced in Tanzania by the NGO W3W with the support of retired engineers from Switzerland. The project began in November 1997 and the NGO was registered officially in 2001. The head office of W-3-W is located in Morogoro, in Tushikamane Vocational Training Centre.

From 2002 to the end of 2005, W3W worked with the United Nations Food and Agriculture Organisation (FAO) with which the NGO had signed a contract. In this way, during that period, 19 districts in Tanzania benefited from the PeP technology as well as from the cooperation with the Ministry of Agriculture and Food Security.

Up to now, more than 600 pumps have been manufactured and installed all over Tanzania.



For two years the work of the NGO has been organised around 4 components:

Cooperation with the government has been existing for less than one year. With the program of decentralisation of the Tanzanian government, the DADP program « district agriculture development program » enables W3W to collaborate with the government and to receive some installation contracts from district authorities.

There is collaboration with other NGO's. The main collaboration is with World Vision, which could help W3W to install more than 50 pumps in Korogwe district. This cooperation is essential for W3W. Now the NGO is looking for others like this one.

The third cooperation is with SACCOS (Savings and Credit Cooperative Societies). W3W has now 6 contracts with these societies. It is a good way for the farmers to get a pump easily.

At first the SACCOS concerned only very small loans which had to be refunded after only a few days. Moreover there is not a lot of SACCOS in rural areas. So the access for small farmers can be very difficult.

At present the problem with SACCOS is that too few farmers (only 50% in Tanzania) reimburse their loans. This is the main problem which has to be solved now.

The last component concerns advertising. This component needs to be developed by the W3W. Indeed a lack of money prevents the NGO from advertising the PeP. Nevertheless this advertising is really important for the spreading of the pump. At the moment advertising is only being carried with public demonstrations and leaflets.

2. Aims of the study

The main aim of this study is to measure the impact of the installation of the Concrete Pedal Pump on the farmers who use it. To improve the quality of the pump and make farmers as satisfied as possible in order to help them, but also to develop this way of irrigation in the country, it is necessary to know how the PeP can improve farmers' lives, their work in the fields (workload, division of labour among the members of the group, possible time saving thanks to the pump, etc) but also if using the pump can increase the earnings and profits of the group.

This study also wants to show how the pump is accepted by farmers, their satisfaction and what could be improved as regards the operation of the pump (according to the farmers themselves), the follow-up of the users of the pump, the maintenance and the advertising for the diffusion of the pump.

So this study consists of different parts each dealing with agronomic, social and economic aspects of the impact of the PeP.

3. Context of Magoma

We have carried out our study in Magoma Division, situated in Korogwe District, Tanga Region, because the pump has a good implantation. Indeed, the PeP has been implanted in this community for 4 years, more than 100 farmers use it, and a partner NGO of W3W, World Vision, is implanted in Magoma. This enabled us to have a support on the spot for our study.

Presentation of Magoma Division:

Magoma Division which comprises 25 villages is more than 50 years old. It was built at this place because of the good natural conditions for agriculture. The community has 43 264 inhabitants, of which a big majority depends on farming (approximately 70%).

As regards the level of education, there are 28 Primary Schools, 4 Secondary Schools, and 14 783 students live there.

About the facilities for health services, there are 7 dispensaries, 1 Health Centre and 13 pharmacies.

With 552 square kilometres of cultivated area, the division is directed towards agriculture. We can find horticulture which requires small scale irrigation, breeding of cattle, chicken and sheep, and sisal plantations (there are sisal decortications plants). Several markets inside the community enable farmers to sell their produces. But also some outputs like fruits, maize, paddy and decortications of sisal fibres, are exported inside the country towards other villages and towns. The community is farming subsisted, it does not need imports.

Farmers receive some help from NGOs like W3W, World Vision, etc. but also from the government through TASAF, PADEP, etc.

Concerning the natural context, the region is characterized by rainfalls contained between 600 mm and 2000 mm according to the season, a minimum temperature of 5°C, a maximum temperature of 32°C, and loam, clay, and alluvial soils. Sources of water are composed by wells, irrigation canals, and rivers.

The topography can be described in three categories:

1. Semi and low land inhabited by the nomadic Masai tribe and rich in mineral such as gemstone green tomarine, rubies and gypsum.
2. Low wetland area well drained by river and small dams and potentially good for small scale irrigation.
3. The mountainous area which comprises villages situated along the famous Usambara Fold mountainous ranges.

4. Methodology

At first we decided which district we were going to work in. After that, one first questionnaire was drawn up and tested with a farmer of Magoma. After some modifications, specifications, additions of questions, deletions of others...a new questionnaire was tested with a farmer from Morogoro who also uses the pump. We decided to keep this second questionnaire and to use it for our study in Magoma.

In Magoma we worked in collaboration with the NGO World Vision based on Magoma ADP. We met all the farmers in ADP office and one member of the team worked with us as a translator. Thanks to this collaboration we met 36 farmers (i.e. about 30% of the farmers in Magoma who use the pump) who were representatives of all the groups using the PeP (12 groups and one individual farmer). It took us about 3 weeks to interview all these farmers and collect all the data.

For each group we interviewed two or three farmers at the same time because some questions concerned the group and others were individual questions. For each interview, among the three interviewed farmers, there was at least either the chairman or the secretary or the treasurer (sometimes the three). In this way, we were able to get more easily reliable economic data.

Each group interview lasted between 1h30 and 2h30.

	group s	individual farmers	Total farmers
number	12	1	36
%	100	100	33

	males	females
number	29	7
%	80.6	19.4

The third part of this study was to analyse and to treat the data. Thus that analysis is composed of different parts concerning agronomic, social and economic aspects of the impact of the pump notably on farmers' lives and work, while other parts deal with advertising and maintenance of the PeP.

The last part describes our general impressions about the pump, but also the farmers' behaviour, etc. and ideas which might help to improve this system and to develop the PeP in more districts.

5. Limitations

As we do not speak kiswahili we needed a translator who was an intermediary between us and the farmers, who most of the time did not speak English. Even if we spent time explaining our questions and expectations to our translator, there was however a risk of misunderstanding or mistake in the way those questions had to be understood.

Moreover the disadvantage with a translator is that he can also misinterpret the farmers' answers and consequently transmit some incorrect information.

The second limitation concerns the farmers themselves: we are not sure that they were able to understand all of our questions. For example, some words that we used as regards economic data made no sense for them. We tried to explain to them but it was sometimes difficult to make us understood.

To finish, it was sometimes difficult to collect reliable information, especially concerning economic data: farmers did not always tell us the truth about their real income and sometimes they had no records and gave us absurd figures.

GENERAL RESULTS

1. Agronomic aspects

Type of farm equipment:

100% of the farmer groups work with traditional equipment. That means that the PeP is appropriate for small-scale farmers. All the farmers are owners of their equipment and even after using the pedal pump they did not change their type of equipment. However 7 groups (50%) bought new tools thanks to their increased profits following the use of the pump.

Type of irrigation before PeP:

Before using PeP 100% of the farmers interviewed used buckets to irrigate their crops. They had to go to the river with their buckets. So 100% of them said that the main reason for the change of the type of irrigation was the difficulty and problems brought by the work

involved. Indeed in all cases, the river was too far away. With the PeP, water is now available directly in the fields and farmers use only the PeP to draw water.

Area:

All the groups have increased their area after the installation of the pump.

Group	1	2	3	4	5	6	7	8	9	10	11	12	ind
size before (acres)	1	1.25	1	0.5	0.5	0.25	1.5	1	1	2	0.25	0.25	1/8
size after (acres)	7	2	2	1	1.5	1	5	2	2	4	0.5	0.5	1
increase	x7	x1.6	x2	x2	x3	x4	x3.3	x2	x2	x2	x2	x2	x8

The average garden size was multiplied by factor 3. The farmers have increased their area because it is easier for them to irrigate with the pump. Indeed they gain time and energy because they no longer need go and take water from the river, which is often far from the field.

Moreover the gain of money thanks to the pedal pump enables farmers to buy or rent a bigger area to cultivate.

Most of the time the size of the group did not change in spite of the increase of the area. Only 4 groups have increased their size, and 2 have even decreased the number of members.

However some groups had a big area before using the pedal pump but they did not use it because of the difficulty to irrigate. Thanks to the pump they can now use their whole area.

Types of crops before /after:

With the PeP, farmers have changed the crop plan of their field. Three cases are to be distinguished:

- One group has completely changed its types of crop.
- 58 % of groups of farmers have diversified their crops: they have increased the number of types of crop.
- 33 % have kept the same types of crop and have only increased the area for each crop.

With the PeP farmers can cultivate many more types of crop because now water is easily available. They can have crops which need a lot of water such as water melon. The main crops which are added in the field with the PeP are:

- sweet pepper
 - onion
 - water melon
- } 38% of the groups have added these crops in their fields
- chinese
 - okra
- } 31% of the groups have added these crops in their field

The main crops which are cultivated (with the PeP) are:

Type of crop	% of groups which cultivate this crop
Tomato	85
Onion	77
Sweet pepper	69
Water melon	69
Cabbage	62
Okra	54
Amaranth	54
Spinach	38
chinese	38

Yield:

The difficulty was that generally farmers do not have records about the yield of their crops. So only 6 groups out of 13 were able to give figures. Nevertheless, all groups have asserted that with the PeP they have an increase of their yield.

Increase of the yield of the main cultivated crops:

Type of crops	Average increase of the yield (/acre)
Tomato	x1.7
Onion	x2.1
Sweet pepper	x1.7
Cabbage	x1.7
Amaranth	x1.9
Overall average	x1.8

With the PeP, on average, farmers have multiplied their yield by 1.8, because water is not a limiting factor anymore.

However these figures are not scientifically reliable because averages have been calculated with 3 to 5 data sets only.

In addition to the increase of the yield, all farmers have noted an improvement of the quality of their products with the PeP: bigger, better taste, better colour... because now the quantity of water is sufficient.

Quantity of water used for irrigation:

7 groups irrigate the complete area every day. 3 groups irrigate 50% of their area, 1 group irrigates $\frac{1}{4}$ and 1 group irrigates only $\frac{1}{8}$ of the area every day. These percentages were the same before increasing the size of the field. They did not change their irrigation plan.

But most of the time, it is difficult for the farmers to know the quantity of water used for irrigation. That is why we asked them the capacity of their tank and how many times per day they filled it. But for some groups the answers were nonsense

Considering all results, farmers use on average 3980 litres of water per day to irrigate 1 acre.

This value however is not very reliable as the data are in a wide range. We can unfortunately not compare with the quantity of water used before the pedal pump because none of the farmers know the figures.

2. Economic aspects

Income, cost of production and profits:

We asked farmers about their income and cost of production before and after using the pump in order to calculate their profits for one year. The income is the money which the group has after selling its produces; and the cost of production includes all expenses in relation with the field (fertilizers, seeds, pesticides, weeding, spraying, transport...)

AVERAGE	before PeP	after PeP
income	569 083	654 306
cost of production	319 000	134 742
profit	250 083	519 563

Data in Tsh/year/acre

These figures were calculated from the results of all groups.

The cost of production has decreased and the income has increased. Finally, for each group the profit has increased. **On average, the profit per acre was multiplied by 2.**

These results are significant but not reliable for the following reasons: some farmers do not know these data, above all the cost of production because they just care about the money they get. When they keep records of the data they have most of the time details about income, but nothing about their cost of production.

Moreover they sometimes did not want to tell us the truth about their income.

So that is not really the right means to evaluate how much farmers' lives have improved. That is why we used some indicators in order to evaluate more precisely the changes in farmers' lives.

In all cases they noted an increase in their profits and used the gain of money for different things.

Use of the gain of money by groups of farmers:

	no	%
Buy/rent land	8	66.7
Buy other farm inputs	8	66.7
Buy material	7	58.3
Bank savings	4	33.3
Buy livestock	2	16.7
Other	2	8.3

Most of the groups use money to buy or rent land, but also to buy material and inputs. 4 groups have opened an account with a bank or a SACCOS, but according to them there is only little money on it (or no money at all).

1 group used money to employ other farmers in order to help them on the farm.

Use of the gain of money by each farmer:

	no	%
Send children to school	29	80.6
Buy livestock	21	58.3
Personal comfort	15	41.7
Build or repair house	8	22.2
Improve own farm	8	22.2
Other	6	16.7

Most of the farmers already sent their children to school before using the PeP. But for all of them it is now easier to pay school fees. For some of them, it was impossible to send their children to secondary school before using the pump whereas now it is possible.

58.3% of the farmers used money to buy livestock (goats, cows and/or chicken). This enables them to have more income. 22.2% have even their own farm and use money to pay a casual labourer who takes care of it.

41.7% of the farmers used money to improve their personal comfort: domestic uses, home consumption, food, clothes for children...

Some farmers used their money also to help their family in case of sickness, or to invest in their own business (sell goats skin for example).

Two of them keep some money at home in order to have some savings.

These results show that the installation of the pedal pump and the gain of money enable farmers to improve the quality of their life.

3. Social aspects

Use of the pump:

Pump operation can be handled by any member of the group in each case. However for 2 groups, only a few members can be in charge of this task (3 or 5). But that is for a reason of organisation in one case and a question of responsibility in the other one: if there is a problem with the pump they know who is responsible.

Moreover all the family members (of the only individual farmer who was interviewed) participate in pump operations. He says that his children enjoy the task.

Size of the group:

5 groups have increased their size after the installation of the pedal pump. Two reasons can explain this: first, farmers increased the area of their farm, so they needed more farmers to do the work. Then, farmers explained that the PeP enabled them to make the work in the fields easier and to gain more money, and for this reason a lot of farmers wanted to join their group in order to take advantage of the pump.

Group	1	2	3	4	5	6	7	8	9	10	11	12
size before	20	30	10	11	10	7	13	10	8	30	8	2
size after	20	16	10	11	25	10	17	10	16	15	8	5
increase/decrease	-	-14	-	-	+15	+3	+5	-	+8	-15	-	+3

One group decreased its size because it was separated in two when the pump was installed and one other said that the reason for the decrease of the size was due to a lot of problems within the group.

Time used for gardening activities:

Before using the pedal pump, each farmer spent on average 6 hours per day on the farm. After the installation of the pump, only two of the groups (15%) use more time for gardening activities.

On average, farmers who now spend less time for gardening activities than before using the pump, gained 2 hours per day. The groups which did not gain time said that the reason was the increase of area. The detail of the organisation of work and the time of each task in the following paragraph enables to understand these changes.

Workload:

Organisation of work:

- Soil:

In 90 % of the groups all farmers take part in the soil preparation (before and after the PeP), even if the size of the group changed.

Among these 90 %, one group employed other farmers to help them before having PeP.

Only one group completely changed its organisation of work after the installation of the PeP (they have decreased the number of people who take part in the soil preparation).

- Sowing seeds:

Same organisation as soil

- Irrigation:

50 % of the groups did not change their organisation: everybody takes part in the irrigation of the field.

And 50 % decreased the number of people who have been taking part in the irrigation since the installation of the pump.

- Harvest:

In 100 % of the groups everybody takes part in the harvest: it is the same before and after PeP.

- Sales:

The main change which appeared with the PeP is that now for more than 50 % of the groups, their customers come to the farm to buy their produces. This change is due to the better quality of them.

Before the PeP, all the groups went to market to sell their produces.

=>The PeP has mainly an impact on the organisation of irrigation of the fields and the sales:

- The task of irrigation being less labour-intense, less people take part in the irrigation which enables a gain of labour force available for other tasks.

- Thanks to PeP, water is not a limiting factor anymore, which enables to have better produces. That is why, now, customers come to buy their produces directly to the farm.

Time of work:

As we have written, with the pump, farmers who have gained time (namely 85% of the farmers groups) have gained on average 2 hours per day of gardening activities.

If we detail the evolution of time spent on each task, we note that the pump had two opposed effects according to the task.

Indeed, as the PeP enabled to increase the area, farmers, who could not compensate for this increase by an increase of the size of their group, increased the time devoted to the preparation of soil, sowing and harvesting. However, this increase of time has been offset by a gain of time in irrigation and sales.

As a consequence, globally the PeP has enabled a gain of time of 2 hours per day.

Details of the gain of time:

- Irrigation:

77 % of the groups have been spending less time irrigating since they use the pump in spite of the increase of the area. This gain of time is due to the fact that they no longer have to go to the river which in most cases is far away.

- Sales:

61 % of the groups have decreased the time devoting to the sales. The main reason for this gain of time is the fact that the customers now come directly to the farm to buy the produces.

Other activities after gardening activities:

Activities	no	%
Keep livestock	8	42.1
Own business	7	36.8
Own farm	4	21.1
Domestic tasks	3	15.8
Other	2	10.5

This gain of time is used by the farmers for other activities. 42% use time to keep their own livestock (goats or/and cows most of the time). Some of them cut grass for their animals, others build a shelter etc.

36.8% have their own business: make and sell rugs, repair bicycles, fishing activities...

21.1% have their own farm and spend more time working on it.

15.8% take care about domestic tasks: they come back home in order to prepare food for children, to wash clothes or to go for firewood for example.

A few farmers use this time to have a rest or to spend time with other people.

These results show that using the pedal pump improves farmers' lives: with the gain of time thanks to the pump, farmers can indeed spend more time on other activities: so they can have another business in order to get more money or just have more time to take care of the

education of their children for example. Moreover these farmers have now more time to enjoy life instead of spending all their time on the fields.

Satisfaction:

100% of interviewed farmers are satisfied with the comfort brought by the pedal pump: for all of them it is easy to use and peddling operations are simple.

Moreover farmers need between 3 and 5 minutes to fill a 200 litres tank. They are satisfied about the efficiency of the pump because they find it quick, they think there is a high water delivery and the tank can contain a lot of water. However 1 group said that they sometimes used more time to fill their tank especially during the dry season, because the water is deep into the ground. Another group specified that they also needed more time when the pump lacked lubricant.

Also two other groups said that because of the low pressure in the tank they could not use the pipe to irrigate their field but had to use buckets from the tank to the field. That is why the efficiency does not absolutely satisfy them.

6 groups received the pump as an aid from ADP Magoma. According to the other farmers who bought the pump themselves, the price was reasonable.

Disadvantages/improvements:

As we have written, 100 % of farmers are globally satisfied about the pump. However there are some disadvantages found by the farmers which could be improved:

According to:

- 46 % of farmers: the pipe from the tank to the garden is too short
The pump enables them to increase their area, but then the pipe is too short to irrigate all the land so they have to use water cans from the tank to the garden.
- 39 % of farmers: the pipe from the source to the tank is too short
Because of the increase of the area, farmers need to move the pump in order to irrigate all the land but when they move the pump, the pipe is too short, the source is too far.
- 31 % of farmers: the pressure from the tank to the garden is too low to bring water from the tank to the garden. So they have to use buckets to irrigate from the tank to the garden.
- 23 % of farmers: the capacity of the tank can be increased
- 23 % of farmers: it would be better to have a plastic tank to avoid rusting
- 15 % of farmers: the well can be reinforced with cement to avoid erosion
- 8 % (one group) of farmers: there is a loss of water from the source to the tank at the beginning and at the end of peddling operations, namely when the pressure becomes too low

- 8 % of farmers: it would be better if the pump was easier to transport because they have to move the pump when the area increases
- 8 % of farmers: a metal support of the pump would be stronger than the wooden one
- 8 % of farmers: the pump is not in proper safety. This group says this because their tank was stolen.

Cost of the pump:

The price of the pump depends on the location and transport. It depends also on the installation and accessories. It costs between 200 000 and 400 000Tsh.

6 groups did not buy the pump: it was an aid from World Vision. In this case the farmers have no idea about the price of the pump.

The other groups bought the pump on loan basis. None of the groups have finished paying back the loan. One group has not even started paying. This group has been using the pump for one year.

According to them, two groups have already paid back half of the price (these groups have been using the pump for 1 and 2.5 years) and another group which bought the pump 1 year ago has already paid back 40 000Tsh.

Another group said that farmers were waiting for money from SACCOS to start paying back their loan.

4. Maintenance

Maintenance problems:

7 of the 13 pumps which were installed in Magoma have not had any maintenance problem.

no of pumps	no of maintenance problems	repaired by the farmers	repaired by a technician	not repaired
13	6	4	1	1

In each case it was only a minor problem. Farmers did not need a technician and could repair the pump themselves: change a plastic part, a piston or some other small parts.

The price depends on the problem and is between 2 000 and 45 000Tsh (including price of the parts, transport and installation).

For one group which paid 45 000Tsh it was expensive to get the pump repaired but all other groups find the maintenance of the pump cheap.

35 of the 36 farmers interviewed had never received any training to repair pumps. Moreover the farmer who did is not really satisfied with it (it was a training to repair many types of pumps). All farmers who were interviewed are very interested in having a training to repair the PeP themselves. Indeed it is easier for them to know how to repair the pump in case of a problem, instead of having to call a technician. It is all the more difficult since they most of the time do not know who to call if the pump does not work anymore. That is why one of the pumps is still broken: farmers do not know who is able to repair their pump so they are waiting for an aid of World Vision.

5. Advertising

Means by which farmers have known the PeP:

Only one group out of the 13 groups who were interviewed has known the pump through another farmer who already had the PeP.

All other groups have known the pump during a public demonstration organized by World Vision Magoma.

100 % of the farmers were convinced by the pump the first time they had seen it.

About other feet driven pumps:

Out of the 36 farmers who were interviewed, 47 % know another feet driven pump. These farmers are distributed in 12 groups. In this way, only one group does not know another feet driven pump.

None of these farmers used another feet driven pump before the PeP but some of them had tested it and all preferred PeP because it is easy to use, it has a high water delivery, it does not rust, and the tank can stock a lot of water.

Spread of the PeP between farmers:

100 % of the farmers who were interviewed have talked about the PeP to other farmers and all of these farmers except one have been interested in the pump. Like this, some of them have bought the PeP and some others intend to buy it.

Nevertheless, the best mean to spread the pump remains World Vision Magoma.

RECOMMENDATIONS

Our first impression is globally positive: unquestionably the PeP is a tool of improvement of farmers' working and living conditions.

However some recommendations can be put forward in order to improve the acceptability of the pump and its impact on farmers' lives:

- Durability of the pump in the long-term

In Magoma, half of the groups who use the pump received it as an aid from World Vision. It means that they have not bought it. The problem, if they do not buy the pump themselves, is that they consider it as a present. And in this case, if the pump needs to be repaired, they will expect another aid from World Vision instead of taking the initiative to call a technician or to repair it themselves. Even if they know that the pump improves their conditions of work and can increase their profits, they just stop using it if it is broken. This is the same if the pump is stolen: indeed one group was using the pump and it was stolen after one year. Farmers just started again using buckets without trying to get another pump whereas they said that the work was really easier when they used one. According to them they are just waiting now for another aid from World Vision. That is why it is better if the pump is sold instead of being given. Indeed if farmers buy it they feel more responsible for it and this is essential in view of the long term.

- Transparency of the prices

It is also important that farmers know the price of the pump, even if they get the pump for free. The price has to be more transparent. Most of them have no idea of it but sometimes they even do not even know which organisation they have borrowed money from !

- Communication between W3W and World Vision

The collaboration between W3W and World Vision is good for farmers because if they have a problem with the pump, World Vision, being on the spot, can help them.

But W3W has to communicate with World Vision; they should not only sell pumps but also follow-up the farmers after. Indeed this NGO knows the farmers who use the pump and knows the problems they meet with it. The communication between these two NGO's is actually essential to know exactly what has to be improved with the PeP. World Vision has to stay an intermediary between farmers and W3W.

- Means of the spread of the pump

Moreover World Vision is a good means to spread the pump. Most of the farmers in Magoma have known it through a meeting or a public demonstration organised by World Vision.

However advertising is also important: lots of farmers know a comparable pedal pump even if they have never used it, thanks to the advertising of the company, whereas interviewed farmers know PeP thanks to World Vision. Actually they sometimes do not know the name of the organisation which builds the pump, namely W3W. The association of the pump and the name of the NGO and also the development of advertising are essential for the good spread of the pump across the country, so that farmers know at least the name of the NGO which builds the pump, the W3W label could be added on the pump at the time of its building.

- The maintenance of the pump

The PeP is easy to use by farmers and can also be easy to repair. But in some cases, farmers cannot repair it themselves and sometimes they just stop using it if it is broken instead of calling a technician. This stems from two problems:

1) they do not know who to call to repair the pump

2) they do not how to repair their pump

That is why it would be useful if either farmers followed a training to repair the pump themselves, not necessarily all farmers but one for each group or village, or if there was a technician in Magoma. It would be easier and cheaper for them and they would not waste time waiting for the technician from Korogwe who cannot travel each time there is a problem, especially as most of the time, problems are minor; All interviewed farmers are very interested in learning to repair the pump.

- Emancipation of farmers

The general problem which we have noted is that farmers do not take the initiative to go to look for information themselves: for example to repair the pump, to buy a new one...If nobody inform them, they do not inform themselves, they wait for help from World Vision. Even to improve the pump and consequently to improve their work conditions, like for example to buy a longer pipe to avoid irrigating with buckets, they wait for World Vision to give them a new pipe without even telling them about the problem. Farmers would need really to be more emancipated. So to “counter” this lack of initiative farmers need to be followed up, to be regularly informed. Word Vision, being on the spot, can do this task, in cooperation with W3W.

CONCLUSION

Our study was carried out in one of many villages where the PeP was introduced in Tanzania. According to this study it appears clearly that the pump improves considerably the work and life conditions of the farmers even if some improvements can be made. Nevertheless, to measure the impact of the PeP all over Tanzania and to improve it, the same study should be carried out in other villages spread over the country.

ANNEXES

ANNEX 1: Survey questionnaire

- **Name of the farmer(s):**
- **Size of the family/the group:** before pep.....after pep.....
- **How long has the group existed?/How long has he been a farmer?**
- **How long has the group/the farmer used the pump?**

1) Social aspects :

1.1 Using of the pump:

- 1.1.a Can pump operation be handled by any member of the family or the group? yes no
 1.1.b If no, who are the members operating the pump?.....

1.2 Charge of work:

Type of work	Who		Time (per day?/week?/cycle?)	
	Before	After	Before	After
Soil (preparation)				
Seed (sowing)				
Irrigation				
Harvest				
Sales				
Other				

1.2.a Time used for gardening activities: before PeP After PeP.....

1.2.b If you are using less time for gardening activities after PeP, which activities are you doing after gardening activities?

.....

1.3 Type of irrigation before PeP:

	Traditional buckets	Diesel pump	Petrol Pump	Other	none
Y/N					

1.3.a Why did you change your type of irrigation?

- Expensive
- broken material
- Laborious
- other.....

1.3.b Now, do you use only the PeP for the irrigation? yes no

If no, what else?.....

2) Agronomical aspects:

2.1 General aspects:

2.1.a Farm equipment:

	Traditional	Small mechanization	tractor
Y/N before			
Owned/hired?			
Y/N after PeP			
Owned/hired?			

2.1.b Total farm area: before.....acres. After.....acres

2.1.c Total irrigated land: before.....acres. After.....acres

2.1.d Quantity of water used for irrigation:

If there is a tank:

How many litres of water can contain your tank?.....

How many times do you fill your tank? (per day/week?).....

How much time do you need to fill your tank?.....

2.1.e Do you use some water of the tank for other things than irrigation? yes no

If yes, what?Quantity?

If no, why?.....

2.2 Crops:

	Area before	Area after	Yield before	Yield after
Tomato				
Banana				
Papaya				
Sweet pepper				
Egg plant				
Passion fruits				
Cow Peas				
Onions				
Maize				
Sweet potatoes				
African eggplant				
Carrots				
Cassava				
Cucumber				
Orange				
Pineapple				
Turnip				
Coriander				
Water melon				
Spinach				
Chinese				
Okra				

African nightshade				
Amaranth				
Zuchinni				
Beans				

2.3 Quality:

Have you noted an improvement of the quality of your products? (size, colour, taste...)

.....

3) Economic aspects

3.1 Income (for one year):

3.1.a Global income before using the pump:.....Tsh

3.1.b Global income after using the pump:.....Tsh

3.2 Cost of production (for one year):

3.2.a Global cost of production before using the pump:.....Tsh

3.2.b Global cost of production after using the pump:.....Tsh

3.2.c If there is an increase in cost of production, in what?

- fertilizer seeds pesticides watering
- weeding spraying harvesting transport
- other.....

.....

3.3 Benefit :

If there is an increase in benefit, for what the gain of money is used?

- to buy land material.....
-
- inputs livestock.....
- personal comfort..... bank
- to send children to school: how many before?..... How many after?.....
- other.....

4) About the pump

4.1 Advertising/ Purchase

4.1.a How have you known the pump?

- Public demonstration leaflet by another farmer other.....

4.1.b Have you been convinced by the pump the first time you have seen it? yes no

4.1.c Do you know “money-maker”? yes no

If yes, have you ever used this pump? yes no

If yes, why have you stopped to use it?

- broken too expensive difficult maintenance other.....

If no, why?

- too expensive difficult maintenance other.....

4.1.d How have you bought the PeP? Loan cash other.....

If with SACCOS, have you finished to pay? yes no

If yes, how much time to pay?.....months

If no, how much do you still have to pay?.....Tsh

4.2 Installation/Maintenance:

- 4.2.a Who has installed the pump? A technician You other.....
- 4.2.b Have you ever had some maintenance problems with the PeP? If yes, which ones?
.....
How many times?.....
How have you made the pump repaired?
 Yourself By a technician other.....
What was the cost of reparation?Tsh
- 4.2.c What do you think about the maintenance of the PeP?
Easy yes no cheap yes no quick yes no other.....
- 4.2.d According to you, what can be improved as regards the maintenance of the pump?
 Cost following reparation time other
- 4.2.e Have you ever followed a training to repair the pump yourself? yes no
If yes, are you satisfied? yes no
If no, are you interested in? yes no

4.3 Satisfaction:

	Comfort	Efficiency	Cost
Y/N			

4.4 Advantages/disadvantages of the pump:

According to you, what can be improved?
.....
.....
.....

4.5 Diffusion:

- Do you talk about the pump to other farmers? yes no
If yes, are these farmers interested in the PeP? yes no
Or have they already bought the PeP? yes no
If no, why?
.....
.....

Would you be ready to do it if you receive a “gift” (some material for the maintenance for example) when a farmer who you told about the pump buy this pump? yes no

ANNEX 2: Map of Korogwe District

