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TNO-report

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Working Visit Ghana

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1 Introduction

1.1 Background

TNO shares her innovative knowledge and experience in order to improve well-being in developing countries. Inspired by social responsibility, TNO is committed to making its own contribution to the Millennium Development Goals with the aim of reducing poverty, combating illness and eradicating starvation. On demand, TNO initiates projects in areas such as water management, food, health, labour, production technology, ICT, innovative materials, construction, energy & environment and safety. We cooperate closely with four prominent partners. One of them is the School Feeding Program in Ghana. The aim of this program is to accelerate economic development in hunger hotspots in Ghana through increased agricultural productivity and providing locally grown, nutritionally balanced school meals. This project contributes to MDG 1, 2 and 6. The organisation of the program consists two multi-stakeholder platforms; one in Ghana (GSFP-decision making) and one in the Netherlands (SIGN; advisory).

TNO is member of the SIGN platform in the Netherlands since January 2007. TNO is investigating how to contribute to the GSFP program, by studying the strategic plan of GSFP and having discussions within the platforms. In February TNO defined three topics where they can add value:

1. drinking water: in quality and quantity;
2. safety of food: improving shelf life of crops;
3. ergonomic farming tools: development of new smart tools together with farmers

A visit to Ghana appeared necessary to specify the needs of GSFP and to start up the cooperation between TNO and Ghana. A team of four from TNO went to Ghana from October 1-10th 2007. Names and contact data of the team members are given in Appendix A.

1.2 Aims of the visit

The aims of the working visit were:

- Meeting and building up relationship with communities, NGO's, government, knowledge institutes and industry (related to/ involved in GSFP);
- Determination of needs and questions;
- Gathering information about the situation in Ghana concerning drinking water, safety of food and ergonomic farming tools;
- Discussing possibilities and selection of opportunities for cooperation.

1.3 Program of visit

Our visit started in Accra, where we visited the National Secretary of GSFP, the Royal Dutch Embassy and many other headquarters and Ministries. Then two of us visited

the Upper East Region for five days. They went to Tamale and Bolgatanga near the border of Burkina Faso. Wiljo Fleurkens of NGO Kalabsh Ghana hosted this team and organized an interesting program. The other two of us went four days to the West, to Cape Coast and Takoradi. Pedro Arens and his colleagues of SNV Takoradi accompanied this TNO team. The last two days we spend in Accra and had wrap up meetings. We met the following organizations:

Meetings in Accra
- GSFP National Secretary;
- Royal Netherlands Embassy;
- SNV Netherlands Development Organisation;
- GAIN;
- Food & Drugs Board;
- Agence Francaise de Developpement (AFD) ;
- Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ);
- Internat. soil Fertility and agricultural Development Centre (IFDC);
- Food Research Institute (FRI);
- Water Resources Commission (WRC);
- Water Research Institute (WRI);
- Water Resources Commission (WRC);
- Community Water and Sanitation (CWSA);
- International Water Research Institute (IWMI);
- AquaVitens Rand / Ghana Water Company (GWC);
- Coniwas.

Meetings in Upper East
- Bolgatanga Polytechnics;
- Gratis Foundation – Bolgatanga;
- Ministry Of Food and Agriculture (MOFA);
- Organisation for Dam construction and Irrigation;
- School supported by the GSFP;
- University of Tamale, Development Studies and Biological Science Research;
- Community of Mirigu;
- District Chief Executive of Mirigu.

Meetings in the West
- SNV Takoradi;
- GRATIS Foundation Takoradi;
- Berea Social Foundation;
- Cape Coast University – School of Agriculture;
- Aqua Farms Industries ltd;
- Apeteshi producer (gin-distillery);
- Pineapple farmer association at Atabandzi;
- Gari producer;
- Palm oil at Frami;
- Toolmarket (Kokompe).

Of all meetings a short report is made. In appendix B an overview of the meeting in Accra is given and in appendix C and D you will find the reports of the meetings in the Upper East region and West region respectively. Appendix E lists all visited organizations with contact persons and contact data.

Figure 1 Small scale production of gari. (from cassava)

Figure 2Earning saved in the hair.

2 Findings

We present our findings in this chapter. Paragraph 1 focuses on general conclusions concerning Ghana and GSFP. In the second paragraph we list 8 questions/needs we gathered in Ghana. We also made an overview of general success criteria for starting up projects in Ghana. Those criteria are given in the third paragraph and focus on a successful approach, organizing a proper project infrastructure, enhance commitment of partners and end users and improve durability. Considering the questions from Ghana, success factors and the expertise and mission of TNO we can select a few topics where cooperation between TNO and Ghana had most impact. In the last paragraph we describe the selection criteria and the short list of possible projects where TNO can add value.

2.1 General findings

Ghana – organization/culture

- People are very friendly;
- Humor is the glue for building relationships;
- People/ organizations have an open attitude for new initiatives;
- There is very few private sector in Ghana;
- Organizations are not used to collaborate – especially private sector with public sector;
- People and organizations prefer short term thinking and planning;
- Many organizations asked for money during our visit, with the aim to realize boreholes, to fund their community program or to buy materials. Ghana has a history with a lot of charity. This has its effect on the entrepreneurship;
- Available crops in Ghana (Source SNV Takoradi):
  - Corn – whole country;
  - Cassava – South;
  - Millet and Sorghum – North;
  - Yams – North;
  - Tomatoes – North: Tachiman district and Navrongo irrigation project;
  - Sweet potatoes – Cape Coast;
  - Onions – North;
  - Cocoa – West and Central district;
  - Pineapples – Central, Volta region, Mid South, Afram Plains (New);
  - Oranges – Assin, South;
  - Palm Oil – Askanti and South;
- Current problems with drinking water:
  - North: high Fluoride and Arsenic level;
  - West: pollution by mining;
  - Lake Volta: Domestic Pollution;
  - Upper East: flooding – heavy rains, rivers high;
  - In general: accessibility.

GSFP

- The enrolment of the program in schools is tremendous; approximately 1100 schools and 500.000 children are attending at this moment.

- There is a concentration of attending schools in the Southern region. There is a need for more focus in GSFP towards hunger spots (North). Selection of attending schools should be poverty based.
- GSFP is highly politicized.
- Food is bought on local markets but most of time not locally grown. A lot of imported cheap food is available on the markets (especially rice). Question is how to link the farmers with locally grown crops to the school feeding.
- Menus are made by nutritionists on district level. Local availability of food and variety of crops in seasons are not included in the menus. An idea is to vary menus according to regions and seasons: use the food that is produced in the regions.
- Schools can be an interesting market for the farmers but schools are a very small part of the whole market. Linking of farmers to schools can be improved by creating farmers associations or by starting school gardens. Teaching school-children how to grow crops and how to monitor water quality (portable water test kits). Emphasis on: involvement, ownership, sustainability, consciousness raising among the pupils' families and creating awareness.
- Water and sanitation is a big issue: more boreholes are needed, especially in the North. Problem is the funding. One borehole costs 15,000 GhCedis = $ 15000. Several organizations asked us to develop cheaper boreholes.
- Farming and well digging is done by farmers. They use traditional hand tools. In Mirigu (Upper east) they dig wells after every wet season. Digging takes about 7 days. In Takoradi (West) farmers plough, weed and harvest by hand with one type of tool. In both regions the farmers ask for new more effective tools for working more comfortable and healthy, to increase productivity and to retain youth in rural areas by interesting them for farming.

2.2 Questions from Ghana

1. Food preservation: improvement of food security (shelf-life, storing) and preservation (cooking, drying) of yam, grain, tomatoes, pepper, plantain, onion and fruit. Solution can be locally produced chocolate, tomato puree or fruit juice for local consumption in order to reduce post harvest losses, to extent shelf life and to enhance the local amount of nutritious food.
2. Local menus: develop menus based on availability of local food in districts in different seasons in order to increase the market for the farmers (increase their income).
3. Monitoring: The National Secretary asked for professional help with collecting data and building monitor systems for GSFP. NGO's would like to monitor the program, but there are too little involved (SNV's capacity: 20 districts out of 138).
4. Health: improve health of children under 3 years. Start a health system related to schools.
5. Hygiene: children have food, but get sick because of the lack of sanitation and hygiene. Improve the hygiene by:
   - accessibility to clean water for hand washing and proper food preparation;
   - development and use of a more cost effective latrine. Some organizations asked TNO to develop a new latrine;
   - train cooks and children in hygiene.
6. Waste management and recycling: food production at family level results in many waste material that may be used for other purposes in case of central collection.

7. Tools for the farmers: In Mirigu (Upper east) and Takoradi (West) farmers ask for appropriate technology for ploughing, weeding, harvesting and digging by hand.
8. Drinking water: water shed management and reduction of Fluoride and Arsenic levels in drinking water in the North and Upper East. Uncertain if maps and required data for good management are available.

2.3 Success factors

In case TNO will start a project in Ghana the following factors should be incorporated in the approach:

- Use local capacity, because a lot of knowledge and experience is available in Ghana. TNO's efforts should increase involvement of Ghanaian parties: ministries, knowledge institutes, companies, NGO's, foundations, associations, communities, etc;
- Improve linkages between GSFP and other organisations. There is little private sector. Large distance between universities and industry. TNO can bridge this gap and can be a motor in building consortia;
- Interaction with communities: start demand driven projects with strong participation of end users in order to have commitment for implementation;
- Local ownership: organise a strong project organisation at local level and local ownership in order to enhance the durability of newly developed solutions;
- Start up projects in the North because the poverty level is huge in this region and fewer schools are involved in GSFP, compared to the South and West.

2.4 Selection of projects

To come to a selection of projects where GSFP, Ghana and TNO can collaborate most successful we applied the following criteria:

- demand driven- selection of questions we gathered in Ghana;
- expected positive impact on school feeding and economic development in the Ghanaian communities;
- sustainable solutions – possibility to adopt the success factors for durability;
- relatively short implementation time;
- collaboration with professional and enthusiastic Ghanaian partners;
- appropriate expertise and approach of TNO.

With those criteria we selected 3 projects to start with:

1. small scale production of pine apple juice for the local market;
2. ergonomic farming tools;
3. use of local menus.

In next chapters a brief workout of each project is given. Those concepts project proposals can be seen as the start up of a discussion with all stake holders to create a proper project. We invite everybody to make a contribution in this process and to join the consortium in those 3 projects!

The other 5 questions can be considered in a later stage by TNO or worked out by other parties.

3 Small scale processing of pineapple juice for local markets in Ghana

3.1 Reduction of post harvest losses

In Ghana different kinds of fruits are grown: e.g. pineapples and mangos. Many fruits are sold on local markets. Post harvest losses are significant. Minimising post harvest losses would result in higher incomes for the farmers and more available food. This fits exactly in the school feeding program of Ghana where the objective is to provide locally produced food products to schools for nutritious meals.

During a visit of TNO in West Ghana it was observed that pineapples could be an interesting product to investigate. At present pineapple juice is produced on commercial basis, but the costs are too high resulting in products with a too high price to include in the school feeding program or for the local markets. It was also observed that processing of products, e.g. palm nut oil, shea nut butter and gari from cassava, is possible and achievable on a very small scale (family level). It would be interesting to extend current small scale processing activities in Ghana with fruit preservation.

3.2 Objective

The main objective is to define a process for small scale preservation of pineapple juice.
Boundary conditions taken into account are:

- processing should be able to be performed at the community level;
- the end product should be microbiologically safe and shelf-stable at ambient temperatures of Ghana;
- the costs for one consumer portion should not exceed $ 0.06;
- the total concept farmer association, processing, marketing, selling, distribution and supply to schools including cost-benefits (business plan) should be based on sustainable principles.

3.3 Project idea

The project will be performed around Takoradi in West Ghana. This project contains 3 important topics: the growing of pineapples, the processing of juice out of pineapples and the marketing and distribution of the juice. Pineapples grow on land owned by individual farmers or farmer associations. For this project it will be investigated if mostly farmer associations can be incorporated. After harvesting the pineapples will be processed: peeling, cutting/pressing, packaging and heating. The current idea is that a farmer association owns the processing equipment. This results in optimal equipment effectiveness. Farmers can process their own harvest and obtain their own juice. A certain fee needs to be paid for processing, from which the equipment can be maintained. The pineapple juice product should be sold to local markets. The role of women in post-harvest distribution, processing and further distribution will be taken into account.

Possible partners in this project are:
- SNV Takoradi: will be asked to be project manager in Ghana; expertise in value chain approach and cost-benefit balance;
- Farmer association of pineapples in Atabandzi (near Takoradi); chair is Frank Baah;
- Berea Foundation: farmer associations;
- IFDC: farmer associations;
- CSIR – Food Research institute: subproject manager, processing conditions and testing;
- Gratis Takoradi: design and production of machinery;
- Dutch partners in SIGN.

3.4 Approach

This projects is divided in six phases. The first 2 phases are described here in more detail. The content of the following phases are dependent of the outcomes of former phases and can be defined later on.

3.4.1 Phase 1 Agree upon project proposal

A fist draft project proposal is presented and discussed in the SIGN platform meeting 18th October 2007. Most platform members reacted enthusiastic. Recommendations made in this meeting are processed in this proposal.

This proposal will be send to Ghanaian partners:
- SNV Takoradi (Pedro Arends, Eric Banyi);
- CSIR – Food Research Institute (Paa-Nii Johnson);

- Berea Foundation (Mercy Enchill);
- Dutch Embassy (Marius de Jong);
- Kalabash Foundation (Wiljo Fleurkens).

After comments of those 5 parties the revised project proposal will be send to the other proposed partners. In bilateral discussions by mail and telephone with TNO and SNV and a teleconference with all partners the aim and approach will be discussed.
Time schedule: November and December 2007.

Deliverables of this phase are:
- a clear organisation structure;
- commitment of partners with clear intentions and responsibilities;
- a final project proposal.

3.4.2 *Phase 2 Feasibility study*

First, it is needed to get an idea of the feasibility of the technical aspects of processing the pineapples and the business model.

Processing pineapple juice
FRI and TNO will investigate the following points:
- The process conditions that will result in safe and shelf-stable pineapple juice;
  - peeling, slicing, squeezing;
  - heating;
- The packaging material should be suitable for heating;
- Product quality should be acceptable after processing;
- Nutritional information of pineapples and juice;
- The need for additives, e.g. citric acid and ascorbic acid;
- Options for mixing with other fruits, especially lemons (rich in vitamin C and citric acid);
- Costs of the processes and packaging material.

An inventory of the processing steps (peeling, slicing, squeezing, heating) and possible packaging materials will be made. A few processing schemes will be developed for pineapple juice production. An experiment will be performed in parallel by FRI and TNO to test the effect of the different processing schemes on product quality and stability. Indications for improvements will be highlighted.

Business model
The role of farmers, the farmer association, distribution, sales (women) as it is most likely expected to operate in Ghana will be investigated, for which SNV and IFDC will be asked to assist. The following elements will be investigated by SNV, FRI and TNO:
- pineapple production and post-harvest volumes;
- current sale volumes;
- volumes in post harvest losses at different steps in the chain;
- costs, sales prices and margins in the current situation.

Costs for production of juice, expected sales volumes, margins and sales prices will be included in the model. The business model allows to assess how feasible it would be to develop a sustainable and cost-effective small scale production application for pineapple juice.
Time schedule: January and February 2008.

Deliverables of this phase are:

- Business concept for pineapple juice
- Technical concept for processing pineapples to pineapple juice
- Go/ No go decision by the consortium based on the feasibility assessment

3.4.3 Phase 3 More detailed exploration

Extended workout of the processing, packaging, marketing and distribution process. Exactly to be described after phase 2.
Time schedule: March - May 2008.

3.4.4 Phase 4 Pilot of processing

Suppliers of ssuitable processing equipment and packaging material will be selected. Pineapple juice will be produced on pilot scale. To be described in more detail after phase 3.
Time schedule: June-July 2008.

3.4.5 Phase 5 Small scale production

Implementation.

3.4.6 Phase 6 Extension of the concept

Options in relation to pineapple juice:

- Options for fortification:
  - iron may be an option (high absorbance);
  - nutritional needs, vitamin C;
- Expanding the market / distribution;
- Alternative processing routes: producing a concentrate, solar drying, adding pineapple to other products (e.g. fruit cake);
- Alternative routes for heating using wood: solar cooking, biogas potentially using pineapple waste material;
- Other commodities and end products:
  - Mangos: juice or dried;
  - Tomatoes: paste;
  - Other fruits in (the north of) Ghana: juice or dried;
  - Juice of mixed fruits.

3.5 Role of TNO

TNO will be over-all project coordinator. TNO will stimulate the involvement of the intended partners and ask SNV Takoradi as project manager in Ghana.
TNO will provide technical knowledge about processing, shelf-life and product quality. This will be shared with FRI, which is intended to be the technical sparring partner. TNO and FRI will perform processing and shelf-life tests in parallel.
TNO will inform the Dutch SIGN platform about the progress of the project and stimulate involvement of the platform.

4 Development and local production of ergonomic farming tools

4.1 Improving comfort and productivity

In Ghana most families have food and earnings from their own land. Maize, groundnuts, millet and yellow sweet potatoes are popular crops. Modernization in those small scale agricultural projects focus on better seeds, use of biological pesticides, intercropping and optimal change in crops during the years. Aim is to increase production. Another, still undeveloped, way to improve farming processes is through the human factor. Work is often performed by hand in the absence of tractors and oxen. This work is physically heavy, because of the long working hours, heavy ploughing and the hot climate. But also because of the awkward working postures caused by the use of simple tools. In practice, farmers use one or two types of mattocks (axe, hoe and pick axe) for many various tasks. Using more specific and ergonomic tools decreases the workload and improves comfort and productivity.
In our exploration visit we met the farmers of the community of Mirigu (Upper East Region) and the Berea Foundation in Takoradi (West Region). Both communities asked us to cooperate in improving some of their tools.

4.2 Aim

The objectives of the project are:
1. to improve one or two tools together with the farmers. The tools should be easier to use, be more effective and efficient and with an interesting cost price;
2. Start production / assembling and marketing of these tools locally.

4.3 Project idea

We want to start up a project in Mirigu. Farmers use hand tools for digging wells and ploughing on the land. Farmers complain about back problems. Price of the hand plough is about 15 new Ghana Cedis. They buy it in Bolgatanga at the local shop. There is no manufacturer in Bolgatanga of these tools. Together with farmers TNO wants to develop new tools. The size, shape and type of material can be improved.

We want to cooperate with the following partners:

- Kalabash - Wiljo Fleurkens can be the local project manager who can monitor the project and assure progress.
- Mirigu - Mr. Roland Ayadina is an enthusiastic and energetic English speaking contact person. He could be the project coordinator in the village and he can translate between English and the local tribal-language.
- Agroeco – Kees van Veluw has a project in which they train new farmers. The new tools could be introduced in this program. We will explore possibilities for cooperation.

4.4 Approach

This projects is divided in six phases. The first 2 phases are described here in more detail. The content of the following phases is dependent of the outcomes of former phases and can be defined later on.

4.4.1 Phase 1 Agree upon project proposal

A first draft project proposal is discussed with Wiljo Fleurkens and presented and discussed in the SIGN platform meeting 18th October 2007. Most platform members reacted enthusiastic. Comments are processed in this second draft proposal.
Wiljo Fleurkens will discuss this proposal with the farmers and manage expectations. In bilateral discussions by mail and telephone the aim and approach will be discussed. A final proposal will be made.
Time schedule: January and February 2008.

4.4.2 Phase 2 Pre-prototype preparation at TNO

Based on what we have seen in our exploration visit and the tool we took home we can discuss with a team of TNO experts possibilities for improvement. Maybe it is also possible to modify this tool and bring it with us the next visit. We can also buy Dutch

tools which we think they can be useful in Ghana. These Dutch tools will only be used as an example for the local farmers.
Time schedule: February 2008.

4.4.3 Phase 3 Specifications for new tools

A small TNO-team visits Mirigu for a period of one or two weeks. Activities:
- Observations, interviews with farmers and expert testing;
- Workshops with farmers using existing Western Tools;
- Interviews with farmers to check the defined specifications;
- SME activities: orientation at local black smiths: can they manufacture the prototypes of the tools and figuring out which are conditions for starting up a new company.
- Visit GRATIS and discuss with them possibilities to cooperate. GRATIS could produce the first prototypes and small scale production of the new tools. GRATIS can also train people to produce these tools and to start an enterprise. We will explore possibilities for this business.
- Set up a small monitor program on the effects of the new tools.

Time schedule: March 2008.

4.4.4 Phase 4. Production and use of the new tools

The local project leader continues the projects closely supported by TNO. He will take care of the production of prototypes, field testing (sent photo's and films for TNO's ergonomic evaluation), manufacturing (after TNO made the final drawings) and he will monitor the effects of the use of the new tools.
Time schedule: March – December 2008.

4.4.5 Phase 5. Business plan for local production

During the process we will bring a second visit to Ghana with the aim to:
- Monitor the project and to adjust activities if needed.
- We also will focus on the possibilities to start a small scale business on these tools. A business plan will be made with data concerning selling volumes, expected production costs, margins, selling price, data from competing products, etc.
- Local orientation on how to introduce the tools in the training program of Agro Eco
- First evaluation of the effects of the project.

Time schedule: June 2008.

4.4.6 Phase 6. Evaluation

Time schedule: November/ December 2008.

4.5 Desired results

After the project we have:
- New tools are designed and tested in a local community in Ghana;
- We have enthusiastic farmers who work more comfortable and productive;
- We have an insight in the possibilities of introducing these new tools and when and how local farmers will use these tools;
- We have locally produced prototypes of the tools;
- We know if and how local smith can produce these tools and we hope a local smith is producing the new tools;

- We know if Agro Eco can and will use the new tools in their training program.

4.6 Costs

It is estimated that TNO will spend 56 working days on this project and Wiljo Fleurkens 36 days. Both parties will finance their own time and travelling costs.

4.7 Role of TNO

TNO will be over-all project coordinator of this project. TNO will ask Wiljo Fleurkens as project manager in Ghana. Both will stimulate the involvement of the intended partners.
TNO will provide technical knowledge about ergonomic design of tools, participative approach and starting small scale industry.
TNO will inform the Dutch SIGN platform about the progress of the project and stimulate involvement of the platform.

5 Use of local menus for the Northern region

5.1 New approach for region specific markets and needs

The Ghana School Feeding Program (GSFP) is a successful program in the way that children at many schools (around 1000) become an everyday meal, supported by funding from the Ghanaian Government. The food for the meals is bought on local markets and this stimulates the local economy.

One of the main aims of the GSFP, that is the stimulation of agricultural production and thereby reaching a large part of the community, is generally not achieved as school menu's contain rice and other products which are being imported from outside Ghana. These products are sold on local markets, but not being locally produced and therefore local farmer do not benefit. Furthermore, participation of local communities and local economy is still an underexposed aspect of the GSFP. This participation is one of the major goals and can be further increased in the future.

From our visit to Ghana it became clear that most schools participating in the GSFP have been selected in the South of Ghana. To further expand the program successfully in the Northern, Upper East and Upper West regions, differences between the North and South of Ghana, in terms of locally produced products, climate conditions and region specific needs, have to be taken into account.

Hereunder we describe an integrated approach for successfully expanding the Ghana School Feeding Program in the Northern, Upper East and Upper West regions of Ghana, by paying attention to differences in starting conditions. In this approach we focus on both children's health and agricultural boosting:the use of locally produced food will stimulate local food production and raise the incomes of local farmers;
by adjusting the menus to food that is produced in specific regions and seasons the availability of locally produced food will be optimally utilized and market for local farmers will be enhanced.

- the use of locally produced food will stimulate local food production and raise the incomes of local farmers;
- by adjusting the menus to food that is produced in specific regions and seasons the availability of locally produced food will be optimally utilized and market for local farmers will be enhanced.

5.2 Aim

The objectives of this project are:

1. the design of local menus;
2. the use of local menus in one school;
3. 3. monitoring the effects of the use of local menus on the incomes and position of local farmers and the health and well-being of school children.

5.3 Project idea

We want to set up a demonstration project on a school in the Upper East Region. For the Upper East Region local menus will be defined and introduced at the school. Changes in nutrition value of the food, the health and well-being of schoolchildren and the income and position of farmers will be measured at baseline, after 6 month and after 1 year.

During our stay in Ghana, we had various interesting discussions with locally operating (research) organisations. From these discussions we suggest the following possibilities for cooperation and focuses:

- Chief District Executive – selection of school.
- Ghana Education Service – selection of school.
- University of Development Studies (Tamale) - areas of Health and Nutrition & Agro-Economics & Applied Science:
  - Compose a menu from locally produced products, which fits the GSFP budget and contains sufficient nutritional value. This menu can vary per season (wet and dry), depending on food availability;
  - Setup a monitoring scheme for evaluation of the project results;
  - Implement monitoring and evaluation.
- Kalabash - Community participation, implemention and impact assesment.
- Head of school and cooks/suppliers - Implementation of new menu's and water quality measures. These people will also be the "ambassadors of the demonstration project".

5.4 Approach

Hereunder we describe the proposed setup of the demonstration school project. This project contains 5 phases.

5.4.1 *Phase 1 Agree upon project proposal*

A fist draft project proposal was send to Wiljo Fleurkens of Kalabash Foundation in Ghana and was presented and discussed in the SIGN platform meeting 18th October 2007. Comments have been processed in this second draft proposal, which will be sent to University of Development Studies in Tamale.

In bilateral discussions, by mail, phone and perhaps a visit, the aim and approach will be discussed with all partners involved.. A final proposal will be made.
Time schedule: November 2007 – February 2008.

Deliverables of this phase are:

- a clear project organisation;
- commitment of partners with clear intentions and responsibilities;
- a final project proposal.

5.4.2 *Phase 2 Selection of a school*

Selection of one school to be added to the GSFP, where the demonstration project can be implemented. Alternative: we can also search for a school that is willing to cooperate, without funding of the GSFP. In this case we need to find extra funds for providing the food.
Time schedule: March 2008.

5.4.3 Phase 3 Development of locally produced menu's

Define menu's:

- from locally produced products; find out which food is available in the North, and in which season;
- within the GSFP budget;
- with sufficient nutritional value.

Stimulating use of local food

- Identify existing infrastructure on food market (connect local producers to schools);
- Involve cooks or suppliers who purchase the food for the schools;
- Form cooperation with farmers who are present in the community where the school is located (e.g. a 'school implementing committee'). The school is the centre of the community and decisions can be taken by the school and this committee.

Time schedule: March – May 2008.

5.4.4 Phase 4 Set up monitoring system and baseline measurement

In this stage we will make an impact assessment with focus on the effects on children's benefits (health, growth, well-being, educational progress, etc.) from good meals and community benefits (income, health, social effects) from stimulation of agricultural production. After the impact assessment a monitoring system will be setup and the baseline measurement will be conducted.

Time schedule: March – May 2008.

5.4.5 Phase 5 Introduction of local menus on the school

Time schedule: June 2008.

5.4.6 Phase 6 Evaluation

- Evaluation of results of the demonstration project after 6 and 12 month;
- Discussion with stakeholders on lessons learned and possibilities for further enrolment.

5.5 Desired results

After the demonstration project:

- ➢ Children at the demonstration school are included in the GSFP project and become every day a locally grown meal;
- ➢ We are able to demonstrate the extra benefits of local menus;
- ➢ We increase insight into the effects of stimulating locally produced meals on agricultural production and related social effects;
- ➢ We are able to demonstrate that through involvement in the demonstration project local community in the North of Ghana can get more involved in the GSFP.

5.6 Role of TNO

TNO will be over-all project coordinator of this project. TNO will ask (a partner in Ghana) as local project manager. Both will stimulate the involvement of the intended partners.

TNO will ask the partners in Ghana to obtain information about availability of food products, its nutritional value (after preparation) and the highest nutritional needs for the children. TNO will discuss possibilities for defining menus throughout the season together with the partners.
TNO will inform the Dutch SIGN platform about the progress of the project and stimulate involvement of the platform.

5.7 Prerequisite

The impact of good nutrition on child health can only be enhanced by also supporting the use of healthy drinking water and sanitation facilities. Currently the availability of clean drinking water and sanitation is not always incorporated in the GSFP approach. With drinking water lacking, being of poor quality or proper sanitation missing the GSFP's efforts and the possible beneficial effects of good nutritious meals can get seriously undermined. This is a problem that especially causes problems in the North and therefore should be addressed in this demonstration project. We suggest to incorporate education on water quality and sanitation in the demonstration project as well.

We suggest the introduction of an educational program that:
- Teaches children how to check water quality from school of community wells.
- (cooperation with IWMI and Ghana Water Company, using water quality test kits). Result is not only an increased awareness among the population of the importance of water quality, but also improved insight in a possible cause of diseases.
- Stimulates the use and creates awareness of the importance of sanitary facilities (e.g. hand washing / latrines):
  - link with results from hand washing project Univ. of Development Studies & Unicef;
  - link with water quality test kit project (Ghana Water Company / IWMI).

Further possibilities that could be looked into:
- Equip kitchen with locally produced ovens that are less wood consuming;
- Provide school with a good storage facility.

A Appendix: Attending TNO team

Marijn Kuijper – researcher/ consultant

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Tel. +31 30 256 47 54

Study: Geohydrology
Expert in: Groundwatersystems, groundwater monitoring, groundwater modeling, Geographical Information Systems (GIS)
Experience developing countries: -

Erik Hoornstra - researcher/ consultant

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Study: Food Technology
Expert in: Microbiology, Preservation, Hygiene
Experience in developing countries: -

Sander Zwanikken - researcher/ consultant

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The Netherlands

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Study: post. Doc. Management of Safety Health and Environment (MoSHE)
Expert in: Occupational Safety, Environmental Policy, management systems, participative approaches.
Experience developing countries: holiday Kalimantan

Mathilde Miedema – program manager

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Study: Physiotherapy, Human Movement Sciences
Expertise: Reduction of heavy workload, Participatory Approach
Experience developing countries: Physiotherapist in Indonesia, holiday Cameroon, Tanzania, Kenya, India, Philippines, Ecuador.

B Appendix: Meetings in ACCRA

SNV Netherlands Development Organisation

Peter de Haan - Country Director

- GSFP: transparency could be improved.
- Concentrate on regions.
- Secretariat content control could be improved.
- Need for more focus in GSFP towards hunger spots (North).
- Food is bought on local markets, but a lot of imported (cheap) food is available.
- Diets should be developed based on availability of local food in district.
- Investment in linking schools to farmers is needed.
- NGO's would like to monitor the program, but they are not or too little involved (SNV's capacity: 20 districts out of 138).
- Districts are involved in work field, whereas regions have possibilities for up scaling; you should make deals with ministry of local government.

Ideas for GSFP and TNO

1. Vary menus according to regions and seasons: use the food that is produced in the regions.
2. Improve linkages between knowledge institutes and GSFP (demands of GSFP), SNV could coordinate building a network.

Royal Netherlands Embassy

Marius de Jong - First Secretary Health and Gender;
Three meetings: at the start of the visit, dinner and a wrap up meeting.

- GSFP: not included in long term plans of the embassy, next 4yr embassy provides 40 Million Euro in program to locally purchase food (local = within district, could be imported products).
- Technical assistance fund for 3yr: 150.000 Euro/year for support of management system, accountancy, monitoring, reporting, operational manual draft (audit by PWC), baseline study.
- Embassy produces terms of reference, National Secretary hires consultants.
- Relevant Ministries: education, health, agriculture, finance, women and children, local governments.
- District Implementation Committee: administration capacity (monitoring?).
- Cash transfer of GSFP to communities (schools in stead of families).
- GSFP external audit report will follow soon: important for further directions
- TNO can help to depoliticise GSFP.
- Program runs in Ghana, so TNO should primarily connect with partners in Ghana: ministries, GAIN, Universities, and Institutes: use local capacity!
- Focus not only on needs GSFP, but also on needs universities and institutes.
- Help institutes with acquisition to local industry (to get funding).
- Locally produced rice is an opportunity. GRIP Ghanaian Rice Project to improve local rice is ongoing, can be interesting.
- ICT/e-learning: Marius knows a contact at IICD (Tamale region).
- Stimulation of local agricultural production is main aim of the GSFP but, as the embassy has limited capacity, focus is on food security (food bought on local

markets). If TNO wants to focus on local agricultural production the embassy could contribute through its large network.

Ideas for GSFP and TNO

1. TNO's efforts should increase involvement of local (research) institutes, because a lot of knowledge is available in Ghana.
2. There is little private sector. Large distance between universities and industry. TNO can bridge this gap. Strength TNO lies in making theoretical knowledge applicable by involving the private sector during development.
3. Interaction with communities and local ownership are important.
4. Preference Marius:
   - Start up project in the North with cooperation with U.D.S. Tamale. This is a new university.
   - Emphasis on food, water, environment and health.
5. Food security: availability and accessibility (incl. $).
6. Children < 3 yrs are interesting target for health, but not part of GSFP.
7. Improve monitoring and management.
8. Improve transparency (by example Gerrit van Roekels (SNV) survey of news info).

GAIN

Ben Haagen

Question during diner meeting:

- Can TNO assist in developing/building a complete processing line for processing cassava?

Food & Drugs Board

Kwamina Van-Ess; Isabella Mansa Agra

- Government task: monitor food safety (mainly).
- At the moment no role in GSFP.
- Perform audits with respect to hygiene: many non-conformities with respect to hygiene.
- Recommend to train cooks and children (hygiene).
- FDB use hygiene code/GMP standard.
- Role in epidemiology: find the agent and the source.
- Food production at family level results in many waste material that may be used for other purposes in case of central collection.
- Growing/ideas: chocolate, maize, fruit juice.
- Willing to cooperate with TNO to share experiences with school meals, and training hygiene (simple brochures, posters).

Ideas for GSFP and TNO

1. Hygiene is not a topic for TNO.
2. Fruit juice is a possibility.

AFD Agence Francaise de Developpement

Caroline Piquet

- AFD is 100% part of the French government
- Not linked to GSFP
- Chairing sector group 'agriculture':
  - who is doing what
  - sharing information
  - core is governmental parties of Ghana
  - 2nd level: industry, NGO's
- Involved in GRIB/rice project: poor quality of rice due to parboiling method and sand/stones and probably also bad seed quality (variety)
- Water management around rice fields
- Post harvest losses great problem
- Large project funded by US-AID about fruit processing: mainly for export
- Tomatoes seem to be of poor quality, also in comparison to tomatoes from Burkino
- Numbers about production and yields etc may be available at FAO

Ideas for GSFP and TNO

1. Reducing post harvest losses: tomatoes
2. Suggests to cooperate with Food Research Institute

GTZ Deutsche Gesellschaft für Technische Zusammenarbeit

Lothar Diehl - didn't show up in the meeting.

- GTZ is more involved in horticulture, both export and local market in Ghana.
- Value chain approach for citrus and pineapple

GSFP National Secretary

Kwame Nuako – general manager,
Andrew Sam Kessie -office manager,
Nana Ayim -dir monitoring & evaluation,
Young Opare -monitor & evaluation

- Objectives of GSFP: education, malnutrition/health, local production/ agriculture;
- Water & sanitation is big issue: more boreholes needed ($). Can TNO develop cheaper boreholes than 15 million Cedis = $ 5000. Ghana Water Company performs water analysis on district level;
- Seasonality of food important. Shelf-life, preservation, fortification: research at FRI
- E-learning: responsibility of Min of Education
- ICT important for health monitoring

Ideas for GSFP and TNO:

1. Food preservation important: yam, tomatoes, pepper, plantain, onion, fruit.
2. Monitoring is a big task. Can TNO help with collecting data and building monitor systems for GSFP

3. TNO presented in a wrap up meeting the idea of small scale processing of pineapple juice. GSFP is enthusiastic. Juice can be given as a dessert in non-fruit seasons. Allowed cost of 1 sachet: GhC 0,06.

IFDC – Internat. soil Fertility and agricultural Development Centre

Marjatta Eilitta, program leader Agribusiness
Kofi Debrah, Chief of Party

- IFDC is an non profit organisation, funding by US AID a.o.
- Second department in the North: Victor Clottey.
- No link with GSFP. Marjatta shares the vision that schools can be an interesting market for the farmers but
    - Schools are a very small part of the whole market
    - Farmers should be organised in associations
    - Selection of attending schools should be poverty based
    - Projects:
        - From Thousands to Millions (1000s+) uses the Competitive Agricultural Systems and Enterprises (CASE) approach to improve productivity and incomes of farmers and link them to input and output markets. Funded by DGIS.
        - Regional Market Information Systems and Traders' Organizations in West Africa (MISTOWA) increases intra-regional trade through market information systems, advocacy, and capacity building of producer and trader organizations (Kofi Debrah). ICT organisation: Busylab and Tradenet; www.tradenet.bizz, 4000 registered farmers. Funded by US AID, AgriTerra.
- Stimulation of local farming. At the field level: maize, soy, beans.
- Storage of grain can be improved.
- Fruit preservation interesting: cooking, drying.
- Tools: Project done in Southers Brasil, development and implementation of tools to plant seeds. Contact Information: L.de Prado Wildner, Santa Catharina (EPAGRI), Brazil.

Ideas for GSFP and TNO

1. Tools: IFDC can form an excellent entrance to farmers and assisting with creating farmer associations.
2. Fruit preservation interesting: cooking, drying.
3. Storage of grain can be improved.

Food Research Institute

Paa-Nii Johnson

- Part of CSIR working on post harvest processing and nutrition.
- Matrix organisation of disciplines (e.g. microbiology) and specialists (e.g. rice); in total ~150 fte.
- Primary processes for rice, plantain, cassava, maize, soy to get flour. Also, mixing for fortification (Canadian project/funding?).
- Secondary process for fruit (drying, cooking).
- Solar drying as option.
- Vegetables to study: tomatoes, aubergines, (pepper), (ocra).

- Not systematically involved in projects.
- Consultancy in GRIB (rice) project by rice technologist (John Manful). Target: good quality rice (for any market), not a push for only school market (and poor quality).
- Dutch researcher Bela Teeken has visited FRI and worked on rice.
- Project with France (CGIAR?) about small scale processing of grains/cassava/plantain.
- Recipes for gari (cassava).
- Example of cooperation in Licence of Agreement demonstrated to TNO; costs paid for travel etc not hour fee.

Ideas for GSFP and TNO

1. FRI is ideal partner for TNO with respect to fruit processing and preservation.
2. FRI sees TNO as feedback / sparring partner to exchange ideas and cooperate on project basis.

Water Resources Commission (WRC)

Ben Ampomah - director (absent)
Dorcas Adwoa Paintsil - Water Quality Specialist

- WRC part of Min Water Resources. Responsible for regulation and management of the utilisation of water resources (no seas/ lagoons).
- Busy with grant water rights.
- No relation with GSFP.
- Price is 0,05 cedis (5 pesos) per 1000 litre (new price).
- Water factories make water sachets (purified): 4 pesos per sachet.
- Not many competitors in water.
- North: problem with fluoride.
- Sometimes; red boreholes – iron magnodised.
- Biggest challenge: educate people how to manage fresh water.
- more information in brochures about WRC is available at TNO.

Water Research Institute (WRI)

Winston Andah - Irrigation & Water resource Engineer
Yaw Opoku Ankomah – Principal

- Part of CSIR – Council for Scientific and Industrial Research.
- Governmental, 1 of the 13th scientific Institutes.
- 500 experts, mainly Accra and Tamale. Topics: Water Quality, Geosciences, Chemistry, Biology, Environment, Health. Drilling crew not any more.
- WRI: Consultancy accessibility to groundwater, quality and quantity. 30% of turnover is contract research (brewery, waste water mt).
- National water database: started 4 years ago. Maps available for free if we are an interesting partner to cooperate (not all districts in detail).
- Current problems:
  - North: high Fluoride level.
  - West: pollution mining.
  - Lake Volta: Domestic Pollution.
  - Flooding – hugh rains, rivers high.
- Working strategy: after data processing WRI send report (with problems) to Water resource Commission.

- Collaboration with TU Delft: Prof Nick van Tigesen (Water Resource Management).
- Do TNO have techniques for cheaper boreholes?
- Action TNO: sending Winston Andah our overview of literature concerning Fluoride detection, interesting party for data and maps (figuring out the quality of those data).

Ideas for GSFP and TNO:

1. Techniques for cheaper boreholes;
2. Water Shed management: maps and data available (not all districts in detail);
3. Reducing Fluoride in drinking water in the North.

Community Water and Sanitation (CWSA)

Benedict Kubabom - Director of Planning and Investments
Ms Theodora - Sanitation
Mr Emanuel Gaze

- Extended power point presentation – very informative.
- Key elements: demand responsiveness approach: communities decide to participate and select their preferred service level based on ability to pay.
- Community Ownership and Management (COM): 5% paying, rest government.
- Community with 75 people: Hand pump (€10.000); 200 people: Solar pump; 3000 people: mechanised standpipes (€ 25.000).
- Data collecting by CSIR and Ghana Water Company.
- Current problems:
  - High Fluoride and Arsenic level: no solution.
  - High Iron Magnetize : Iron remover plants.
  - Macro biological pollution surface water.
- Definition of accessibility of drinking water: source < 500 m whole year around, and good quality.
- Output Source: 20 litre water per person per day.
- There is a pilot with biogas and latrines.
- Extensive hygiene program for sanitation in schools, hand washing campaign, change of behaviour: award.

Ideas for GSFP and TNO:

1. Reducing Fluoride and Arsenic in drinking water. Action TNO: sending report on techniques to determine and reduce Fluoride and Arsenic.
2. Development of more cost effective latrine.
3. CWSA interesting partner for TNO: practical information and programs, implementation.

International Water Research Institute (IWMI)

Dr. Liqa Raschid Sally - Head West-Afrika office;
Dr. Pay Drechsel - Theme Leader "Agriculture, Water and Cities";
Dr. Boubacar Barry - Glowa-Project Coordinator;
Dr. Regassa Namara - Economist: institutional economics of groundwater development.

- Non-profit research and development organization.

- Provides practical solutions to water management problems through the application of state of the art management tools.
- Working area not only in Ghana but international: Nile, the Limpopo, and the Volta Basin.
- Cooperation with institutes like WRC, WRI.
- Key themes:
  - Basin Water Management.
  - Land, Water and Livelihood.
  - Agriculture, Water and Cities.
  - Water Management and Environment.
- Not all developed knowledge / methods are put into practice, as there is a lack of companies/industries willing to invest, e.g.:
  - Indicators of pollution/diseases,
  - Potassium-chloride tables for cleaning drinking water.
- Bore-holes: 1 of 8 times they find water. Boring depth: 55 meter. Main problem: fractured rocks. Detection methods are available. The bore-hole business depends on money from NGO's and government. Sustainability can be improved.
- According to IWMI are all relevant maps and data available.
- Recommendations for further information:
  - *Water Resources Commission* (WRC): James Raciot (Canadian) Organization dealing with groundwater (maps and data), groundwater assessment, pumping wells. Report available: "dealing with groundwater in the Northern Region". Reports to Min. of water resources, works and housing mr. Minta (Chief Director)
  - *Water Research Institute* (WRI): Mr. Dapaah Director groundwater unit Groundwater specialist, water quality, GIS, groundwater resources, well yields, Glowa Volta shallow groundwater for irrigation in the Upper East region.

Idea for GSFP and TNO

School gardens: clubs for schoolchildren teaching them how to monitor water quality (portable water test kits). Emphasis on: involvement, ownership, sustainability, consciousness raising among the pupils' families and creating awareness.
Example in Kumasi:
http://www.gg.rhul.ac.uk/kumasi/dissemination/dissemination.html
http://www.gg.rhul.ac.uk/kumasi/Project_Related_Papers/Cedar_IRNR/Paper_2/paper_2.html

AquaVitens Rand / Ghana Water Company (GWC)

Anne de Groot - Managing Director;
Theo Smit - General Manager Distribution;
Erik Kwofie - Groundwater Resource Manager;

- Private company; Employees: 4 Vitens, 7 Rand Water.
- Urban water supply throughout Ghana: 40 groundwater boreholes + 38 surface water systems and 376.000 taps in urban areas, for 6-8 miljon people.
- Aqua Vitens Rand: Management contract with GWC comprising all activities from borehole to billing and collection.
- Price water supply: 47 pesewa/ m3.
- Management structure and backgroundinformation: www.waterforghana.org.

- Customers Vitens Netherlands: donations to Water for life for improvement of water and sanitation.
- Challenges / problems encountered:
  - Well design (better drilling techniques needed, current method: straight flush).
  - Management (no maps available on groundwater availability, pressure and yield).
  - Geological info (maps) are available.
  - Yield reduction caused by borehole clogging (Fe & Mn) >> capacity (5-10 m^3/hour) can be doubled by mechanical and chemical refurbishment.
  - Over extraction.
  - Availablitiy of surface water (not managed by government: in dry season much of the surface water is used for irrigation >> conflict with urban drinking water supply).
  - Water quality (Fluoride in Upper East & Upper West regions, Arsenic in mining areas).
  - NGO Water for Life: funded by consumers of Vitens: 1 project in Upper East, combination of boreholes, pipelines and bucketpoints. Goal is to increase avalaibality of good quality of drinking water: info at: **http://www.waterforlife.nl/Water+for+Life/**)

Coniwas

Mr. Patrick Apoya - Excutive Secretary & staff

- National Secretariat for Coalition of NGOs in Water And Sanitation.
- Network of 60-80 cooperating NGO's in water and sanitation: http://coniwas.org.
- Focus: equity, human rights, water governance on several levels.
- Monitoring impact on society.
- Challenges for Coniwas: capacity building, staff rotation and continuity (talented staff members leaving to other, bigger NGO's), management, communication, funding of staff of Coniwas).
- Ghana education coalition: info about monitoring, impact, gaps in program (located opposite RAVI in Airport Res. Area Accra).
- GSFP should be more sustainable: make it community improved in stead of school improved.
- GSFP: water should be part of the concerns of GSFP, because: if there is no water or too far away: children will not go to school.

Ideas for GSFP and TNO:

1. Skills: "green villages" education of school children about health and nutrition.
2. Hygiene promotion (children have food, but get sick because of the lack of sanitation and hygiene).

C Appendix: Meetings in Upper East region

Bolga Polytechnic & Gratis Foundation Bolga

Mr. Magti Dubick.. Director Gratis Foundation Bolgatanga
Prof. Paul Bomber Tanzubil Principal Polytechnic Bolgatanga Gratis Foundation
(**www.gratis-ghana.com**)

- NGO.
- Supported by EU, Cida, Ghana Government.
- Training technical apprentices:
  - Beekeeping.
  - Weaving.
  - Batic dye.
  - Soap making.
  - Production and use of agro-processing equipment e.g. mills, shea nut extraction equipment, ploughs, water pumps.
  - Complete workshop: providing education, skill development, empowerment.
- Market demands and production targets: funding needed for allowance of apprentices and replacement of equipment.

Bolga Polytechnics

- Education centre; 10 regional institutions.
- Practically orientated training: focus on science and technology.
- Upgrading to level of Bachelor of Technology (B.Tech.)
- Competence baseline: cooperation with Nuffic.
- Specialist training for local artisans / business men (e.g. communication training).
- Community services.
- Courses based on importance / relevance for the region >> innovation and imporovement.
- Industrial attachment: internships of students at private companies Committee: affiliate with industries and show relevance and benefits of cooperation.
- Challenges / Needs:
  - Funding for research capacity (both facilities and knowledge e.g. how to modernise equipment).
  - Finding of "learning on the job places" for students.
  - Post harvest problems: micro toxins.

Ideas for cooperation with TNO:

1. Technical expertise: share knowledge and ideas
2. Linkages: group activities / enhance collaboration with industries. They have farmer students which could contribute into a joined project.

Ministry Of Food and Agriculture (MOFA)

Ms. Charity

- Short conversation about the work area of Ms. Charity:
  - Small Reservoir Project: dams and irrigation, boreholes for drinking water and sanitation Project has ended. Should be taken over by districts, but this is not working so well.
  - Monitoring and evaluation.

Organisation for Dam construction and Irrigation

Staff of IDA

- Core business: dam construction and design.
- Sand dams block part of the overland flow and create a lake in a natural low lying area. Water is meant for dry season farming (irrigation).
- Design based on long term meteorological data, elevation data of the area and estimate of the amount of water needed for irrigation and field visits.
- Location based on elevation data and in close dialogue with the community (social aspects, like land ownership are of high importance).
- Not all dams are used for irrigation purposes, sometimes people are not interested in dry season farming and use the water for domestic purposes only (washing, drinking water for animals). The intended use in not known during the design period (people will not tell); as a result dams are sometimes over dimensioned.
- This year a large dam broke. This caused flooding of the downstream area. Houses are severely damaged and no irrigation water will be available during the next dry season.
- Maintenance of dam is not done by farmers. They should learn how to maintain and repair smaller incidents.
- A dam has a lifetime ranging from 20 to 40 years. No statistics about this.
- No data about maintenance costs available.

School supported by the GSFP

School director and Madame in charge of the kitchen supplier

- GSFP implemented 3 months before the current holidays.
- Effect of GSFP so far: increased enrolment from 482 children last year to 519 this year.
- Primary school: 6 grades. primary 1 to primary 6 Age of children varies from 3, GSFP incl. kinder garten, to 17 (or older?) depending on the age of first attendance.
- Per class / teacher: 60-80 children.
- 4 cooks work in the kitchen.
- Supplier assigned by the district assembly charged with purchasing of food. Pays three weeks in advanced before being refunded by the local government. Budget: Gh. cedi 0,3 per child per day.
- Supplierbuys food at the local market: vegetables, rice, beans, fish (not necessarily local produced food)
- Menu copied from school in the vicinity: Monday: plain rice/fish/sauce, Tuesday: plain rice, meat, palave sauce, Wednesday: bean stew, ...
- Water available from borehole. Every day the four cooks each walk 10 – 15 times up and down to the borehole to fetch the amount water needed for cooking and drinking.
- Cooks have not been paid yet.

University of development Studies; Biological Science Research

Guy Adorradaga (ajigedeuro@yahoo.com)

- University of Development Studies: Faculty of applied science
- Brainstorm discussion about:

  - effects of agrochemicals on quality of groundwater and surface water,
  - protection of natural resources and monitoring of water quality,
  - Ghana waste management.
- Monitoring of groundwater quality: water quality is measured and analysed when a new borehole has been drilled. Monitoring does not take place during use of the well. Measurements are too expensive and no money is available for a new well in case the existing well appears to be polluted. Still monitoring can be valuable: causes of diseased can be earlier detected; measures can be taken for groundwater protection, e.g. locating a (public) toilet downstream of the well.
- Faculty also does research/inventory in medical herbs. Validation of findings is hard.
- Students do innovative projects on food innovations. They have results but they don't commercialise these results. That's the end of the project.

Community of Mirigu

Farming tools and well digging

Community grows a large variety of crops: rice, millet, vegetables, beans, tomatoes, peppers. Problems encountered:

- Lack of (manual) labour on large farms,
- Lack of fertilizers and pesticides.
- This year low yields due to very dry period followed by excessive rain.he community introduced their field work: well-digging, ploughing and shuffling.

They demonstrate three tools: axe, hoe and pick axe Well digging: well is around 1,5 meter in diameter and 10 meter deep. Digging takes about 7 days, and after the dry season they put the sand back in, to prevent te well from being demolished by the rain. So they have to dig each well after every wet season.

- Ploughing is done by hand. See photos. The measure of the strokes between the seeds depends of the measure of the tools. See photos.
- Farmers complain about back problems. First they laugh about suggested adjustments to their tools, but they seem to be willing to improve tools if it helps them to work easier.
- Every tool seems to be used for several purposes.
- In this village Wiljo has an enthusiastic and energetic English speaking contact person mr. Roland Ayadina, could be used in the contacts.
- Price of the hand plough is about 1,5 new Gh.Cedis. They buy it in Bolgatanga at the local shop. There is no manufacturer in Bolgatanga of these tools.

Project Calabash: Tap water

A borehole has been drilled in the village for providing tap water:

- Depth: 65 m below the ground surface.
- Groundwater level measured: 18 m below the ground surface.
- Pumping test: maximum yield 375 l/min. During the pumping test the groundwater level lowered to 23 m below the ground surface (drawdown of 5 meters) and was restored within 15 minutes after the pumping stopped.
- Estimated costs of the borehole: EUR 900 (siting) + EUR 6000 (drilling) + EUR 750 (25 yr lifespan pump). Energy for the pump is now provided by 25 solar panels each providing 100 watts (EUR 425, each).
- Siting is done by company called Foramat (http://foramat.com); average success rate: 50%.

- Water from the borehole is pumped into six water towers (polytanks on top of concrete construction). By using a switch the community controls the transport of water to the different towers. When a water tower is full the polytank will overflow.
- From the towers water is transported to a tap system for use of the water.
- Both water tower, subsurface piping and the tap systems were constructed by the community.

TAWODEP: Talensi Area Women Development Project

Doris Asharidid

Aim: generate income for women.
Activities: Shea butter extraction, Shea nut picking, Farming, Goats and guinea fouls, Pettt trading groups, Oven builders, Malt makers, Dawadawa makers, Soap and pomade makers, Sun dried fruit makers.
Approach: groups of women become a Micro Credit to invest in one of the activities: seed, equipment etc. The group pays back with 20 percent interest (comparison: 28% is normal) and saves the profits. 652 women in 60 groups are involved now. TAWODEP trains the women in these new activities (capacity building). Calabash co-funds this program.

Shea nut butter: all activities are done by hand.
There is mechanical equipment on the market (GRATIS!) but it seems to us these women have two problems: no fuel or electricity and no money to buy this equipment.

Ideas for GSFP and TNO

1. To encourage the GSFP in using improved ovens like they build at TAWODEP (cooperation between GSFP and TAWODEP in the Upper East?)
2. To combine the GSFP and products of TAWODEP: increase local markets for products of these women.
3. To improve equipment for the women: by example a hand driven shea nut butter maker. Combine this with a micro-credit system.

District Chief Executive of Kassena-Nankana district

07 September 2007
HON. Emanuel A. Ghegewah

The DCE is by now mainly concerned with the recent flood in the Upper East Region. A major dam is broken en several people are homeless because of the fact that their houses are demolished. He tries to find extra funds for acute help like tents, food etc.

- Four school within the district participate in the GSFP.
- School within the GSFP see a rise in enrolment and attendance, children also come from other schools to register with schools who are providing GSFP.
- Hygiene: for treatment of drinking water from wells and boreholes chlorine tables have been purchased by the district. There are not enough tablets for all wells.
- In this wet period groundwater levels are high. Almost all boreholes are drilled successfully, but the change of having a dry bore hole in the dry season is there. In the dry season many wells may dry up.

- Household irrigation schemes: the district has optimistic plans for irrigation for dry season farming: one borehole for every household (about 2 ha of arable land), will make harvesting in the dry season possible. Now between the 6 and 30 boreholes per year are being supported by the district.
- The district sponsors teachers for the schools. Teachers are attached to the school for a period of three years. Constraint is accommodation for the teachers. Now one teacher per 80 students. Ideally it would be one teacher per 35 students.
- Tree planting is stimulated to battle dessert encroachment. Idea: tree planting competition at schools: award school with best results.

Water Resources Commission

Mr. Aaron Bundi Aduna - WVB Officer

The water resources commission is concerned with water quality and quantity.

- Focus on measures to minimize the impact of agricultural, domestic and recreational use of water.
- Cooperation with the White Volta Basin Board (comprising district assembly rep., environmental protection agencies, traditional authorities, director women's department, research institutes, MOFA).
- Cooperation with NGO's who carry out the field work..
- Cooperation with WRI (data)
- Community involvement and ownership form a crucial part of the WRC integrated approach.
- Pilot: river bank protection (PAGEY project), collection and sharing of data, groundwater protection on a community level.
- Challenges for WRC:
  - Get people to appreciate the protection of water resources
  - Deal with institutional mandates: e.g. protection of water quality from boreholes
  - WRC understaffed: more people needed to expand the program.
- Useful contacts at WRC Accra head office:
  - Surface water specialist: Isaac Asamoah (long term flow regimes)
  - Groundwater specialists: Enoch Asare and Adjoa Painstil (boreholes, drawdown, gw quality samples)

University of development Studies

Mr. Joseph Awuni; Agro-Economics
Mr. Abdul Razak ; Health and nutrition

- U.D.S. focuses on applied science for NGO's / organizations like Unicef and WFP. Example: evaluation of hand washing project at schools with Unicef.
- Questions for GSFP:
  - Nutritional value (energy) of school food;
  - Does a shift in meals take place, from home (breakfast) to school (lunch)?
  - Amount and safety of the food.
- Impact of monitoring health and safety is only established when it concerns the GSFP objectives (involve the GSFP secretariat and government)

Idea for GSFP and TNO:

1. Pilot project: create a menu for 2500 GHC / child / day

Composed of local produces products
With sufficient nutritional value
Involve the current GSFP: monitoring on two schools:

- one school that is already part of the GSFP, where food is bought at the local markets;
- one school which is about to be involved in the GSFP where meals from the 'new' menu will be served: only locally produced food.

GRATIS Foundation workplace in Bolgatanga

Mr. Magti Dubick and Mr. Michael Ayubire

- GRATIS produces equipment on demand, most work is from NGO's (for example production of rope pumps, or mills).
- They train people how to use equipment and produce.
- After training period trainees are encouraged to start own business. GRATIS funds these entrepreneurs by giving start equipment.
- There is lack op tools and equipment. Available equipment is old en needs to be renewed.

Ideas for GSFP and TNO:

1. GRATIS would like to have an R&D unit within the centre. TNO could contribute to this.
2. Capacity building of GRATIS staff; (rural activities, ICT knowledge, design knowledge).
3. Lack of (hand) tools.
4. Working safety programme: to prevent accident free working environment.

D Appendix: Meetings in the West (Takoradi)

SNV

Pedro Arens and Eric

- SNV focuses mainly on responsive and accountable local government and Market access for the poor. Busy with legislation on land ownership, Value Chain management (VCA) and tourism.
- Focus on Value Chain Approach (VCA).
  - Stakeholders: farmers, processors, workers on farms, suppliers, consumers, market queens.
  - Product mapping, flowchart with linkages between stakeholders.
  - Aim: all actors think in same chain.
  - VCA done with pineapples, honey, shear, mango's, cassava, corn, allan blanchia (tree seeds – oil).
  - German Development Services (GDS) has done VCA on citrus and spices.
- SNV involved in GSFP; stimulation some districts.
- In Ghana lack of money and lack of entrepreneurship and leadership.

Idea for GSFP and TNO:

1. TNO can play a role in linking private sector to knowledge institutes, to accelerate projects and to make it work. Pilots as star cases.

GRATIS Foundation Takoradi

- Ghana Research Applied Technology (GRATIS).
- Develop technology, produces and sells small scale post harvest processing equipment + training how to use.
- Mostly modifications with farmers on existing equipment.
- This office (16 FTE) mainly for palm nut oil and cassava.
- For tomatoes also a 'smasher' € 700, capacity 200kg/ hour.
- Head office / R&D centre in Tema.
- Sometimes a community buys the equipment. Financed by farmer association, ministry of agriculture or rural bank or NGO.
- ROI palm nut digester/expeller is ~2 yr.
- USP: good quality, delivery in time, affordable price, after sales services, netwotk.
- Deliver on order, no innovation.
- Potential to grow etc, but not used to do it that way: survival strategy.
- No knowledge about ergonomics, hand tools.

Idea for GSFP and TNO:

1. TNO: involvement in project to fabricate equipment when needed.

Berea Social Foundation

Benjamin Epton – director.
Mercy Enchill Duodo - assistant project officer and 2 collegues

- Small NGO working on:
  - food: fund raising for children, campaigns 'eat healthy and not filly';
  - farmer level: organising farmer associations;
- Post harvest losses part of the scope. MD2 pineapple project no success (did not grow well).
- Palm oil and cassava (gari) current (?) projects.
- Partnership with Dutch NGO: ISCOM (funding milling machine for cassava). The farmers association owns the equipment and farmers can rent this. With the oney the finance maintenance, spare parts, etc.

Idea for GSFP and TNO

1. They explain their problems with plantain: harvesting green, after 2 days ripe, after 5 days rotten. How to preserve it? Cooking? Making super balls?
2. Berea asked for new fancy tools for farmers/ Aim: to retain youth in rural areas and interest them for farming. Tools must be comfortable/ healthy and increase productivity. Searching for tools to take roots out of the ground, catching fruit from the trees (like plantain, oranges).
3. TNO presented the idea of small scale processing of pineapple juice. They told us about a small scale producer in Winneba. Idea has to be checked on technical, social and market features. Cooperation with Food Research Institute.

Cape Coast University – School of Agriculture

Dr Sam Aqua - head of engineering agriculture
Robert Ernest,
Oscar Joosten,
Ernest Albano,
Paa-Kobina Turkson,
students (Rebecca+Rebecca)
Dean

- Rebecca 1, 2 + Eric students paid by Aqua Farms: broad interest.
- 5 dept: crop science, engineering (irrigation, processing), economics, soil science.
- 35 lecturers.
- Biogas installations developed.
- Mango drying: no big success (how did they try it?: solar/oven).
- Gari: reduce cost of processing, high quality.
- Mixing wheat with other starches/flour: for good texture and taste.
- Water: rainwater harvesting, house hold watersupply.
- Drinking water Cape Coast: iron/magnesium, groundwater is salted. Memstill?

Idea for GSFP and TNO:

1. Having contact about ideas: post harvest losses, memstill, Biogas.

Aqua Farms

Raja Najjar – CEO

- Strong in fish feed and tilapia. Part of Fina Trade Group.
- Trends: use of soy instead of animal products as fish feed: cheaper. Soy from Ghana.
- Experiencing new farming products. Visit to farm: tilapia, poultry; ostriches; goats, rabbits, quail.

- Maize interesting to develop (project with US Aid).
- Chicken / eggs interesting market, trend to organic.
- Seed + fertilizers for soy, maize also interesting.
- Wants to start with biogas.
- No export needed. Ghana market is sufficient. Selling direct to market queens.
- Not yet a role in GSFP: orientating.
- Why not much private sector in Ghana: it takes 3 generations to settle good private sector.

Apeteshi producer (gin-distillery)

- family level, many families in this area produce it.
- process: press fluid from sugar loaf, fermentation in containers 2-4 weeks, distillation (twice), filling in jerry-cans.
- production 21 gallons a day (1 gallon = 4,5 liter = € 0,50) = € 10,- a day.
- 7 people at work in 1 factory.
- sometimes fermentation is not good, maybe due to low sugar content.
- option for improvement: measure sugar content (Brix), increase fermentation by adding product at the start.

Pineapple farmer association at Atabandzi
Frank Baah – chair

- aim association: problems with marketing: organised selling, gaining position.
- in nov/dec (wet season) prices go down.
- post harvest damage also due to mishandling and storing in sun.
- now circa 7000 fruits per acre.
- SPEG (Sea Fright Pineapple Export Ghana) wants new farming: 20.000 fruits per acre (different spacing, organic). Now starting MOAP: marketing organisation Agricultural Program also with SNV. Design: land in 4 parts; differing in planting in lines, pecticides y/n, wheating, ridges, plastic (prevents wheating)
- Processing NOT by farmers: juicing, syruping.
- 3 pineapples – 1,5 litres of juice.
- Waste material – sell to pig farmers or composting half a year.

Gari producer

- family level, many families in this area produce it.
- process: peeling cassava, grinding/grating (Gratis), pressing (Gratis), sieving, frying/drying.

Palm oil at Frami

- family level, many families in this area produce it.
- tree is fruiting after 3 years – in bunges.
- oil is in kernel of fruits.
- process: sheaving, cooking, digesting (Gratis), expeller (Gratis).
- oil conserved for 5-6 month.
- use for soap, frying and stew/sauce.
- coconut oil is more expensive.

- option for improvement: shorten standing times between process steps (currently a few days; needed for softening?)

Toolmarket (Kokompe)

Dig; Cost 3,5 GhC, from China, brand Rabbit
Blade from China 5 GhC.
Blade from Ghana 2 Gh, hooked 90 degrees.
Cuttler, 3 GhC.
TNO: fruit processing seems to be most needed and challenging.
Pineapple juice may be a good starcase!

E Appendix: List of organisations with contact data

Organisation	Contact person	Function	Telephone number	e-mail
AFD - Agence Francaise de Developpement	Caroline Piquet	Project Officer	0233 21 77 87 55	piquetc@groupe-afd.org
AgroEco	Kees van Veluw		0031 318 42 04 05	k.vanveluw@agroeco.nl
Aqua Vitens Rand Ltd.	Anne de Groot	Managing Director	Tel. 0233 21 77 40 11 ext. 123	Anne.degroot@ghanawater.info
Aqua Farms Industries Ltd	Raja Najjar	CEO	0233 21 28 62 14	ran@finatradegroup.com
Bebo Bakery	Herman Assen	Manager	0031 6 49 68 43 35	hermanassen@wanadoo.nl
Berea Social Foundation	Benjamin Epton	Director	0233 244 59 47 83	eptonben@yahoo.com
Bolgatanga Polytechnics	Paul Bomber Tanzubil	Principal		
Cape Coast University – School of Agriculture	Robert Ernest Paa-Kobina Turkson	Professor Dean	 0233 42 327 09	 kobbiecc@yahoo.com
Coniwas	Patrick Apoya	Executive secretary	0233 24 447 27 84	patrickapoya@yahoo.com
Community Water and Sanitation (CWSA)	Benedict Kubabom	Director of planning & investments	0233 20 815 91 31	
Danida	Ole Jensen		0233 24 431 15 23	okj@pem.dk
Food & Drugs Board	Kwamina Van-Ess Isabella Mansa Agra	Deputy CEO Food division Head, Food safety & nutrition dept.	0233 24 465 31 67 0233 24 433 72 49	fdb@ghana.com
Food Research Institute (FRI)	Paa-Nii Johnson	Deputy Director	0233 21 77 99 09	paaniijohnson@yahoo.com

Organisation	Contact person	Function	Telephone number	e-mail
GAIN	Essel Ben Hagan	Chairman	0233 24 360 61 04	ebenhagan@gmail.com
Ghana Millennium Project UNDP	Frank McAvor	National Project Coordinator	0233 21 22 85 29	Frank.mcavor@unmillenniumproject.org
GRATIS Foundation Takoradi				
GRATIS Foundation workplace in Bolgatango	Seth Achamfour-Yeboah	Managing Director		s.ayeboah@yahoo.co.uk
GSFP National Secretary	Kwame Tuffuor Kwame Nuako	Executive Chairman Director of Finance & Administration	0233 24 433 18 71 0233 614 36 96	dratuffuor@yahoo.com kwamenuako@yahoo.com
GTZ – Deutsche Gesellschaft für Technische Zusammenarbeit	Lothar Diehl		0233 24 431 29 67	Lothar.diehl@gtz.de
IFDC – Internat. Soil Fertility and agricultural Development Centre	Marjatta Eilitta	Program Leader Agro Business	0233 21 78 08 30	meilitta@ifdc.org
International Water Research Institute (IWMI)	Pay Drechsel	Head West-Afrika office	0233 21 78 47 53/4	p.drechsel@cgiar.org
Institute for Industrial Research	Essel Ben Hagan	Director	0233 21 50 01 93/5	ebenhagan@gmail.com
Irrigation Developement Authority (IDA) Bolgatanga				
KALABASH Ghana	Wiljo Fleurkens	CEO	0233-24 36 24 83	~~Unitedcultures_ghana@yahoo.com~~ kalabashghana@yahoo.com
Kassena-Nankana district	HON. Emanuel A. Ghegewah	District Chief Executive		
Kumasi University – Biological Science Research	Melvin Guy	Professor		
Kumasi University – Water management	Steve Amischa	Professor		
Ministry Of Food and Agriculture (MOFA)	Ms. Charity			

Organisation	Contact person	Function	Telephone number	e-mail
Ministry of Local Government, Rural Development and Environment	Mrs Levina Owusu		0233 20 815 48 91	levinaowusu@yahoo.co.uk
Pompen is Leven	Gerrit van Roekel	Secretary	0031 318 43 18 25	gvr@kpnplanet.nl
Royal Netherlands Embassy	Marius de Jong	First Secretary health and Gender	0233 21 21 43 61	Marius-de.jong@minbuza.nl
SNV Netherlands Development Organisation	Peter de Haan Pedro Arens Rinus van Klinken	Manager Accra Manager Takoradi Manager Tamale	0233 21 77 61 98 0233 24 411 45 24	Pdehaan@snvworld.org Parens@snvworld.org Rvanklinken@snvworld.org
TAWODEP: Talensi Area Women Development Project	Doris Asharidid			
TNO	Mathilde Miedema	Program manager	0031 23 554 99 35	Mathilde.miedema@tno.nl
University of Development Studies Tamale	Guy Adonadaga Mr. Joseph Awuni Mr. Abdul Razak	Biological Science Research Agro-Economic Health and nutrition		ajigedeuro@yahoo.com
Water Research Institute (WRI)	Winston Andah	Hydrologist	0233 21 77 53 51	weiandah@africaonline.com.gh
Water Resources Commission (WRC)	Mr. Aaron Bundi Aduna	WVB Officer	0233 07 202 39 31	aaronaduna@yahoo.com