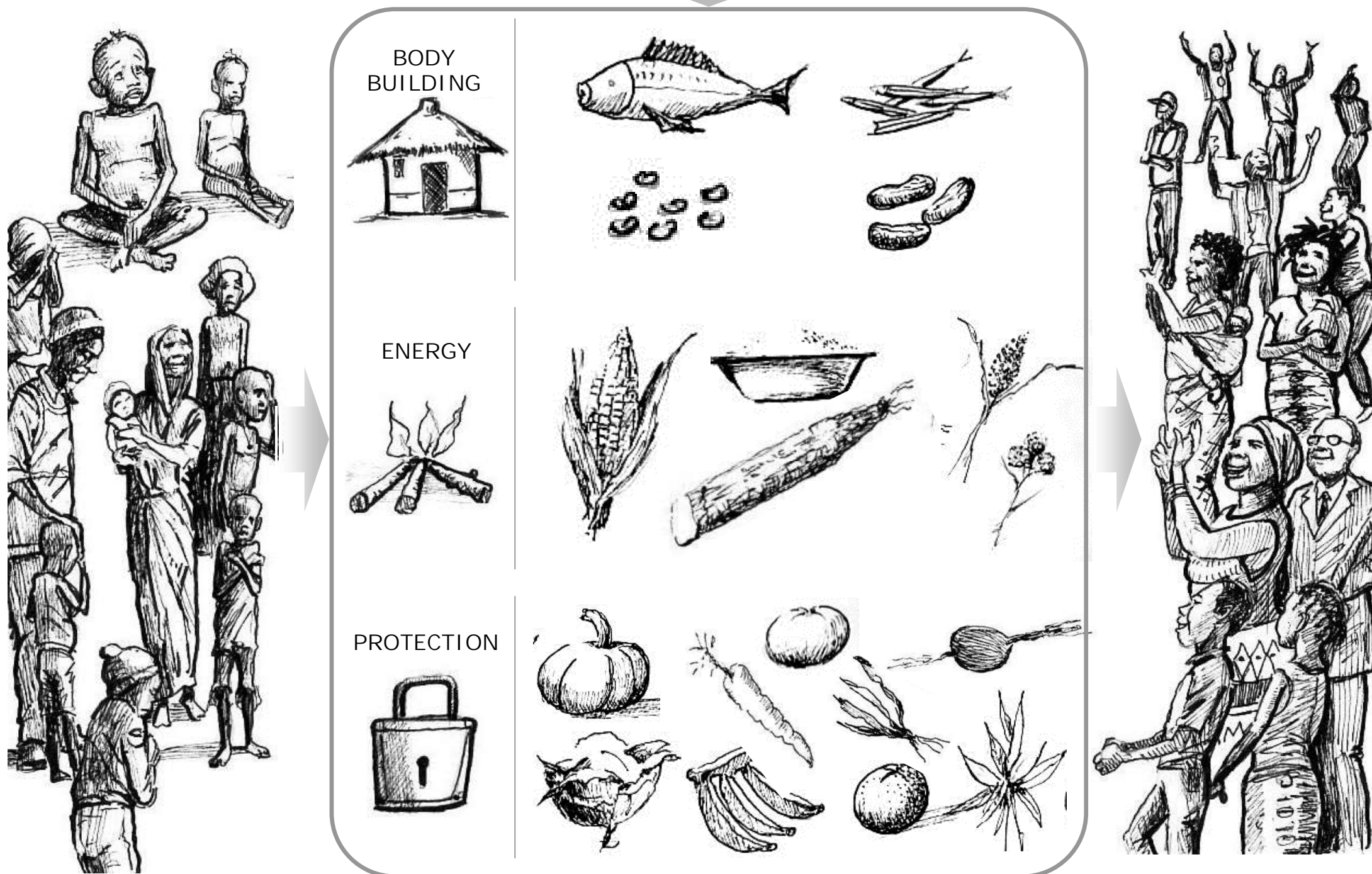
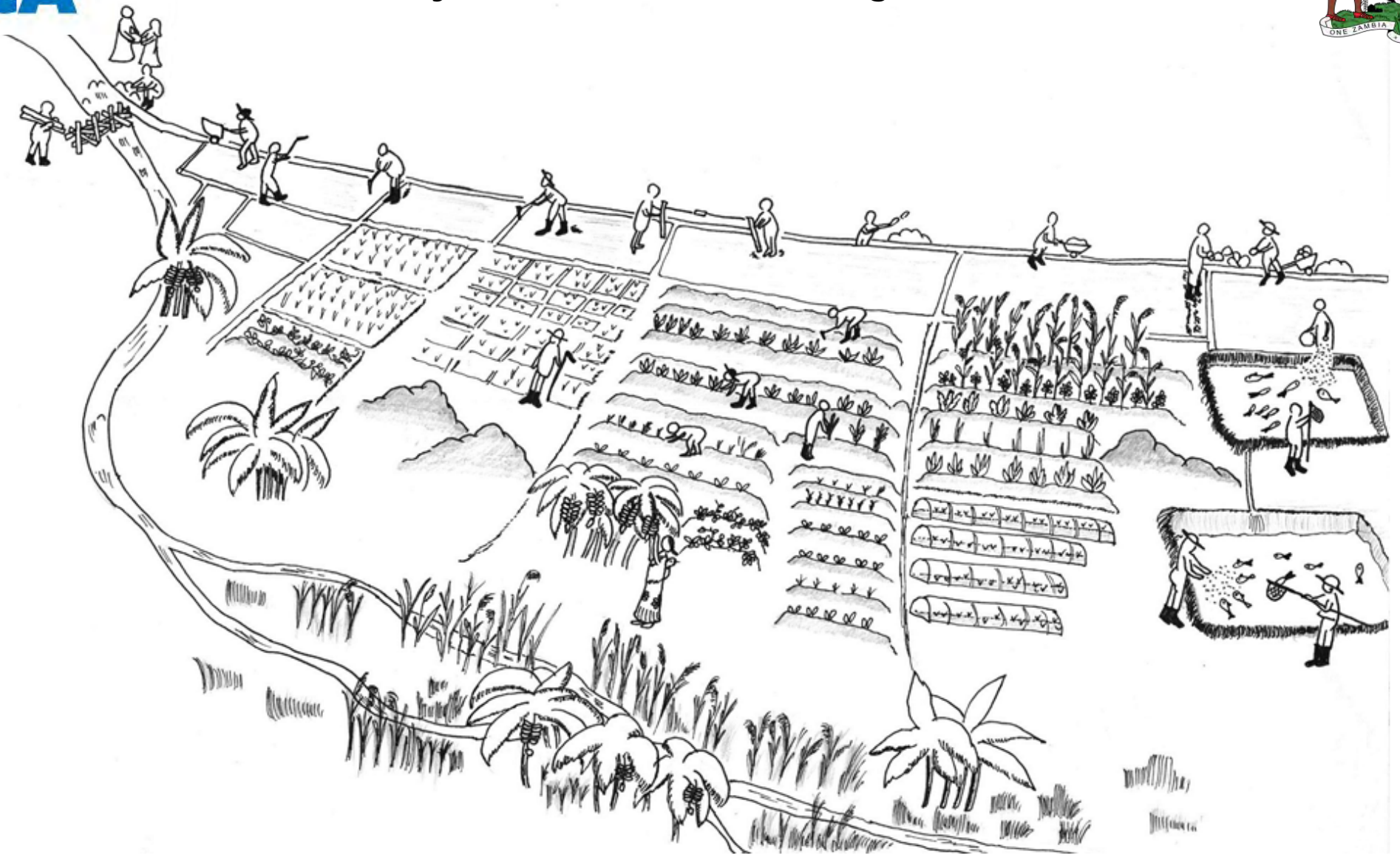


# Healthy Life with Smallholder Irrigation

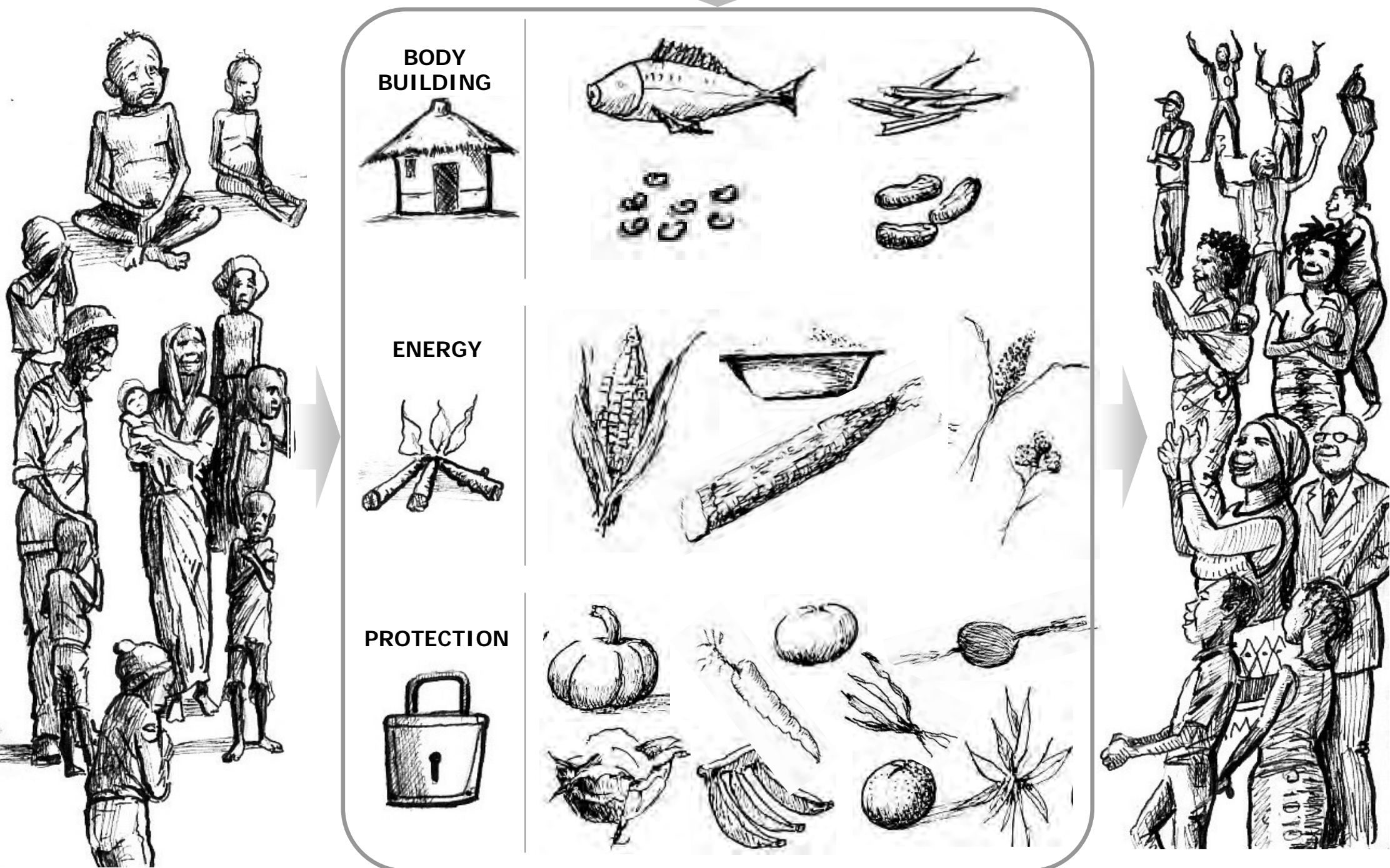
All the necessary nutrition can be produced by yourself





# Healthy Life with Smallholder Irrigation

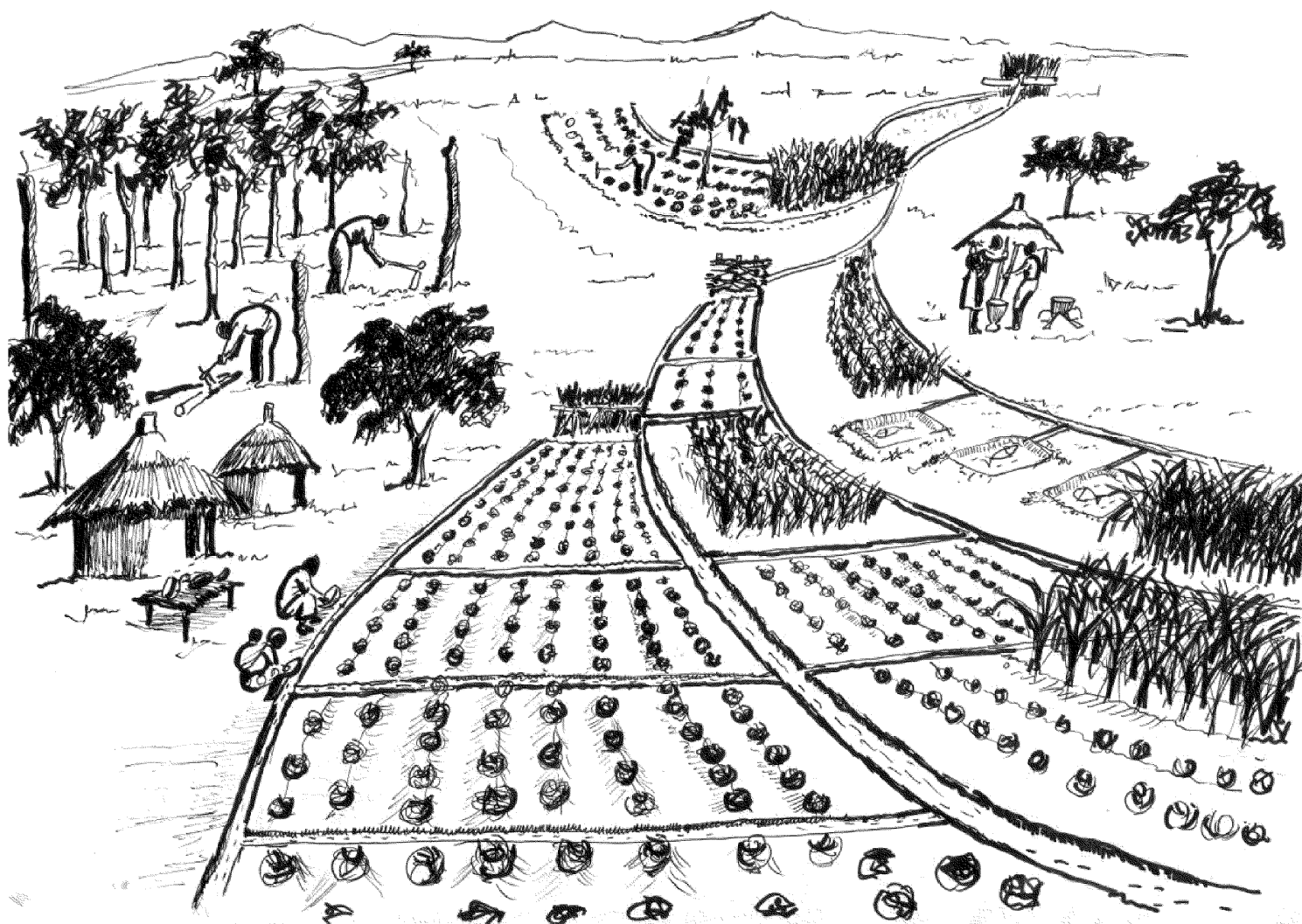
All the necessary nutrition can be produced by yourself



**JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)  
MINISTRY OF AGRICULTURE (MOA), REPUBLIC OF ZAMBIA**

# **STARTING IRRIGATION IN OUR LOCAL CONTEXT:**

**Rather than waiting for someone else's support,  
why don't we try something we can do first?**



**April 2016**

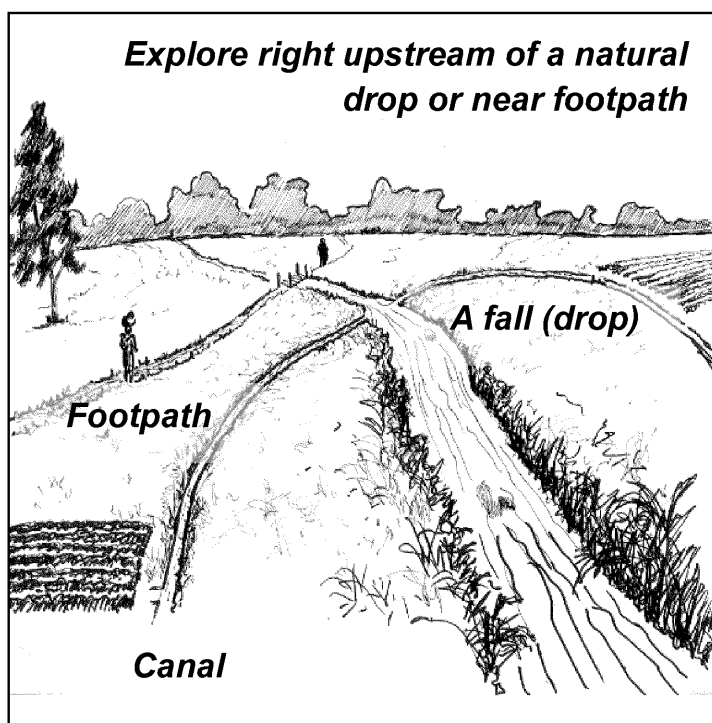
**SANYU CONSULTANTS INC., TOKYO, JAPAN**

## 1. ATTITUDE TO PROMOTE IRRIGATION CULTURE

Given a perennial stream, we can start up irrigation on our own. In this context, the facilities should be such that they are constructed, operated and maintained by the farmers themselves. To bring such irrigation system into being in the farmers' locality, CEOs should be a technical advisor and also PARTICIPANT while the farmers are the committed implementers and the OWNER of the irrigation system.

## 2. IDENTIFY POTENTIAL DIVERSION SITE

Potential diversion sites should maintain perennial flow, and the depth should not be very deep: preferably limited to 2 m. Good sites can very often be found at JUST UPSTREAM OF NATURAL DROPS (small falls) and near villagers' FOOTPATHS which cross a perennial stream.

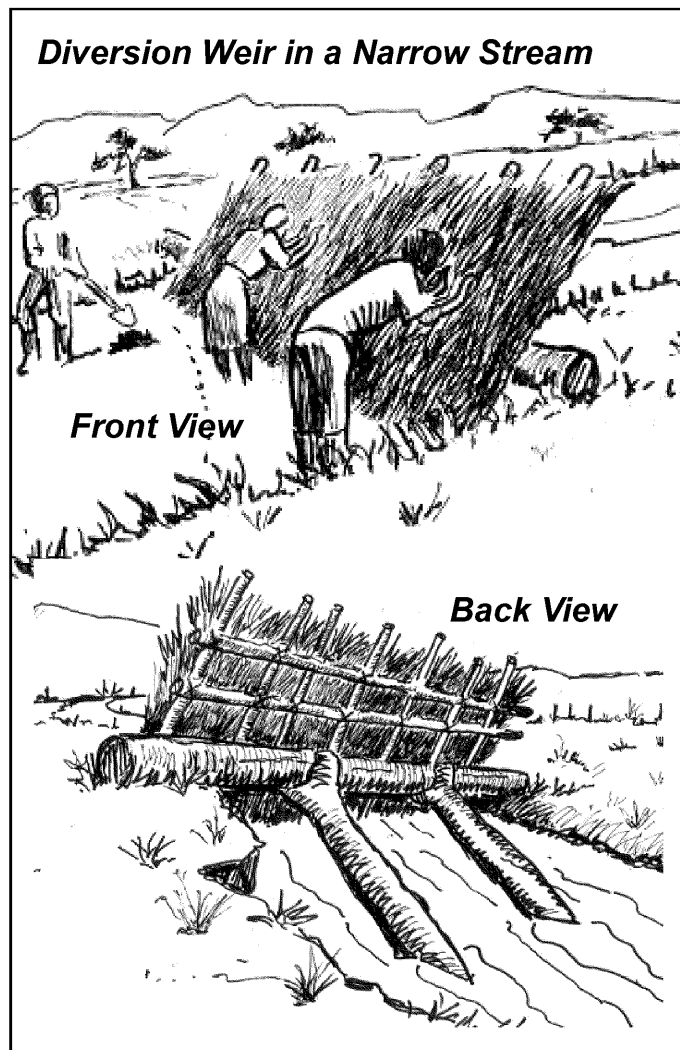


Right upstream of natural drops (small fall) could easily lead the water into canal by gravity thanks to the elevation difference. Footpaths usually traverse streams at a shallow place, forming a topographic condition, which is easier in diverting and getting water onto the farms.

## 3. CONSTRUCT DIVERSION STRUCTURE

First step is to believe that weirs can be constructed by using locally available materials such as wooden log, bamboo, grasses,

soils, etc., and can raise the water level across even over a 20 meter width stream and as high as 1.5 meter depth.



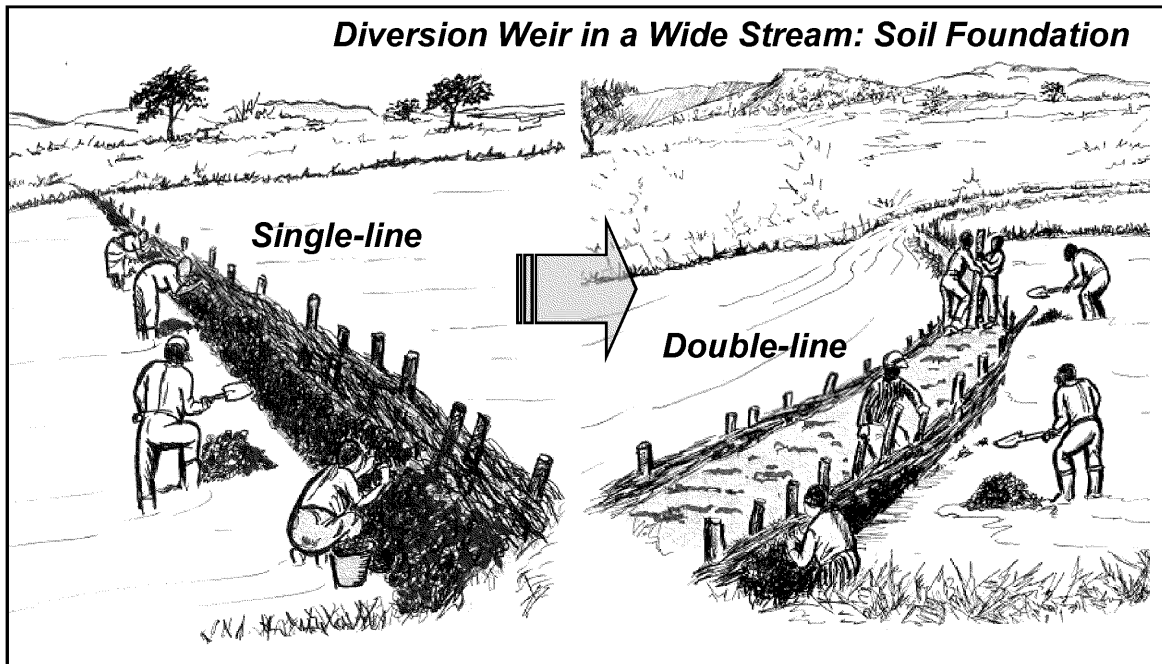
In case of narrow stream, constructing diversion weir is very easy: 1) put a horizontal member (wooden log) astride the both banks preferably supported by a wooden prop, 2) place vertical members, on the horizontal member, of bamboo, twig, and reed inclined to downstream, 3) put grasses on the vertical members and then clay soil thereon.

In case of wide stream, there are mainly two ways of constructing a diversion weir

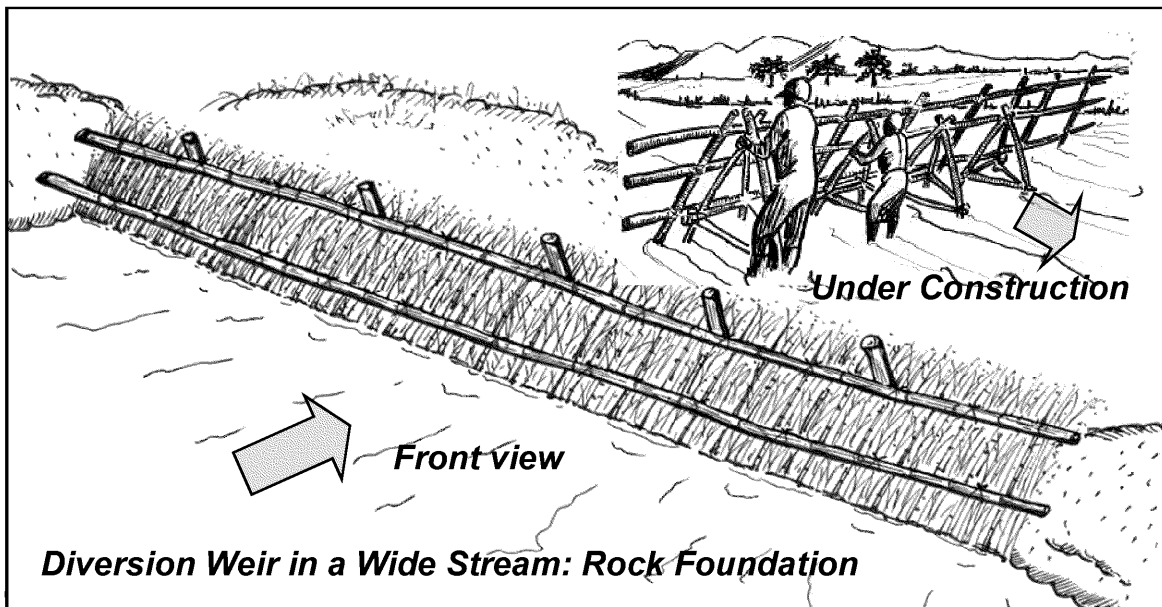
depending on the foundation condition: i.e. soil or rock.

At soil foundation, 1) drive wooden logs into the foundation across the stream preferably 30 – 50 cm interval, 2) put grasses alternately through the logs like weaving the logs, and then 3) patch clay soils upstream on the woven wall. This single-line weir is very simple and can fit in dambo areas. If leakage needs to be minimized, 4) make another line of the wooden-log woven with grasses about 70 cm to 150 cm downstream from the first line, 5) put clay soil in between the two lines and compact the soil by footing/treading. This double-line weir can also work as

footpath for villagers.

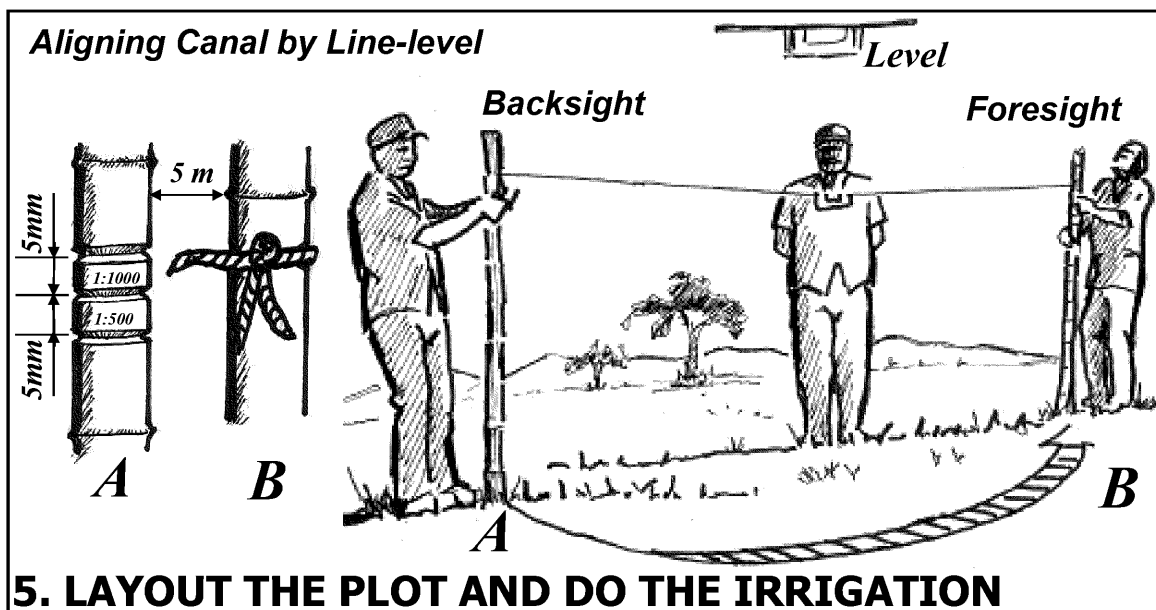


At rock foundation, 1) first prepare trigonal prop stand structures which support the weir body from behind across the stream, 2) put horizontal members of twig or bamboo in front of the props preferably every 30 – 50 cm interval in vertical, 3) put vertical members of twig, bamboo and reed on the horizontal members, 4) put grasses and then clay soils thereon.



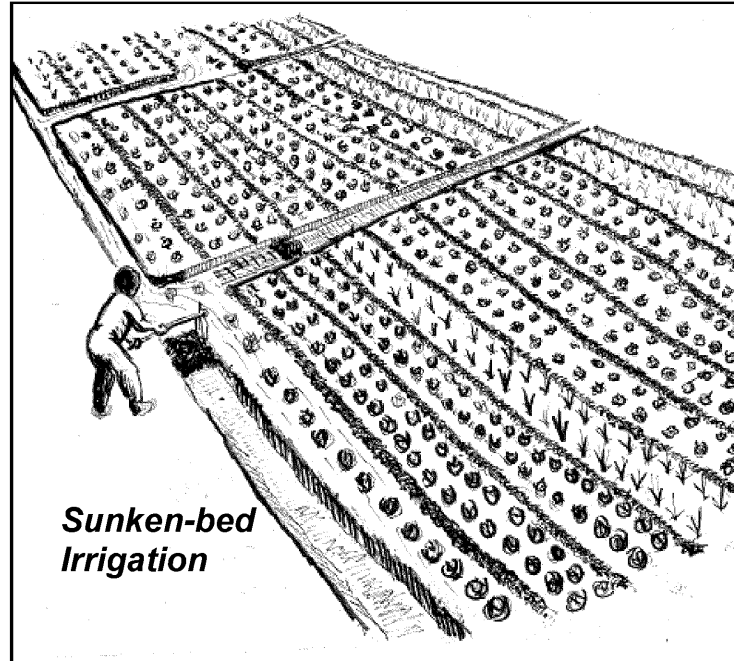
The simplest way of aligning canal is to follow the water flow by gravity; namely, 1) dig the canal from the diversion point for example a 10 meter distance, 2) let the water flow in the dug canal, 3) deepen the canal and/or shift the canal alignment toward lower side (stream side) if the water does not run well, and 4) repeat the process until the end point.

Better way of canal alignment is to use spirit line level. Interval of the two poles should preferably be 5 meter, and one side of the tied points should be 0.5 – 1 CM HIGHER THAN THE OTHER. Pole with higher tied point should always be placed foreside, not like conventional alternate placing. 0.5 cm difference in 5 meter gives 1:1000 gradient suitable for gentle topography like dambo, and 1 cm gives 1:500 gradient adaptable for sloped topography.

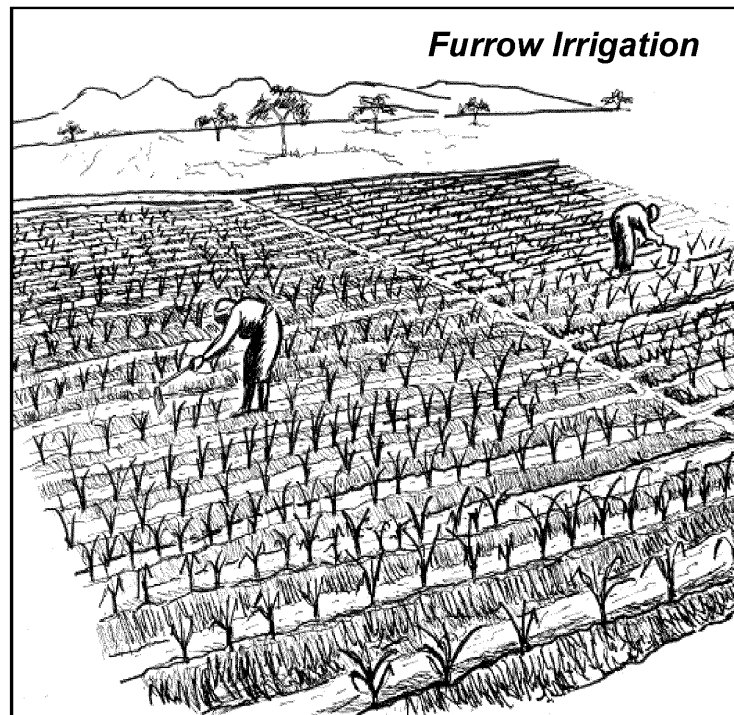


There are two irrigation methods adaptable for smallholders; SUNKEN-BED and FURROW. Sunken-bed is a horizontal area of land, which is surrounded by earthen bunds and is suited for any kinds of crops. Furrow irrigation system looks like commonly used ridged rain-fed agriculture since it consists of furrows and ridges. The furrow irrigation is suited to row crops such as maize.

At flat lands, sunken bed irrigation can be best suited as long as water logging does not last more than 48 hours. Smallest size of sunken bed can be 1.2m x 3m, and be enlarged to 2.4m x 10m depending on the leveling and the size of the plot.



On sloped lands, say more than 4% slope, furrow irrigation may be preferred by the farmers and indeed adaptable. The spacing of the furrow can follow the rainy season's ridge spacing; say 75 cm – 90 cm. Length can be 5m to 10m depending on the size of the plot.



The irrigation interval is determined based on moisture holding capacity of the soil and the crop type. Though the maximum irrigation interval depends on the soil characteristics, it can be said that the interval SHOULD NOT BE OVER 8 DAYS in most cases, or crops may start wilting.



## 6. ISSUES AND CONCERNS

### 6.1 Possible Service Area on the Water Available

It can be roughly said that a crop area of 1 hectare needs 16 to 13 l/s of irrigation water at intake and 5 to 4 l/s at field. This means that 160 l/s of irrigation water at intake can serve 10 hectares for any main crops. (1 hectare equals to 4 lima)

Irrigation Water Requirement (l/s/ha)

Main Crops	Intake	Field
Maize	16.1	4.8
Onion	15.8	4.7
Tomato	15.1	4.5
Cabbage	12.9	3.9
Potato	12.5	3.8

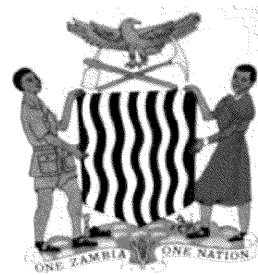
Note: Frequency is daily and 8hrs

### 6.2 Equity between Haves and Not-haves

Irrigation obviously cannot serve all the villagers simply because of certain land location being outside the service area. This may create jealousy to the Haves. A mitigation measure is to divide the service area into blocks and lend out to the Not-haves either free or with a minimal rental fee. The rented land will be returned to the owner for rainy season agriculture.

### 6.3 Physical Improvement of the Soil

It can be seen in Zambia that chemical fertilizer having long been applied without measure of physical improvement has already fatigued/exhausted the soils here and there. Irrigation agriculture results in two times usage of the same land, exploiting the soil fertility further. COMPOST MANURE should therefore be strongly recommended to the irrigators not only for supplementing fertility but also improving the physical soil characteristics..



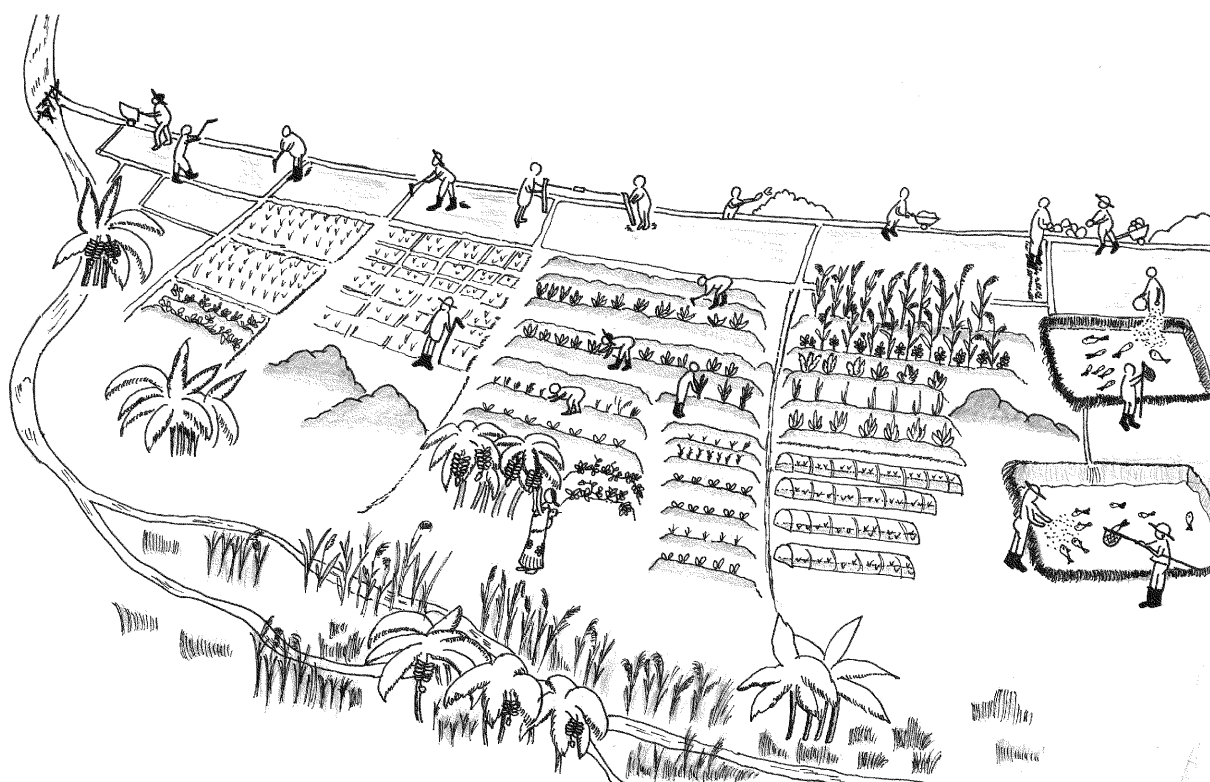
***This leaflet was prepared under:***

***Technical Cooperation Project on  
Community-Based Smallholder Irrigation (T-COBSI)***

**JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)  
MINISTRY OF AGRICULTURE (MOA), REPUBLIC OF ZAMBIA**

# **IRRIGATED AGRICULTURE TODAY FOR A BETTER LIFE TOMORROW**

**Using a Simple Irrigation Technique,  
Let's Start Improved Irrigated Agriculture Now!**



**April 2016**

**SANYU CONSULTANTS INC., TOKYO, JAPAN**

## 1. Initiation of Irrigation Development

There is a set of quite simple technologies that can well fetch water from small stream with no outsourced materials like cement or iron bars; called Community-based Smallholder Irrigation (COBSI). With this simple technology and community members' participation, you can enjoy irrigated agriculture TODAY. To be an owner of irrigation system, you can get necessary information and technical assistance from nearby MACO officers; they are ready with technical manual, leaflet, process-description posters and leaflet for you. This leaflet encourages you to start an improved irrigated agriculture using your COBSI scheme. For the detail of irrigation development itself, please refer to a leaflet "Starting Irrigation in Our Local Context."

## 2. BOKASHI COMPOST (A Quick-Compost)

As you may know, soil in this agro-ecological zone is quite depleted and thus fertility is generally low. With the low fertile soil, you may not always enjoy abundant harvest notwithstanding plenty of water flowing in front of you. Thus, first thing recommended is to cope with unfertile soil in your farm. Fortunately, irrigation water can provide you with a great potential in improving soil condition; here is a technique of making compost in a short period of time using irrigated water.

BOKASHI compost is a type of quality compost that can be made with local materials in 2-3 weeks. As compared to conventional compost that takes 2-3 months, required time is significantly short. Because of this quickness, you can prepare this compost for this dry season even after constructing canal.



The principle of making BOKASHI compost is simple: 1) to facilitate the decomposition of the materials, incorporate virgin soil which contains a lot of active microorganisms, 2) Through periodical turn-up, keep the temperature of the materials less than 60 degree Celsius in order not to kill the microorganisms, and 3) by watering time by time, keep the moisture content of the materials appropriate for microorganisms. With the aerobic condition in the material heap, aerobic microorganism's activities will be highly accelerated and the compost will be ready in a short period of time.

### Process of BOKASHI Making

Materials required for one heap of Bokashi are as follows. Although it can be adjusted depending on availability of each material, soil should not be more than 30% of all materials.

- Water: Provided by Canal
- Animal manure: 3 buckets (+ urine absorbed in grasses)
- Virgin soil: 3 buckets (from dambo, and/or natural forest)
- Plant residue: 4 buckets (legume, maize bran, etc.)
- Ash: A half bucket (pH control, K supplement)
- Broken charcoal: A half bucket (as microbes' house)
- Yeast materials: a half bucket of local beer residue, one bucket of Bokashi previously made, a 1/2-1 bucket of banana peel, rotten fruits, all soaked in water.

Cut the plant residues into small pieces to mix thoroughly with other materials. It also helps facilitate the decomposition process. Plant residues are cobs of maize, pod of beans, maize bran, sugarcane residues, and other plant bodies. Fresh materials are recommended, as the fertility has not yet evaporated.



Mix the material a little by little. After regulating moisture, pile it as a heap and cover it by banana leaves. Temperature of the materials usually rises up in 1-2 days. As too high temperature kills the effective microorganism, if temperature reached 60 degree Celsius or more, break down the heap and re-make it. To know the temperature, stick a panga or alike into the heap for ten seconds and touch it; you will feel the temperature. During the entire period, several times of turn-up may be required; more attention should be placed especially at the beginning.



As you check the temperature, also check the moisture. If it is too dry, add water. Take care of the temperature and moisture once or twice a day during the first week. After 2-3 weeks, the color of Bokashi gets dark; ready for the use. Spread all the materials and dry it under shade.

Bokashi can be used both as basal- and as additional-fertilizer. When applying it as additional-fertilizer, a handful of Bokashi is generally suitable to each plant: make a hole, put it in the hole and cover it up with soil.



### **3. INTERCROPPING**

#### *Advantages of Intercropping*

One of recommended cropping systems under irrigation is intercropping. Intercropping is a way of diversifying the farming system by which crop production can be more stabilized at lower risks. Specifically, there are several advantageous aspects in this system:

- Increased land productivity by producing multiple crops
- Reduced risk of pest and disease by diversification
- Efficient use of water, nutrient, and sunlight
- Minimized weed population with cover crop
- Improved soil fertility when legume is incorporated

By mixing two or more types of crops, it can dramatically increase the production per land area. Then, by enriching the diversity in the farming system, stability generally increase with reduced risk of pest and disease. In addition, with the use of crops with that have different root systems, shape of plants, and growing characteristics, it can use water, nutrient and sunlight more efficiently. It leads to higher production level comparing to aggregated production of individual crops. Furthermore, increased leaf cover in intercropping helps reduce weed populations once the crops are established.

#### *Recommended Combination*

Typical crops combinations for intercropping are summarized in Table 1. Concerning the generally depleted and thus low fertile soil in this area, it is recommendable to mix legume crops with other crops. By incorporating legume crops in the system, nitrogen fixation can be facilitated, whereby soil fertility is to be improved and maintained. Furthermore, legume crops are generally rich in protein and can be a good source for nutrition management of the rural household.

Another good aspect of intercropping is that when incorporating deep rooting crops, such as pigeon pea, physical characteristics of surface soil can be improved deeper.

**Table 1: Examples of Recommended Intercropping**

<b>Crop</b>	<b>Description</b>
Maize-climbing bean (Relay-cropping)	After at least 4 weeks of sowing maize, but before the harvest, plant climbing bean so that the bean can use maize stalks as stakes. Climbing beans can produce 3-4 times more yield than bush beans.
Maize-Legume (2 by 2 system)	Establish two rows of maize and another two rows of legume crops to alternate each other. Common bean, Soybean, green gram, and groundnuts can be used in this system. By creating a wide space in between maize rows, legume crops can receive more sunlight and thus a total production can be increased.
Maize-Sweet potato (Leaves) (mixed cropping)	Maize is sown in row and after the first weeding, and fertilization, sweet potatoes are planted in between the maize. Sweet potato plants cover the surface of the soil by which damage of weeds can be reduced.
Cabbage-Tomato	Tomato acts as a physical barrier against insects like Diamondback moth and has repellent odor. Cabbage is planted two weeks after Tomato is transplanted.
Cabbage-onion	Onion has repellent effect against common insects including aphids and is a useful intercrop for many crops. One of good combinations is with cabbage and carrot. But, combination with pea is not recommended.

#### **4. Cropping Calendar**

Sample models of cropping calendar are shown in Table 2. As smallholder farmers maintain 0.25 limas for irrigated agriculture, expected profit of each system computed based on actual farmers' practice are also indicated. Note that, however, the profit may differ depend on the characteristics of each site and each farmer.

There listed are 5 types of cropping systems. 1) relay-cropping of green maize and climbing beans: climbing bean can use maize stand as sticks; 2) gradual planting of tomato: risk and



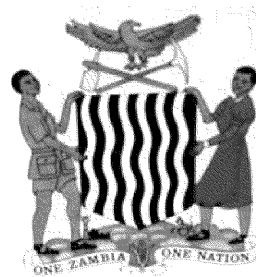
labor can be dispersed; 3) rotation of groundnuts and cabbage: legume crop improve soil fertility and highly profitable crop can be introduced later; and 4) intercropping of Tomato/onion and cabbage: by introducing crops that have repelling effect, damage from insects can be reduced.

**Table 2: Examples of Recommended Cropping Calendar**

Area	Apr	May	Jun	Jul	Aug	Sep	Oct	Expected Profit
<b>Pattern 1</b> G-maize & beans (0.25 lima)			Green Maize	Relay planting	Climbing Beans			693ZMW
<b>Pattern 2</b> Tomato (0.25 lima)			Tomato		Tomato			441ZMW
<b>Pattern 3</b> Groundnuts & Year 1 (0.25 lima)			Groundnuts					367ZMW (1 <sup>st</sup> year)
Cabbage Year 2 (0.25 lima)			Cabbage					666ZMW (2 <sup>nd</sup> year)
<b>Pattern 4</b> Tomato/onion and Cabbage Intercropping (0.25 lima)			Tomato/Onion					With Tomato 554ZMW  With Onion 789ZMW

Source: Harvest survey to 478 sample farmers in 7 districts in Northern and Luapula provinces.

Note: This result is based on the averaged figure of successful and unsuccessful cases surveyed on the actual ground. Expected profit may vary significantly depending on the amount of agricultural inputs, level of farming techniques, and marketing potential. .



*This leaflet was prepared under:*

***Technical Cooperation Project on  
Community-Based Smallholder Irrigation (T-COBSI)***



**T-COBSI**  
*Irrigation for everyone*



*With simple weir, start irrigated farming today*

### ***Simple Weir to Initiate Irrigation Today***

**T-COBSI** employs a very simple technology in construction of weirs that can be constructed using materials that are locally available such as:

- Wooden poles
- Grasses, and
- Soil

*Depending on the site condition, different types of structures can be applied: single-lined, double-lined, inclined, and trigonal— Irrigation can be started today.*

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**C**ommunity-**B**ased **S**mallholder **I**rrigation



**T-COBSI**  
*Irrigation for everyone*



***Our weir, source of our  
livelihood: permanent weir***

### ***Permanent Weir to Stabilize Irrigation***

**T-COBSI** helps farmers upgrade the weir facility from simple one to permanent structure for securing irrigation water throughout the season.

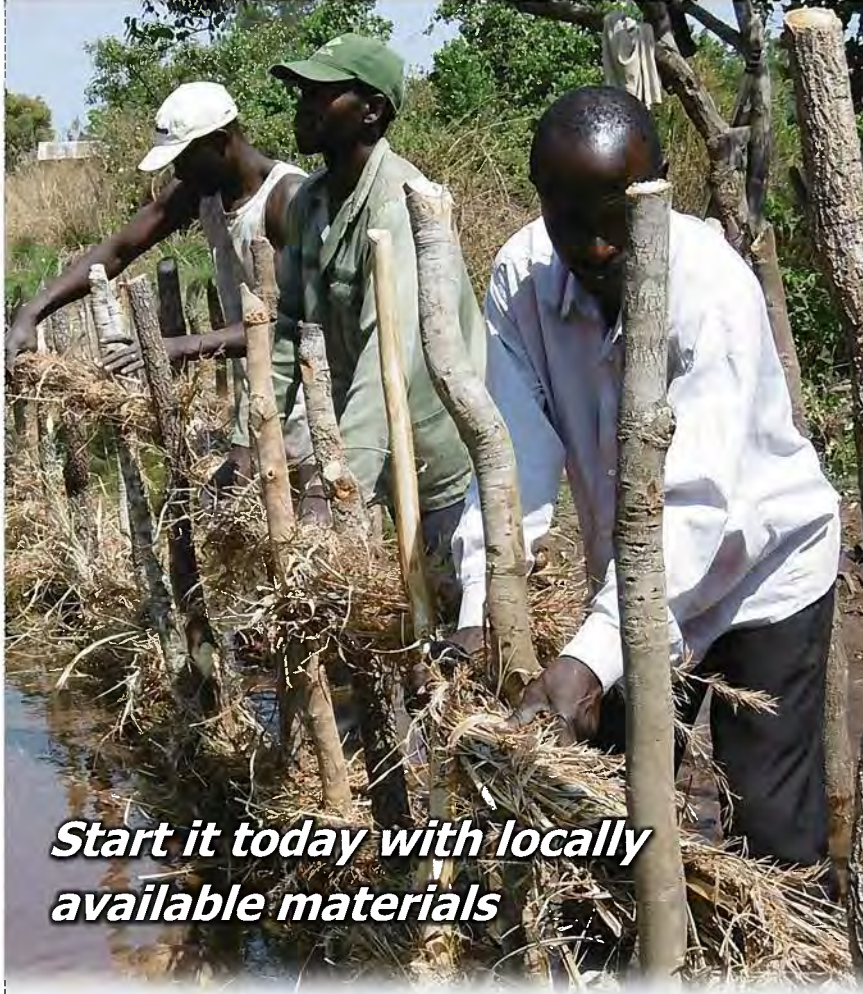
- *Stones and sands are collected by farmers*
- *Construction is done by farmers under supervision*
- *No money/food for work is provided*

*With these principles, sense of ownership and thus sustainability are harnessed.*

*Technical Cooperation Project on  
**Community-Based Smallholder Irrigation***



**T-COBSI**  
*Irrigation for everyone*



***Start it today with locally available materials***

### ***Innovative Approach in Irrigation Dev.***

**T-COBSI** initiates a series of simple irrigation technologies, with which farmers can construct the facilities using locally available materials; that enables:

- *Low cost implementation*
- *Immediate outcome, and*
- *Farmers' self-reliance*

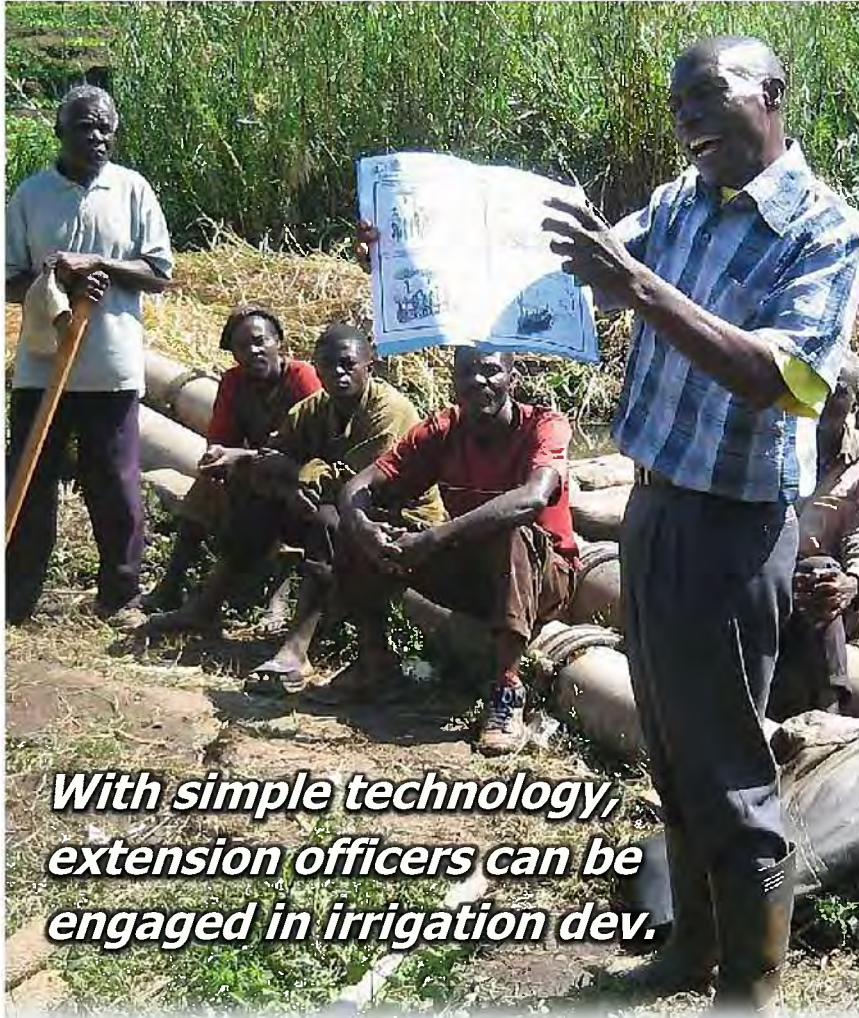
*By minimizing the use of external materials, farmers do not have to wait for any support from outside; using **COBSI** technologies, they can develop and manage their own irrigation schemes.*

**T**echnical Cooperation Project on  
**C**ommunity-**B**ased **S**mallholder Irrigation



# T-COBSI

Irrigation for everyone



***With simple technology,  
extension officers can be  
engaged in irrigation dev.***

## ***Irrigation Dev. through Extension***

**T-COBSI** disseminates irrigation technologies through the extension structure, by which an increased number of farmers can benefit. This cascade-like technology dissemination is enabled with:

- Simplicity of the technology
- Diversified extension materials, and
- Extension officers' commitment

With simple technologies, **T-COBSI** brings non-technical officers in the field of irrigation development.

**T**echnical Cooperation Project on  
**C**ommunity-**B**ased **S**mallholder **I**rrigation



**T-COBSI**  
*Irrigation for everyone*



***Other than guess work,  
align canal with the best slope***

### ***Appropriate Canal Alignment***

**T-COBSI** offers farmers a way to align canal with a slope of 1/500 to 1/1,000 for appropriate water flow. But, how? The canal can be well aligned by using simple tools, they are:

- Straight poles (2)
- String of 10 m in length connected to the poles, and
- Line level, hanged on the string

*Align the canal not toward the direction you want to go but as the slope allows you; and you can minimize the labor work in digging a deep canal.*

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**T-COBSI**  
*Irrigation for everyone*



***Now, we are ready to go to  
the next step—upgrading***

### ***Upgrading Approach for Sustainability***

**T-COBSI** proposes a process-oriented irrigation development—upgrading, in which farmers first gain experience with simple weir, then, where applicable, upgrade the weir to permanent structure.

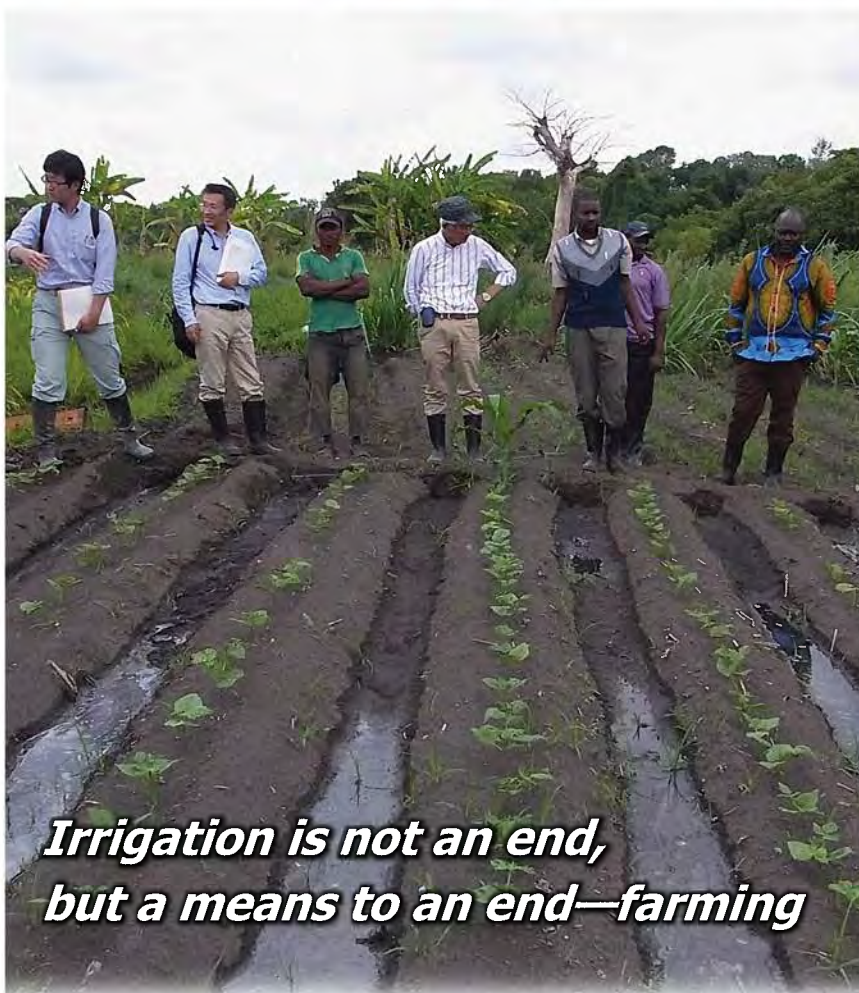
As farmers can acquire knowledge in Operation & Maintenance (O&M) and irrigated farming, sustainability is assured.

**T**echnical Cooperation Project on  
**C**ommunity-**B**ased **S**mallholder **I**rrigation





**T-COBSI**  
*Irrigation for everyone*



***Irrigation is not an end,  
but a means to an end—farming***

### ***Appropriate Farming Technologies***

**T-COBSI** promotes various types of on-farm technologies that farmers can apply depending on the local context:

- On-farm irrigation (gravity irrigation)
- Companion cropping,
- Soil fertility management, and more

*To materialize the potential, farmers continue improving their farming methods and cope with any challenges with appropriate technologies.*

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**C**ommunity-**B**ased **S**mallholder **I**rrigation



**T-COBSI**  
*Irrigation for everyone*



***Start with market and  
end with market***

### ***Farming as a Business***

**T-COBSI** provides a series of trainings to agricultural extension officers and farmers in market-oriented agriculture, particularly:

- Market research
- Farm planning, and
- Marketing

Farmers can generate more income with strategic farming and selling. Irrigation gives farmers an ability to choose the cropping pattern according to the market demand.

**T**echnical Cooperation Project on  
**C**ommunity-**B**ased **S**mallholder **I**rrigation

## Program of the Kick-off Training at Mansa Farm Institute JICA T-COBSI From May 9 to 13, 2016

*(Officer in Charge)*

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### **DAY 0 (May 8, Sun): Gathering to the Venue**

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### **DAY 1 (May 9, Mon): Orientation and Introduction** **(Saila)**

*Module 1 - Program Orientation* *(Saila)*

- 08:00-08:45 Registration and pre-training knowledge inventory
- 08:45-09:00 Prayer, welcome remarks and program orientation (housekeeping issues)
- 09:00-09:45 Opening (PACO/PAO), self-introduction, and overview of the training
- 09:45-10:00 Health break**

*Module 2 – Overview of T-COBSI* *(Remmy)*

- 10:00-10:45 Introduction to the T-COBSI Project
- 10:45-11:15 COBSI approach at glance (video)

*Module 3 –Type of COBSI Schemes (weir type, canal, ancillaries, etc.), Environment, Gender, etc.*

- 11:15-11:30 Weir type and construction method (theory) *(Sinkolongo)*
- 11:30-11:45 Canal alignment, ancillaries and potential diversion site (theory) *(Sinkolongo)*
- 11:45-12:15 On Farm irrigation by gravity *(Sinkolongo)*
- 12:15-13:15 Lunch**
- 13:15-15:15 Weir construction and canal alignment (practice at the venue)  
*(Sinkolongo/ Mbewe/Simukoko)*

- 15:15-15:30 Health break**
- 15:30-16:15 Environment and social consideration *(Mwape)*
- 16:15-16:45 Institution and gender mainstreaming *(Remmy)*
- 16:45-17:00 Preparation of the field observation (distribution of gumboots) *(Remmy)*

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### **DAY 2 (May 10, Tue): Field Observation** **(Sinkolongo)**

- 07:45- Registration
- 08:15- Recapitulation (review and clarification of the Day 1 activities)

*Module 4 – Field Observation* *(Saila)*

- 08:30-10:30 Travel to the site
- 10:30-12:00 Field observation at a simple irrigation scheme *(Saila)*
  - On-farm irrigation
  - Practice of canal alignment using spirit line level
- 12:00-13:00 Lunch in the field (lunch box)**
- 13:00-13:30 Travel to the site
- 13:30-15:00 Field observation at a permanent irrigation scheme [Mansa/ Mwense] (NKandu/Kalumbu)
  - Construction of permanent weir (*theory*)
  - Operation and maintenance (O&M)
- 15:00-17:00 Travel back to the venue

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### **DAY 3 (May 11, Wed): Irrigation Planning and On-Farm Technologies** **(Remmy)**

- 07:45- Registration
- 08:15- Recapitulation (Review and Clarification of Day 2 Activities)

*Module 5 – Implementation of Smallholder Irrigation Dev. (permanent-weir)* *(Saila)*

- 08:30-08:45 Implementation procedure
  - 08:45-09:15 Selection of candidate sites
  - 09:15-09:30 Items to be clarified by the investigation
  - 09:30-09:45 Tea break**
  - 09:45-10:00 Basic of irrigation planning *(Saila)*
-

# K O T

10:00-10:30	Preparation of basic plan	
10:30-11:30	Irrigation plan: (1) water requirement	
11:30-12:30	Irrigation plan: (2) On-farm irrigation plan	
<b>12:30-13:30</b>	<b>Lunch</b>	
13:30-14:00	Report on the JICA training in Japan	(Saila)

## *Module 6 – Appropriate Farming Technologies*

14:00-14:30	Integrated soil fertility management	(Chanda)
14:30-15:00	Postharvest handling of orange maize grown under irrigation	(Chanda)
<b>15:00-15:15</b>	<b>Health break</b>	
15:15-15:45	Appropriate technologies (Companion cropping & RESCAP)	(Chanda)
15:45-17:00	Planning demonstration sites & Distribution of demo plot materials	(Remmy)

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## **DAY 4 (May 12, Thu): Field Practice** (Chanda)

<u>07:45-</u>	Registration	
<u>08:15-</u>	Recapitulation (review and clarification of Day 3 activities)	

## *Module 7 –Field Practice* (Saila /Mbewe/Simukoko)

08:30-09:30	Travel to the practice site	
09:30-13:30	Construction practice of a simple diversion weir	
<b>13:30-14:30</b>	<b>Lunch at the field</b>	
14:30-15:30	Travel back to the venue	

## *Module 8 – Entry Planning*

15:30-17:00	Explanation of Fuel distribution	(Mbewe)
	Preparation of entry plan by officer	(Sinkolongo)

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## **DAY 5 (May 13, Fri): Entry Planning** (Mwape)

<u>07:45-</u>	Registration	
<u>08:15-</u>	Recapitulation (review and clarification of Day 4 activities)	

## *Module 8 – Entry Planning* (Remmy)

08:30-10:15	Presentation and adjustment of the entry plans by district	
<b>10:15-10:30</b>	<b>Health break</b>	
10:30-12:30	Presentation and adjustment of the entry plans by district (cont'd)	
<b>12:30-13:30</b>	<b>Lunch</b>	
13:30-14:00	Reporting mechanics (types of materials, monitoring format, reporting mechanic, and logistics support)	
14:00-15:30	Distribution of dissemination materials	(Sinkolongo)
<b>15:30-15:45</b>	<b>Health break</b>	

## *Module 9 – Program Evaluation and Closing* (Saila)

15:45-16:15	Evaluation of the training program	
16:15-17:00	Closing (PACO/PAO), Certificate	

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## **DAY 6 (May 14, Sat): Home Sweet Home**

Have a Safe Trip!

## Program of the Kick-off Training at Kasama Farm Institute JICA T-COBSI From April 25 to 29, 2016

*(Officer in Charge)*

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### DAY 0 (April 24, Sun): Gathering to the Venue

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### DAY 1 (April 25, Mon): Orientation and Introduction (Simukoko)

*Module 1 - Program Orientation* *(Sifaya)*

- 08:00-08:45 Registration and pre-training knowledge inventory
- 08:45-09:00 Prayer, welcome remarks and program orientation (housekeeping issues)
- 09:00-09:45 Opening (PACO/PAO), self-introduction, and overview of the training
- 09:45-10:00 Health break**

*Module 2 – Overview of T-COBSI* *(Martin)*

- 10:00-10:45 Introduction to the T-COBSI Project
- 10:45-11:15 COBSI approach at glance (video)

*Module 3 –Type of COBSI Schemes (weir type, canal, ancillaries, etc.), Environment, Gender, etc.*

- 11:15-11:30 Weir type and construction method (theory) *(Syansingu)*
- 11:30-11:45 Canal alignment, ancillaries and potential diversion site (theory) *(Mbewe)*
- 11:45-12:15 On Farm irrigation by gravity *(Simukoko)*
- 12:15-13:15 Lunch**
- 13:15-15:15 Weir construction and canal alignment (practice at the venue) *(Simukoko)*
- 15:15-15:30 Health break**
- 15:30-16:15 Environment and social consideration *(David)*
- 16:15-16:45 Institution and gender mainstreaming *(Annie)*
- 16:45-17:00 Preparation of the field observation (distribution of gumboots) *(Martin, Mbewe)*

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### DAY 2 (April 26, Tue): Field Observation (Lawrence)

- 07:45- Registration
- 08:15- Recapitulation (review and clarification of the Day 1 activities)

*Module 4 – Field Observation* *(Mbewe/Simukoko)*

- 08:30-10:30 Travel to the site
- 10:30-12:00 Field observation at a simple irrigation scheme *(Mbewe/Simukoko)*
  - On-farm irrigation
  - Practice of canal alignment using spirit line level
- 12:00-13:00 Lunch in the field (lunch box)**
- 13:00-13:30 Travel to the site
- 13:30-15:00 Field observation at a permanent irrigation scheme [Luwingu] *(Sifaya)*
  - Construction of permanent weir (*theory*)
  - Operation and maintenance (O&M)
- 15:00-17:00 Travel back to the venue

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### DAY 3 (April 27, Wed): Irrigation Planning and On-Farm Technologies (Martin)

- 07:45- Registration
- 08:15- Recapitulation (Review and Clarification of Day 2 Activities)

*Module 5 – Implementation of Smallholder Irrigation Dev. (permanent-weir)* *(Syansingu)*

- 08:30-08:45 Implementation procedure
- 08:45-09:15 Selection of candidate sites
- 09:15-09:30 Items to be clarified by the investigation
- 09:30-09:45 Tea break**
- 09:45-10:00 Basic of irrigation planning *(Sakajira)*

# K O T

10:00-10:30	Preparation of basic plan	
10:30-11:30	Irrigation plan: (1) water requirement	
11:30-12:30	Irrigation plan: (2) On-farm irrigation plan	
<b>12:30-13:30</b>	<b>Lunch</b>	
13:30-14:00	Report on the JICA training in Egypt	(Sakajira)

## Module 6 – Appropriate Farming Technologies

14:00-14:30	Integrated soil fertility management	(Lawrence)
14:30-15:00	Postharvest handling of orange maize grown under irrigation	(Elizabeth)
<b>15:00-15:15</b>	<b>Health break</b> (providing orange maize bread)	(Elizabeth)
15:15-15:45	Appropriate technologies (Companion cropping & RESCAP)	(Annie)
15:45-17:00	Planning demonstration sites	(Simukoko)

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## DAY 4 (April 28, Thu): Field Practice (David)

<u>07:45-</u>	Registration	
<u>08:15-</u>	Recapitulation (review and clarification of Day 3 activities)	

## Module 7 – Field Practice (Simukoko)

08:30-09:30	Travel to the practice site	
09:30-13:30	Construction practice of a simple diversion weir	
<b>13:30-14:30</b>	<b>Lunch at the field</b>	
14:30-15:30	Travel back to the venue	

## Module 8 – Entry Planning (Simukoko)

15:30-17:00	Explanation of Fuel distribution Preparation of entry plan by officer	
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## DAY 5 (April 29, Fri): Entry Planning (Sifaya)

<u>07:45-</u>	Registration	
<u>08:15-</u>	Recapitulation (review and clarification of Day 4 activities)	

## Module 8 – Entry Planning (Martin/Mbewe/Simukoko)

08:30-10:15	Presentation and adjustment of the entry plans by district	
<b>10:15-10:30</b>	<b>Health break</b>	
10:30-12:30	Presentation and adjustment of the entry plans by district (cont'd)	
<b>12:30-13:30</b>	<b>Lunch</b>	
13:30-14:00	Reporting mechanics (types of materials, monitoring format, reporting mechanic, and logistics support)	
14:00-15:30	Distribution of dissemination materials & demo plot materials	(Lawrence/Anne)
<b>15:30-15:45</b>	<b>Health break</b>	

## Module 9 – Program Evaluation and Closing (Sifaya)

15:45-16:15	Evaluation of the training program	
16:15-17:00	Closing (PACO/PAO), Certificate	

---

## DAY 6 (April 30, Sat): Home Sweet Home

Have a Safe Trip!

**PRE-TRAINING KNOWLEDGE/EXPERIENCES INVENTORY FOR THE TRAINING  
Kick-off Training 2016**

Name		Age		Sex	<input type="checkbox"/> Male <input type="checkbox"/> Female
District Name		Camp Name			
Job Title (tick)	<input type="checkbox"/> P-TSB, <input type="checkbox"/> D-TSB, <input type="checkbox"/> BEO, <input type="checkbox"/> CEO, <input type="checkbox"/> Others ( )			Year joined GRZ	

**On Smallholder Irrigation**

1. Have you ever been involved in any irrigation project which is operated and maintained by FARMERS themselves?
Tick: <input type="checkbox"/> Yes ( <input type="checkbox"/> Tick if it was COBSI pilot project by JICA) <input type="checkbox"/> No
2. Which irrigation systems have you ever been ENGAGED in under smallholder irrigation?
Tick: <input type="checkbox"/> None <input type="checkbox"/> Furrow (natural diversion WITHOUT any diversion facilities) <input type="checkbox"/> Gravity river diversion with SIMPLE facilities <input type="checkbox"/> Gravity river diversion with PERMANENT facilities <input type="checkbox"/> Treadle pump <input type="checkbox"/> Motorized/Engine pump irrigation <input type="checkbox"/> Dam (pond/reservoir) <input type="checkbox"/> Buckets <input type="checkbox"/> Others (Please specify: )
3. Have you ever been engaged in construction of permanent structure in smallholder irrigation? If yes, what item?
Tick: <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Site survey <input type="checkbox"/> Facility Design, <input type="checkbox"/> Canal aligning, <input type="checkbox"/> Construction supervision <input type="checkbox"/> Others (Please specify: )

**On Your Experiences as an Provincial Officer/District Officer/ BEO/CEO**

4. Please describe the problem(s) you have faced or are facing as a Government Technical/Extension Officer.
5. Please describe what kind of efforts you have extended to solve the problem(s) above.
6. Please describe the best experience(s) you have had as a Government Technical/Extension Officer.

**On Agriculture**

7. What are the major activities you are engaged in each quarter as a government officer?
Jan to Mar: _____ Apr to Jun. _____ Jul to Sep: _____ Oct to Dec: _____ Throughout the year: _____
8. What kinds of farming technologies would you recommend for irrigated agriculture? Please list below.
9. What kinds of farming technologies would you like to learn for irrigated agriculture?

**GO TO NEXT PAGE →**

### On Marketing

10. Have you ever directed your subordinate or villagers about Marketing in irrigated farming? If yes, what contents did you address?
<input type="checkbox"/> YES <input type="checkbox"/> NO Contents:

### On Institution and Gender Issue

11. Have you ever faced any difficulties when you communicate with villagers? Please describe details.
12. Have you ever tried to involve women in the community development project which you were in charge of? Please describe the details how you involved women.

### On Your Expectations

13. How can the smallholder irrigation improve the livelihood of smallholder farmers?
14. What is the role of the Government Officer for developing smallholder irrigation?
15. What do you expect from this training? Please list 2 main expectations associated with what you would like to learn.
1)
2)

This is the end of questions, thank you!



## TRAINING PROGRAM DAILY REVIEW

Training Module	Level of Satisfaction					Comments for improvement
	Excellent	Good	Average	Below Average	Poor	
<b>DAY 1: Orientation and Introduction</b>						
<i>Module 1 - Program Orientation</i>						
Program orientation						
<i>Module 2 – Overview of T-COBSI</i>						
Introduction to the T-COBSI Project						
COBSI approach at glance (video)						
<i>Module 3 –Type of COBSI Schemes (weir type, canal, ancillaries, etc.),Environment,Gender,etc.</i>						
Weir type and construction method (theory)						
Canal alignment, ancillaries and potential site						
On Farm irrigation by gravity						
Weir construction and canal alignment (practice)						
Environment and social consideration						
Institution and gender mainstreaming						
<b>DAY 2: Field Observation</b>						
<i>Module 4 – Field Observation</i>						
Field observation at a simple scheme						
Field observation at a permanent scheme						
<b>DAY 3: Irrigation Planning and On-Farm Technologies</b>						
<i>Module 5 – Implementation of Smallholder Irrigation Dev. (permanent-weir)</i>						
Implementation procedure						
Selection of candidate sites						
Items to be clarified by the investigation						
Basic of irrigation planning						
Preparation of basic plan						
Irrigation plan: (1) water requirement						
Irrigation plan: (2) On-farm irrigation plan						
Report on the JICA training in Egypt/Japan						
<i>Module 6 – Appropriate Farming Technologies</i>						
Integrated soil fertility management (Biochar)						
Postharvest handling of orange maize grown under irrigation						
Appropriate technologies (Companion cropping & RESCAP)						
Planning demonstration sites						
<b>DAY 4: Field Practice</b>						
<i>Module 7 –Field Practice</i>						
Construction practice of a simple diversion weir						
Practice of canal alignment using spirit line level						
<b>DAY 4 - DAY 5: Entry Planning</b>						
<i>Module 8 – Entry Planning</i>						
Explanation of Fuel distribution						
Entry planning						
Reporting mechanics						

## TRAINING PROGRAM OVERALL EVALUATION

1. Present your overall degree of **ACHIEVEMENT** relative to the **OBJECTIVES** you participated for.

Excellent	Good	Average	Below Average	Poor	Comments for improvement

2. Present your overall degree of **SATISFACTION** relative to the training contents **AS A WHOLE**.

Excellent	Good	Average	Below Average	Poor	Comments for improvement

3. Present your overall degree of satisfaction relative to **LOGISTICS** (venue, transportation, lodging, etc.).

Excellent	Good	Average	Below Average	Poor	Comments for improvement

4. How much has the training program met with what you expected relative to **THEORY**?

Excellent	Good	Average	Below Average	Poor	Comments for improvement

5. How much has the training program met with what you expected relative to **PRACTICE**?

Excellent	Good	Average	Below Average	Poor	Comments for improvement

6. Write freely your idea how to improve this program in future.

**Materials Provided**  
**Kick-off Training on Community Based Smallholder Irrigation (T-COBSI) 2016**

No.	Title/ Contents	Set
<b>General</b>		
1	T-COBSI Project Brochure on T-COBSI [color]	1
2	Program of the TOT & Kick-off Training	1
3	Pre-training Knowledge/Experience Inventory	1
4	Training Program Daily Review & Training Evaluation	1
5	List of Materials Provided (this paper)	1
<b>Operation and Monitoring of Project Activities</b>		
1	Explanatory note of the major terms in T-COBSI	1
2	Planning sheet for setting the target of 2016 Dry Season (by district)	1/ district*
3	Simple weir monitoring sheet for main BEO/CEO (Individual)	1
4	Simple weir monitoring sheet for TSBs (District)	1/ district*
5	Fuel distribution system under T-COBSI (for 2016 Dry Season)	1
6	Requisition form for fuel (May to Oct)	18
<b>PPT Presentation Materials</b>		
1	What's T-COBSI (PPT: Module 2-1)	1
2	Type of COBSI schemes (PPT: Module 3-1)	1
3	On Farm Irrigation by gravity (PPT: Module 3-1's attachment)	1
4	Environmental and social consideration (PPT: Module 3-2)	1
5	Institution and gender mainstreaming (PPT: Module 3-3)	1
6	Integrated soil fertility (PPT: Module 6-1)	1
7	Postharvest handling of orange maize (PPT: Module 6-2)	1
8	Appropriate Farming Technologies (PPT: Module 6-3)	1
9	Planning demonstration plot (PPT: Module 6-4)	1
10	Entry planning (PPT: Module 8-2)	1
<b>Manuals and Posters for Promotion</b>		
1	Technical Manuals (Simple Weir & Canal)	1
2	Implementation Manual (Permanent Scheme)	1
3	Extension Officers' Manual (RESCAP Manual)	1
4	T-COBSI Project Brochure on T-COBSI [B&W]	5 *
5	Picture Stories Poster (4 sheets per set with A3 paper) 1) For officer's use x 5; 2) For CAC meeting (stapled) x 10	(5+10) 15*
6	Poster for Nutrition Improvement with Smallholder Irrigation 1) For officer's use x 5; 2) For CAC meeting x 10	(5+10)15*
7	Leaflet (Starting Irrigation in Our Local Context) (April 2016)	15*
8	Leaflet (Starting Irrigation Agriculture) (April 2016)	15*
<b>Other Tools</b>		
1	Convex (5m)	1 *
2	Sprit Line Level	1 *
3	Gumboots	1 *

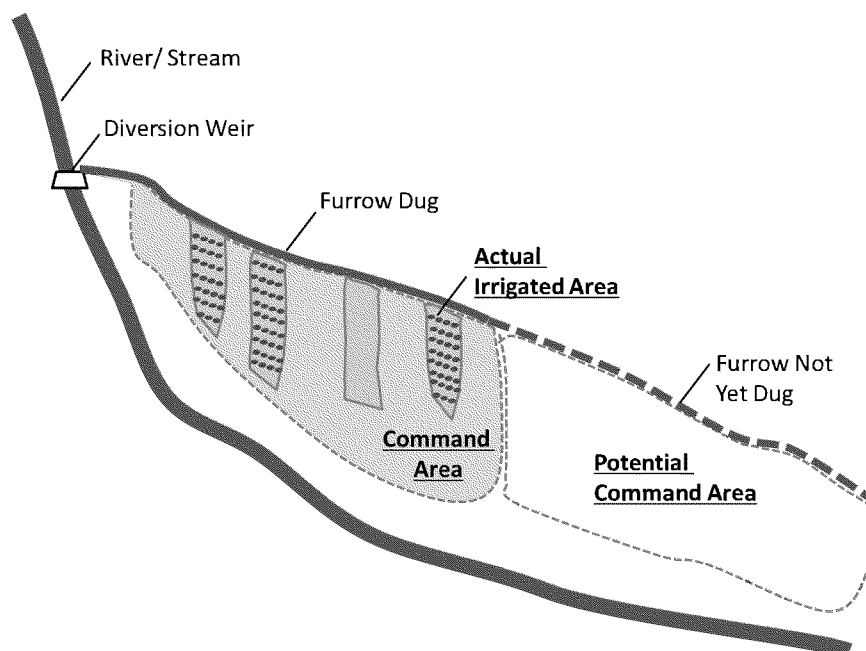
\*: to be distributed during the KOT workshop

## EXPLANATORY NOTE OF MAJOR TERMS

Kick-off Training (T-COBSI)

### GENERAL TERMS

- **Command Area:** Area being irrigated and can be irrigated below the furrow already dug.
- **Actual Irrigated Area:** Area being actually irrigated in the command area. Idle land in the command area is not included.
- **Potential Command Area:** Yet to be opened farmland where irrigation can be practiced once the furrow is developed/ extended. Note that the volume of water available at the intake point may be the limiting factor to expanding the farm plots (ex. 2 liter/sec/ha at the intake point).
- **Improvement:** Construction of new facilities in natural diversion site or renewal of existing irrigation facilities which had been constructed with primitive way, for which a new type of weir promoted by T-COBSI (ex. inclined-weir) is introduced. It also includes re-aligning and extension of furrow using T-COBSI technique. Irrigation schemes developed by the COBSI pilot project (2009-2010) and ones developed under T-COBSI are not included. Neither re-construction of weir nor extension of furrow in the COBSI pilot project site is regarded as “improvement” but ordinal “O&M.”
- **New Development:** A development of new irrigation scheme where there was no irrigation practice before. All the area under irrigation is the achievement of T-COBSI activity.
- **Household:** A unit of family members who are living together; shares same food and finance (including none-relatives).



### [1] Site Profile for Simple Weir Development done by Main BEO/CEO [NEW/IMP]

- ❖ List up all the irrigation schemes and fill up the form
- ❖ Inform this information to the district TSB officers at the end of each month
- ❖ Submit this form at the evaluation workshop scheduled in October 2016
- “Weir type”: choose either one of the weir types listed below the table such as inclined, single-line, and double line; answer is made using the number designated to each type.
- “Original canal length” (in “Improvement” part) : the length of canal (furrow) existing since before the improving the scheme (before KOT 2016).
- “Area originally irrigated”: the size of actual irrigation area existing since before improving the scheme (before KOT 2016).
- “Canal length newly dug”: the length of canal newly dug upon improvement of the scheme, which does not include the length of canal existing since before the improvement.

- “*Area (newly) opened*”: the total size of farm plots newly converted from a virgin land upon the improvement of the scheme (after KOT 2016). It may include a farmland just converted but yet cultivated under irrigation; however, it does not include the area under operation since before the improvement.
- “*Area newly irrigated*”: the size of actual irrigation area newly irrigated upon the improvement of the scheme (after KOT 2016). Do not include the area already being irrigated since before the improvement.
- “*Original*” number of fishponds: number of fishponds dug in the scheme before the improvement of the scheme (before KOT 2016).
- Number of “*newly constructed*” fishponds: number of fishponds newly dug upon improvement of the scheme (after KOT 2016). Do not include the ones existing since before the improvement.
- Count only the sites where weirs and furrows were actually constructed and dug; Do not include any provisional numbers (i.e. site only identified as a potential site) To see your progress, compare your achievement with your target
- Fuel for the following month will be provided only upon your monthly reporting
- Be proud of yourself; good achievement will be informed to all the other colleagues

## **[2] Site Profile for Simple Weir Development done by Fellow BEO/CEO [NEW/IMP]**

- Check the achievement of your fellow BEOs/CEOs at the end of each month
- Inform your district TSB officer you and your fellow’s achievements at the end of each month
- Then, TSB officer record all the BEO/CEO’s achievement on the same sheet (district version)

## **[3] Manuals/Extension Materials**

- Make a great use of manuals and extension materials for the promotion of T-COBSI.
- Distribute some copies of manual, poster, and leaflet to your fellow CEOs and client farmers at CAC meeting

If you have any question, please contact the Project Implementation Unit of each province.

### PIU Northern Province

Mr. Sifaya Mufalali	Email: sifayamufalali@yahoo.com	Mobile: 0977-372-247
Mr. Kelvin Simukoko	Email: kelvinsimukoko@hotmail.com	Mobile: 0979-291-515
Mr. Ackson Mbewe	Email: acksonmbewe@yahoo.co.uk	Mobile: 0979-120-338
Ms. Annie Bulaya	Email: bulayaannie@gmail.com	Mobile: 0976-411-299

### PIU Muchinga Province

Mr. Syansingu Stephen	Email: stesya42@gmail.com	Mobile: 0977-444-442
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### PIU Luapula Province

Mr. Mayson Saila	Email: maysonsayila@yahoo.com	Mobile: 0979-810-532
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### JICA Project Team

Project Team	Email: t.cobsi2014@gmail.com	
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**PLANNING SHEET FOR THE SIMPLE DIVERSION-WEIR SCHEMES  
PROVINCE**

Province: \_\_\_\_\_

Date Planned: \_\_\_\_\_

Name of District	Target on Construction of Simple Irrigation Schemes		Target on the Conduct of Training of Fellows
	No. of New Development Site	No. of Improvement Site	No. of Officers to be Trained
<b>TOTAL</b>			

AP-1-1-12

# Simple Weir Monitoring Sheet for Main BEO/CEO (Individual)

Name of Main BEO/CEO: \_\_\_\_\_

Name of Camp: \_\_\_\_\_

Name of District: \_\_\_\_\_

## Contents:

Sheet-1; Site Profile of New Sites and Improvement Sites done by Main BEO/CEO

Sheet-2: Monthly Achievement of Number of Fellows trained by Main BEO/CEO

Sheet-3: Site Profile of New Sites and Improvement Sites done by Trained Fellows

Sheet-4: Schedule of Camp Agriculture Committee (CAC) and Simple Weir Construction

Sheet-5: Receipt of Fuel

## ***Important!!***

- *All sheets are filled up by Main BEO/CEO individually.*
- *All sheets are reported monthly to District TSB Office by Main BEO/CEO*

## **Target and Achievement as Individual**

Target of New Sites as of May:



Achievement of New Sites as of Oct:

Target of Improvement Sites as of May:



Achievement of Improvement Sites as of Oct:

Target of Nos. of Trained Fellows as of May:



Achievement of Nos. of Trained Fellows as of Oct.:

### NEW CONSTRUCTION

No.	Site Name	Date Weir is Constructed	Date Irrigated Farming Started	No. of member Household	No. of member farmers in the site			Weir Type <sup>*1</sup>	Done in This Dry Season (2016)			Plan for the Next Dry Season (2017)			No. of Fish Pond made using COBSI irrigation
					Male	Female	Total		Canal Length dug in 2016 (km)	Opened Area in 2016 (lima)	Actual Irrigated Area in 2016 (lima) (A)	Canal Length to be dug (km)	Additional Area to be irrigated, (lima) (B)	Total Area to be irrigated (lima) (A+B)	
ex.	Monbo	May 16	Jun 25	13	38	40	78	2	2.3	8.5	7.5	1.4	3.0	10.5	4
1															
2															
3															
4															
5															
<b>Total</b>															

\*1 Weir Type: 0: Natural Diversion, 1:Inclined, 2:Single-Line, 3:Double-Line, 4:Trigonal, 5:Masonry, 6:Sandwich line

### NEW CONSTRUCTION

No.	Tickupon filling this form	COBSI Techs <u>YOU</u> have Disseminated								COBSI Techs <u>FARMERS' GROU</u> P have Applied							
		Irrigation Tech		Farming Tech					Market-Oriented Farming	Irrigation Tech		Farming Tech					Market-Oriented Farming
		O&M	On-Farm Irrigation	Contour-ridge	Soil Improve.	Compa. cropping	Nutritious Crop	Others		O&M	On-Farm Irrigation	Contour-ridge	Soil Improve.	Compa. cropping	Nutritious Crop	Others	
ex.	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1																	
2																	
3																	
4																	
5																	

Continue from the previous page



### IMPROVEMENT

No.	Site Name	Date Weir is Improved	No. of member Household	No. of member farmers in the site			Weir Type*1	Original		Additional by Improvement in 2016			Original + Newly Irrigated Area (Iima) (A+B)	No. of Fish Pond	
				Male	Female	Total		Original Canal Length (km)	Area originally irrigated (Iima) (A)	Canal Length Newly Dug (km)	Area Opened in 2016 (Iima)	Area Newly Irrigated in 2016 (Iima) (B)		Original	Newly Constructed
ex.	Kanuma	Jun 15	13	28	33	61	4	3.80	19.5	1.5	6.3	5.2	24.7	3	5
1															
2															
3															
4															
5															
<b>Total</b>															

\*1 Weir Type: 0: Natural Diversion, 1:Inclined, 2:Single-Line, 3:Double-Line, 4:Trigonal, 5:Masonry, 6:Sandwich line

### IMPROVEMENT

No.	Tick upon filling this form	COBSI Techs <u>YOU</u> have Disseminated								COBSI Techs <u>FARMERS' GROU</u> P have Applied								
		Irrigation Tech		Farming Tech					Market-Oriented Farming	Irrigation Tech		Farming Tech					Market-Oriented Farming	
		O&M	Gravity Irrigation	Contour-ridge	Soil Improve.	Compa. cropping	Nutritious Crop	Others		O&M	On-Farm Irrigation	Contour-ridge	Soil Improve.	Compa. cropping	Nutritious Crop	Others		
ex.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1																		
2																		
3																		
4																		
5																		

Continue from the previous page

**Number of Trained Fellows:**

Monthly Achievement of Number of Fellows trained by Main BEO/CEO

Date of Training done	Name of Trained Fellow	Name of Camp covered by trained Fellow	Mobile No. of trained Fellow

AP-1-1-16

Sheet-3: Site Profile of New Sites and Improvement Sites done by Trained Fellows (1/2)

**NEW CONSTRUCTION**

Name: \_\_\_\_\_, Camp: \_\_\_\_\_, District: \_\_\_\_\_

No.	Site Name	Date Weir is Constructed	Date Irrigated Farming Started	No. of member Household	No. of member farmers in the site			Weir Type <sup>*1</sup>	Done in This Dry Season (2016)			Plan for the Next Dry Season (2017)			No. of Fish Pond made using COBSI irrigation
					Male	Female	Total		Canal Length dug in 2016 (km)	Opened Area in 2016 (lima)	Actual Irrigated Area in 2016 (lima) (A)	Canal Length to be dug (km)	Additional Area to be irrigated, (lima) (B)	Total Area to be irrigated (lima) (A+B)	
ex.	Monbo	May 16	Jun 25	13	38	40	78	2	2.3	8.5	7.5	1.4	3.0	10.5	4
1															
2															
3															
4															
5															
<b>Total</b>															

\*1 Weir Type: 0: Natural Diversion, 1:Inclined, 2:Single-Line, 3:Double-Line, 4:Trigonal, 5:Masonry, 6:Sandwich line

**NEW CONSTRUCTION**

No.	Check upon filling this form	COBSI Techs <u>YOU</u> have Disseminated								COBSI Techs <u>FARMERS' GROU</u> P have Applied							
		Irrigation Tech		Farming Tech					Market-Oriented Farming	Irrigation Tech		Farming Tech					Market-Oriented Farming
		O&M	On-Farm Irrigation	Contour-ridge	Soil Improve.	Compa. cropping	Nutritious Crop	Others		O&M	On-Farm Irrigation	Contour-ridge	Soil Improve.	Compa. cropping	Nutritious Crop	Others	
ex.	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1																	
2																	
3																	
4																	
5																	
<b>Total</b>																	

Continue from the previous page

Sheet-3: Site Profile of New Sites and Improvement Sites done by Trained Fellows (2/2)

**IMPROVEMENT**

No.	Site Name	Date Weir is Improved	No. of member Household	No. of member farmers in the site			Weir Type <sup>*1</sup>	Original		Additional by Improvement in 2016			Original + Newly Irrigated Area (lima) (A+B)	No. of Fish Pond	
				Male	Female	Total		Original Canal Length (km)	Area originally irrigated (lima) (A)	Canal Length Newly Dug (km)	Area Opened in 2016 (lima)	Area Newly Irrigated in 2016 (lima) (B)		Original	Newly Constructed
ex.	Kanuma	Jun 15	13	28	33	61	4	3.80	19.5	1.5	6.3	5.2	24.7	3	5
1															
2															
3															
4															
5															
<b>Total</b>															

\*1 Weir Type: 0: Natural Diversion, 1:Inclined, 2:Single-Line, 3:Double-Line, 4:Trigonal, 5:Masonry, 6:Sandwich line

**IMPROVEMENT**

No.	Check upon filling this form	COBSI Techs <u>YOU</u> have Disseminated								COBSI Techs <u>FARMERS' GROU</u> P have Applied							
		Irrigation Tech		Farming Tech					Market-Oriented Farming	Irrigation Tech		Farming Tech					Market-Oriented Farming
		O&M	Gravity Irrigation	Contour-ridge	Soil Improve.	Compa. cropping	Nutritious Crop	Others		O&M	On-Farm Irrigation	Contour-ridge	Soil Improve.	Compa. cropping	Nutritious Crop	Others	
ex.	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1																	
2																	
3																	
4																	
5																	
<b>Total</b>																	

Continue from the previous page

Sheet-4: Schedule of Camp Agriculture Committee (CAC) and Simple Weir Construction

This table is to be submitted to Provincial PIU monthly by District TSB Office based on the report made by Main BEOs/CEOs

Schedule of Simple Weir Construction made through conducting CAC

May		Name of Village targeted	Activity on the day for Simple Weir Construction	June		Name of Village targeted	Activity on the day for Simple Weir Construction
1 <sup>st</sup>	S			1 <sup>st</sup>	W		
2 <sup>nd</sup>	M			2 <sup>nd</sup>	T		
3 <sup>rd</sup>	T			3 <sup>rd</sup>	F		
4 <sup>th</sup>	W			4 <sup>th</sup>	S		
5 <sup>th</sup>	T			5 <sup>th</sup>	S		
6 <sup>th</sup>	F			6 <sup>th</sup>	M		
7 <sup>th</sup>	S			7 <sup>th</sup>	T		
8 <sup>th</sup>	S			8 <sup>th</sup>	W		
9 <sup>th</sup>	M			9 <sup>th</sup>	T		
10 <sup>th</sup>	T			10 <sup>th</sup>	F		
11 <sup>th</sup>	W			11 <sup>th</sup>	S		
12 <sup>th</sup>	T			12 <sup>th</sup>	S		
13 <sup>th</sup>	F			13 <sup>th</sup>	M		
14 <sup>th</sup>	S			14 <sup>th</sup>	T		
15 <sup>th</sup>	S			15 <sup>th</sup>	W		
16 <sup>th</sup>	M			16 <sup>th</sup>	T		
17 <sup>th</sup>	T			17 <sup>th</sup>	F		
18 <sup>th</sup>	W			18 <sup>th</sup>	S		
19 <sup>th</sup>	T			19 <sup>th</sup>	S		
20 <sup>th</sup>	F			20 <sup>th</sup>	M		
21 <sup>st</sup>	S			21 <sup>st</sup>	T		
22 <sup>nd</sup>	S			22 <sup>nd</sup>	W		
23 <sup>rd</sup>	M			23 <sup>rd</sup>	T		
24 <sup>th</sup>	T			24 <sup>th</sup>	F		
25 <sup>th</sup>	W			25 <sup>th</sup>	S		
26 <sup>th</sup>	T			26 <sup>th</sup>	S		
27 <sup>th</sup>	F			27 <sup>th</sup>	M		
28 <sup>th</sup>	S			28 <sup>th</sup>	T		
29 <sup>th</sup>	S			29 <sup>th</sup>	W		
30 <sup>th</sup>	M			30 <sup>th</sup>	T		
31 <sup>st</sup>	T						

AP-1-1-19

Schedule of Simple Weir Construction made through conducting CAC

July		Name of Village targeted	Activity on the day for Simple Weir Construction	August		Name of Village targeted	Activity on the day for Simple Weir Construction
1 <sup>st</sup>	F			1 <sup>st</sup>	M		
2 <sup>nd</sup>	S			2 <sup>nd</sup>	T		
3 <sup>rd</sup>	S			3 <sup>rd</sup>	W		
4 <sup>th</sup>	M			4 <sup>th</sup>	T		
5 <sup>th</sup>	T			5 <sup>th</sup>	F		
6 <sup>th</sup>	W			6 <sup>th</sup>	S		
7 <sup>th</sup>	T			7 <sup>th</sup>	S		
8 <sup>th</sup>	F			8 <sup>th</sup>	M		
9 <sup>th</sup>	S			9 <sup>th</sup>	T		
10 <sup>th</sup>	S			10 <sup>th</sup>	W		
11 <sup>th</sup>	M			11 <sup>th</sup>	T		
12 <sup>th</sup>	T			12 <sup>th</sup>	F		
13 <sup>th</sup>	W			13 <sup>th</sup>	S		
14 <sup>th</sup>	T			14 <sup>th</sup>	S		
15 <sup>th</sup>	F			15 <sup>th</sup>	M		
16 <sup>th</sup>	S			16 <sup>th</sup>	T		
17 <sup>th</sup>	S			17 <sup>th</sup>	W		
18 <sup>th</sup>	M			18 <sup>th</sup>	T		
19 <sup>th</sup>	T			19 <sup>th</sup>	F		
20 <sup>th</sup>	W			20 <sup>th</sup>	S		
21 <sup>st</sup>	T			21 <sup>st</sup>	S		
22 <sup>nd</sup>	F			22 <sup>nd</sup>	M		
23 <sup>rd</sup>	S			23 <sup>rd</sup>	T		
24 <sup>th</sup>	S			24 <sup>th</sup>	W		
25 <sup>th</sup>	M			25 <sup>th</sup>	T		
26 <sup>th</sup>	T			26 <sup>th</sup>	F		
27 <sup>th</sup>	W			27 <sup>th</sup>	S		
28 <sup>th</sup>	T			28 <sup>th</sup>	S		
29 <sup>th</sup>	F			29 <sup>th</sup>	M		
30 <sup>th</sup>	S			30 <sup>th</sup>	T		
31 <sup>st</sup>	S			31 <sup>st</sup>	W		

AP-1-1-20

Schedule of Simple Weir Construction made through conducting CAC

September		Name of Village targeted	Activity on the day for Simple Weir Construction	October		Name of Village targeted	Activity on the day for Simple Weir Construction
1 <sup>st</sup>	T			1 <sup>st</sup>	S		
2 <sup>nd</sup>	F			2 <sup>nd</sup>	S		
3 <sup>rd</sup>	S			3 <sup>rd</sup>	M		
4 <sup>th</sup>	S			4 <sup>th</sup>	T		
5 <sup>th</sup>	M			5 <sup>th</sup>	W		
6 <sup>th</sup>	T			6 <sup>th</sup>	T		
7 <sup>th</sup>	W			7 <sup>th</sup>	F		
8 <sup>th</sup>	T			8 <sup>th</sup>	S		
9 <sup>th</sup>	F			9 <sup>th</sup>	S		
10 <sup>th</sup>	S			10 <sup>th</sup>	M		
11 <sup>th</sup>	S			11 <sup>th</sup>	T		
12 <sup>th</sup>	M			12 <sup>th</sup>	W		
13 <sup>th</sup>	T			13 <sup>th</sup>	T		
14 <sup>th</sup>	W			14 <sup>th</sup>	F		
15 <sup>th</sup>	T			15 <sup>th</sup>	S		
16 <sup>th</sup>	F			16 <sup>th</sup>	S		
17 <sup>th</sup>	S			17 <sup>th</sup>	M		
18 <sup>th</sup>	S			18 <sup>th</sup>	T		
19 <sup>th</sup>	M			19 <sup>th</sup>	W		
20 <sup>th</sup>	T			20 <sup>th</sup>	T		
21 <sup>st</sup>	W			21 <sup>st</sup>	F		
22 <sup>nd</sup>	T			22 <sup>nd</sup>	S		
23 <sup>rd</sup>	F			23 <sup>rd</sup>	S		
24 <sup>th</sup>	S			24 <sup>th</sup>	M		
25 <sup>th</sup>	S			25 <sup>th</sup>	T		
26 <sup>th</sup>	M			26 <sup>th</sup>	W		
27 <sup>th</sup>	T			27 <sup>th</sup>	T		
28 <sup>th</sup>	W			28 <sup>th</sup>	F		
29 <sup>th</sup>	T			29 <sup>th</sup>	S		
30 <sup>th</sup>	F			30 <sup>th</sup>	S		
				31 <sup>st</sup>	M		

AP-1-1-21

## Sheet-5: Receipt of Fuel

Sign upon Receiving Fuel

NAME	Particular	May	Jun	Jul	Aug	Sep	Oct	Total
	Amount (lit)							
	Sign							
	Amount (lit)							
	Sign							
	Amount (lit)							
	Sign							
	Amount (lit)							
	Sign							

AP-1-1-22

Indicate your name on the top and the name of your fellow officers below.



# Simple Weir Monitoring Sheet for District TSB Office (Totaling as District)

Name of TSB: \_\_\_\_\_

Name of TSB: \_\_\_\_\_

Name of District: \_\_\_\_\_

## Contents:

Sheet-1; Monthly Achievement of New Sites and Improvement Sites done by Main BEOs/CEOs

Sheet-2: Monthly Achievement of Number of Fellows trained by Main BEOs/CEOs

Sheet-3: Monthly Achievement of New Sites and Improvement Sites done by Trained Fellows

Sheet-4: Schedule of Camp Agriculture Committee (CAC) and Simple Weir Construction

Sheet-5: Recording Sheet for the Fuel Distribution (Monthly)

## **Important!!**

■ ***All sheets are filled up monthly by TSBs based on the Report made by Main BEOs/CEOs***

## **Target and Achievement as District**

Target of New Sites as of May:



Achievement of New Sites as of Oct.:

Target of Improvement Sites as of May:



Achievement of Improvement Sites as of Oct.:

Target of Nos. of Trained Fellows as of May:



Achievement of Nos. of Trained Fellows as of Oct.:

Sheet-1; Monthly Achievement of New Sites and Improvement Site done by Main BEOs/CEOs

Number of **New Sites** done by Main BEOs/CEOs (Monthly Achievement)

Name of Main BEO/CEO who constructed New Site	May	June	July	August	September	October	Total by the Main BEO/CEO
Total of the month							

Number of **Improvement Sites** done by Main BEOs/CEOs (Monthly Achievement)

Name of Main BEO/CEO who constructed Improvement Site	May	June	July	August	September	October	Total by the Main BEO/CEO
Total of the month							

AP-1-1-24

**Number of Trained Fellows as District:**

Monthly Achievement of Number of Fellows trained by Main BEOs/CEOs (Monthly Achievement)

Name of Main BEO/CEO who trained his/her Fellows	May	June	July	August	September	October	Total by the Main BEO/CEO
Total of the month							

AP-1-1-25

Sheet-3; Monthly Achievement of New Sites and Improvement Sites done by Trained Fellows

Monthly Achievement of Number of **New Sites** done by Trained Fellows (Monthly Achievement)

Name of Trained Fellow who constructed New Site	May	June	July	August	September	October	Total by the Trained Fellow
Total of the month							

Monthly Achievement of Number of **Improvement Sites** done by Trained Fellows (Monthly Achievement)

Name of Trained Fellow who constructed Improvement Site	May	June	July	August	September	October	Total by the Trained Fellow
Total of the month							

AP-1-1-26

Sheet-4: Schedule of Camp Agriculture Committee (CAC) and Simple Weir Construction

This table is to be submitted to Provincial PIU monthly by District TSB Office based on the report made by Main BEOs/CEOs

Schedule of Simple Weir Construction made through conducting CAC

May		Name of Village targeted	Activity on the day for Simple Weir Construction	June		Name of Village targeted	Activity on the day for Simple Weir Construction
1 <sup>st</sup>	S			1 <sup>st</sup>	W		
2 <sup>nd</sup>	M			2 <sup>nd</sup>	T		
3 <sup>rd</sup>	T			3 <sup>rd</sup>	F		
4 <sup>th</sup>	W			4 <sup>th</sup>	S		
5 <sup>th</sup>	T			5 <sup>th</sup>	S		
6 <sup>th</sup>	F			6 <sup>th</sup>	M		
7 <sup>th</sup>	S			7 <sup>th</sup>	T		
8 <sup>th</sup>	S			8 <sup>th</sup>	W		
9 <sup>th</sup>	M			9 <sup>th</sup>	T		
10 <sup>th</sup>	T			10 <sup>th</sup>	F		
11 <sup>th</sup>	W			11 <sup>th</sup>	S		
12 <sup>th</sup>	T			12 <sup>th</sup>	S		
13 <sup>th</sup>	F			13 <sup>th</sup>	M		
14 <sup>th</sup>	S			14 <sup>th</sup>	T		
15 <sup>th</sup>	S			15 <sup>th</sup>	W		
16 <sup>th</sup>	M			16 <sup>th</sup>	T		
17 <sup>th</sup>	T			17 <sup>th</sup>	F		
18 <sup>th</sup>	W			18 <sup>th</sup>	S		
19 <sup>th</sup>	T			19 <sup>th</sup>	S		
20 <sup>th</sup>	F			20 <sup>th</sup>	M		
21 <sup>st</sup>	S			21 <sup>st</sup>	T		
22 <sup>nd</sup>	S			22 <sup>nd</sup>	W		
23 <sup>rd</sup>	M			23 <sup>rd</sup>	T		
24 <sup>th</sup>	T			24 <sup>th</sup>	F		
25 <sup>th</sup>	W			25 <sup>th</sup>	S		
26 <sup>th</sup>	T			26 <sup>th</sup>	S		
27 <sup>th</sup>	F			27 <sup>th</sup>	M		
28 <sup>th</sup>	S			28 <sup>th</sup>	T		
29 <sup>th</sup>	S			29 <sup>th</sup>	W		
30 <sup>th</sup>	M			30 <sup>th</sup>	T		
31 <sup>st</sup>	T						

AP-1-1-27

Schedule of Simple Weir Construction made through conducting CAC

July		Name of Village targeted	Activity on the day for Simple Weir Construction	August		Name of Village targeted	Activity on the day for Simple Weir Construction
1 <sup>st</sup>	F			1 <sup>st</sup>	M		
2 <sup>nd</sup>	S			2 <sup>nd</sup>	T		
3 <sup>rd</sup>	S			3 <sup>rd</sup>	W		
4 <sup>th</sup>	M			4 <sup>th</sup>	T		
5 <sup>th</sup>	T			5 <sup>th</sup>	F		
6 <sup>th</sup>	W			6 <sup>th</sup>	S		
7 <sup>th</sup>	T			7 <sup>th</sup>	S		
8 <sup>th</sup>	F			8 <sup>th</sup>	M		
9 <sup>th</sup>	S			9 <sup>th</sup>	T		
10 <sup>th</sup>	S			10 <sup>th</sup>	W		
11 <sup>th</sup>	M			11 <sup>th</sup>	T		
12 <sup>th</sup>	T			12 <sup>th</sup>	F		
13 <sup>th</sup>	W			13 <sup>th</sup>	S		
14 <sup>th</sup>	T			14 <sup>th</sup>	S		
15 <sup>th</sup>	F			15 <sup>th</sup>	M		
16 <sup>th</sup>	S			16 <sup>th</sup>	T		
17 <sup>th</sup>	S			17 <sup>th</sup>	W		
18 <sup>th</sup>	M			18 <sup>th</sup>	T		
19 <sup>th</sup>	T			19 <sup>th</sup>	F		
20 <sup>th</sup>	W			20 <sup>th</sup>	S		
21 <sup>st</sup>	T			21 <sup>st</sup>	S		
22 <sup>nd</sup>	F			22 <sup>nd</sup>	M		
23 <sup>rd</sup>	S			23 <sup>rd</sup>	T		
24 <sup>th</sup>	S			24 <sup>th</sup>	W		
25 <sup>th</sup>	M			25 <sup>th</sup>	T		
26 <sup>th</sup>	T			26 <sup>th</sup>	F		
27 <sup>th</sup>	W			27 <sup>th</sup>	S		
28 <sup>th</sup>	T			28 <sup>th</sup>	S		
29 <sup>th</sup>	F			29 <sup>th</sup>	M		
30 <sup>th</sup>	S			30 <sup>th</sup>	T		
31 <sup>st</sup>	S			31 <sup>st</sup>	W		

AP-1-1-28

Schedule of Simple Weir Construction made through conducting CAC

September		Name of Village targeted	Activity on the day for Simple Weir Construction	October		Name of Village targeted	Activity on the day for Simple Weir Construction
1 <sup>st</sup>	T			1 <sup>st</sup>	S		
2 <sup>nd</sup>	F			2 <sup>nd</sup>	S		
3 <sup>rd</sup>	S			3 <sup>rd</sup>	M		
4 <sup>th</sup>	S			4 <sup>th</sup>	T		
5 <sup>th</sup>	M			5 <sup>th</sup>	W		
6 <sup>th</sup>	T			6 <sup>th</sup>	T		
7 <sup>th</sup>	W			7 <sup>th</sup>	F		
8 <sup>th</sup>	T			8 <sup>th</sup>	S		
9 <sup>th</sup>	F			9 <sup>th</sup>	S		
10 <sup>th</sup>	S			10 <sup>th</sup>	M		
11 <sup>th</sup>	S			11 <sup>th</sup>	T		
12 <sup>th</sup>	M			12 <sup>th</sup>	W		
13 <sup>th</sup>	T			13 <sup>th</sup>	T		
14 <sup>th</sup>	W			14 <sup>th</sup>	F		
15 <sup>th</sup>	T			15 <sup>th</sup>	S		
16 <sup>th</sup>	F			16 <sup>th</sup>	S		
17 <sup>th</sup>	S			17 <sup>th</sup>	M		
18 <sup>th</sup>	S			18 <sup>th</sup>	T		
19 <sup>th</sup>	M			19 <sup>th</sup>	W		
20 <sup>th</sup>	T			20 <sup>th</sup>	T		
21 <sup>st</sup>	W			21 <sup>st</sup>	F		
22 <sup>nd</sup>	T			22 <sup>nd</sup>	S		
23 <sup>rd</sup>	F			23 <sup>rd</sup>	S		
24 <sup>th</sup>	S			24 <sup>th</sup>	M		
25 <sup>th</sup>	S			25 <sup>th</sup>	T		
26 <sup>th</sup>	M			26 <sup>th</sup>	W		
27 <sup>th</sup>	T			27 <sup>th</sup>	T		
28 <sup>th</sup>	W			28 <sup>th</sup>	F		
29 <sup>th</sup>	T			29 <sup>th</sup>	S		
30 <sup>th</sup>	F			30 <sup>th</sup>	S		
				31 <sup>st</sup>	M		

AP-1-1-29

Sheet-5: Recording Sheet for the Fuel Distribution (Monthly)

Technical Cooperation Project on Community-Based Smallholder Irrigation

Station (District/Province): \_\_\_\_\_

Month: **MAY, 2016**

No.	Name of Officer	Position (TSB/BEO/CEO)	Location (District/Camp)	Amount Received (liter)	Date	Signature
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
14						
15						

AP-11-30



Sheet-5: Recording Sheet for the Fuel Distribution (Monthly)

Technical Cooperation Project on Community-Based Smallholder Irrigation

Station (District/Province): \_\_\_\_\_

Month: **JUNE, 2016**

No.	Name of Officer	Position (TSB/BEO/CEO)	Location (District/Camp)	Amount Received (liter)	Date	Signature
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
14						
15						

AP-11-31

Sheet-5: Recording Sheet for the Fuel Distribution (Monthly)

Technical Cooperation Project on Community-Based Smallholder Irrigation

Station (District/Province): \_\_\_\_\_

Month: **JULY, 2016**

No.	Name of Officer	Position (TSB/BEO/CEO)	Location (District/Camp)	Amount Received (liter)	Date	Signature
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
14						
15						

AP-11-32

Sheet-5: Recording Sheet for the Fuel Distribution (Monthly)

**Technical Cooperation Project on Community-Based Smallholder Irrigation**

Station (District/Province): \_\_\_\_\_

Month: **AUGUST, 2016**

No.	Name of Officer	Position (TSB/BEO/CEO)	Location (District/Camp)	Amount Received (liter)	Date	Signature
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
14						
15						

AP-11-33

Sheet-5: Recording Sheet for the Fuel Distribution (Monthly)

Technical Cooperation Project on Community-Based Smallholder Irrigation

Station (District/Province): \_\_\_\_\_

Month: **SEPTEMBER, 2016**

No.	Name of Officer	Position (TSB/BEO/CEO)	Location (District/Camp)	Amount Received (liter)	Date	Signature
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
14						
15						

AP-11-34

Sheet-5: Recording Sheet for the Fuel Distribution (Monthly)

**Technical Cooperation Project on Community-Based Smallholder Irrigation**

Station (District/Province): \_\_\_\_\_

Month: **OCTOBER, 2016**

No.	Name of Officer	Position (TSB/BEO/CEO)	Location (District/Camp)	Amount Received (liter)	Date	Signature
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
14						
15						

AP-11-35

Sheet-5: Recording Sheet for the Fuel Distribution (Monthly)

**Technical Cooperation Project on Community-Based Smallholder Irrigation**

Station (District/Province): \_\_\_\_\_ Month: \_\_\_\_\_, 2016

No.	Name of Officer	Position (TSB/BEO/CEO)	Location (District/Camp)	Amount Received (liter)	Date	Signature
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
14						
15						

AP-11-36

## Fuel Distribution System under T-COBSI (2016)

### **General**

In principle, T-COBSI is the GRZ's own initiative and thus necessary cost shall be disbursed by the government. However, to accelerate the project activity in a limited time, JICA would like to supplementary support the transportation cost of officers engaged.

### **Period**

- For TSB, Main BEO/CEO, including SAO: From May to October, 2016; on monthly basis
- For Fellow BEO/CEO: From the month of the completion of training by main BEO/CEO until October, 2016; on monthly basis

### **Amount**

As shown in the table below:

Category	Target	Liter per month	Unit
Provincial TSB (Northern & Muchinga)		50	Liter/office
Provincial TSB (Luapula)		100	Liter/office
District SAO	18 Districts	30	Liter/office
District TSB (w/o Permanent)	15 Districts	70	Liter/office
District TSB (w/ Permanent)	3 District (KAM, MNG, CPL)	100	Liter/office
Main BEO/CEO (w/o Permanent, w/o demo)	38 persons	30	Liter/person
Main BEO/CEO (w/ Permanent, w/ demo)	18 persons	40 (30 for Simple Weir) (10 for Demo (fix))	Liter/person
Main BEO/CEO (w/ Permanent)	3 persons (KAM, MNG, CPL)	40 (30 for Simple Weir) (10 for Demo (fix))	Liter/person
Fellow BEO/CEO (fellows)		30	Liter/person

Main BEO/CEO: those who participated in the kick-off training

Fellow BEO/CEO: those who are trained by the main BEO/CEO on COBSI techniques

### **Condition for All**

Following month's fuel disbursement is conducted only upon the receipt of 1) monthly reporting of achievement, 2) monthly record of fuel distribution, and 3) receipt from the filling station (where JICA team cannot receive it at the station).

### **Condition for Main BEO/CEO**

Amount of fuel alters every two months according to the number of sites constructed by the previous month. For the first two months, May and June, standard amount of 30L/officer is provided to all the main BEO/CEO. Then, following months are based on the tables below

#### *Allocation for July and August*

Achievement until June	Allocation in July and Aug	Remarks
2 or more sites	40L/officer/month	10 L of increase
1 site	30L/officer/month	No change
0 site	20L/officer/month	10L of decrease

### Allocation for September and October

<b>Achievement until August</b>	<b>Allocation in Oct</b>	<b>Remarks</b>
4 or more sites	40L/officer/month	10 L of increase
2-3 sites	30L/officer/month	No change
0-1 site	0	No allocation

### **Condition for Fellow BEO/CEO**

For fellow BEOs/CEOs, fuel is provided only after the completion of training by the main BEOs/CEOs who participated in the Kick-off Training. It is therefore required for main BEOs/CEOs to report the completion of the training to district TSB office, which covers: 1) date, 2) location, 3) name of the main officer who trained, 4) name of the fellow officers who are trained, 5) phone number of the fellow, 6) modality (lecture/ OJT), 7) contents taught, and 8) materials used.

After the reporting of the completion of the training, 30L/officer is provided to the fellow officer in the following month. Then, the amount of fuel to be distributed is varied according to the month the fellow BEO/CEO starts the irrigation development activities as follows:

<b>Month activity starts after completion of training</b>	<b>June (Liter /person)</b>	<b>Achievement in total until June (Sites)</b>	<b>July (Liter /person)</b>	<b>Aug (Liter /person)</b>	<b>Achievement in total until August (Sites)</b>	<b>Sep (Liter /person)</b>	<b>Oct (Liter /person)</b>
June	30	0	20	20	0~1	0	0
		1 or more	30	30	2 or more	30	30
July			30	30	0~1	0	0
					2 or more	30	30
Aug				30	0~1	0	0
					2 or more	30	30
Sep						30	30

- Training report is to be submitted from the main BEO/CEO to District TSB by the end of month.
- Fuel distribution to the fellow BEO/CEO is to be started from following month of the training report submission to T-COBSI PIU Team from District TSB.

### **Signatories for Authorization to the Fuel Disbursement**

Necessary signatories for authorization are as shown in the table below:

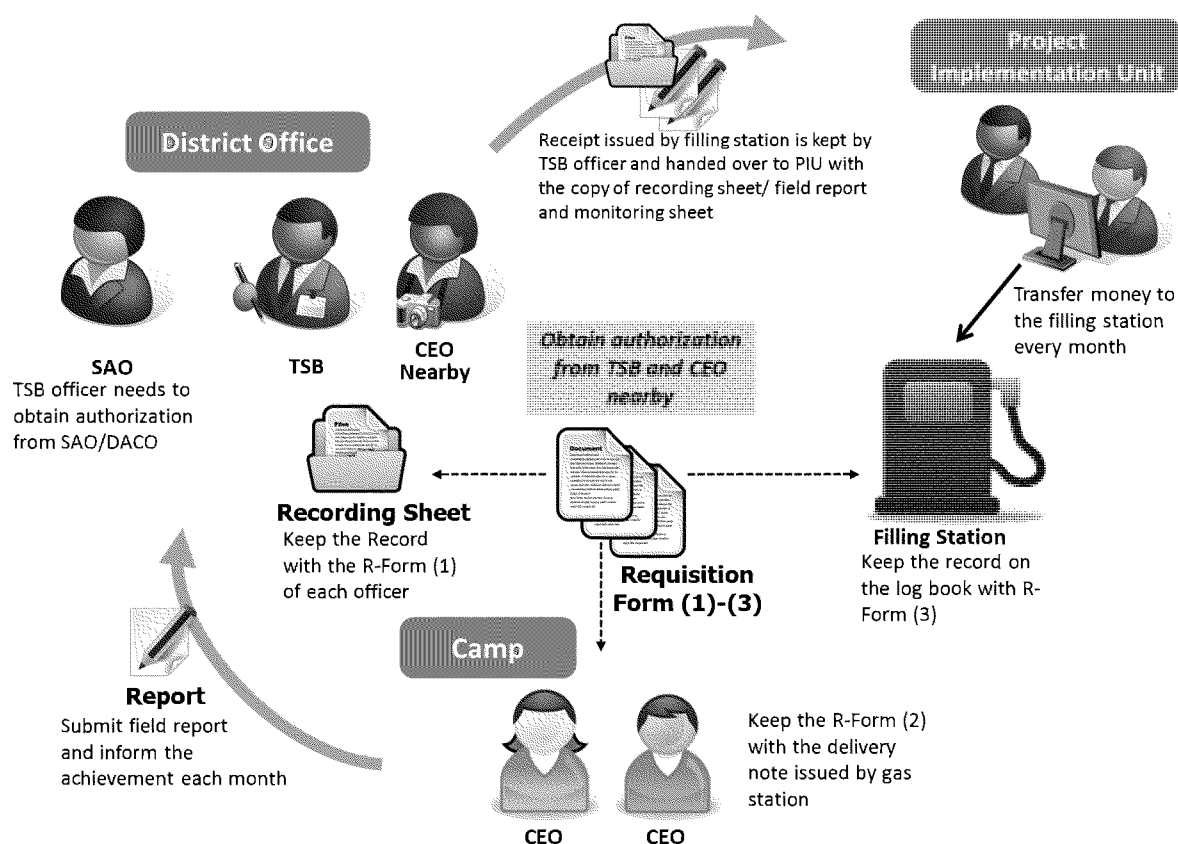
<b>Category</b>	<b>PACO/PAO/ JICA Team</b>	<b>DACO/SAO</b>	<b>District TSB</b>	<b>CEO Nearby</b>
Provincial TSB	✓			
District TSB (w/Permanent)		✓		
District TSB (w/o Permanent)		✓		
BEO/CEO (main)			✓	✓
BEO/CEO (fellows)			✓	✓

Provincial TSB officer needs to obtain authorization from either one of PACO, PAO or JICA project team  
 District TSB officer needs to obtain authorization from either DACO or SAO  
 BEO/CEO needs to obtain authorization from both district TSB officer and CEO nearby



## Distribution System

- 1) Project Implementation Unit (JICA team) makes a payment of fuel at the designated filling station and informs the district TSB officer
- 2) District TSB officer checks the arrival of the payment at the filling station and receive the receipt where applicable\*<sup>1</sup> (to be submitted to the PIU at the end of the month).
  - \*1: For the districts other than the ones using the filling station in Kasama
- 3) District TSB officer inform the designated CEOs in the district that fuel is ready.
- 4) Designated CEO obtains authorization from the two signatories, 1) district TSB officer and 2) CEO nearby, on the **requisition form** (R-Form) in triplicate.
- 5) Requisition form (1) is kept at the district office and upon the acquirement of the authorizations, CEO sign on the **recording sheet** that district TSB manages.
- 6) CEO brings requisition form (2) and (3) to the designated filling station and receives a designated amount of fuel of the month.
- 7) Requisition form (2) is kept by the filling station and the requisition form (3) is kept by the CEO.
- 8) Upon the receipt of the fuel, filling station may issue a delivery note to the recipient; then, CEO keeps it for the record.
- 9) At the end of month, CEO needs to submit a field report using the government's normal reporting format, copy of log book and recording sheet.
- 10) Again, without the submission of proper documents, fuel provision in the following month shall be suspended.
- 11) The distribution of fuel is subject to change: for those who do not perform anything for a certain period, distribution may be suspended.



**Figure: Fuel Distribution System under T-COSBI (2015 Dry Season)**  
(Case of CEO)

**Technical Cooperation Project on Community-Based Smallholder Irrigation  
(T-COBSI)**

**REQUISITION FORM FOR FUEL**

Exclusively for the Officers Engaged in the Captioned Project

Date: \_\_\_\_\_, 2016

*Prepare this form in triplicate for district office, filling station and yourself every month.*

To: JICA Project Team

From \_\_\_\_\_ (Name of Filling Station)

I refer to the above.

Could you please issue fuel from \_\_\_\_\_ account?

Name of Officer: \_\_\_\_\_ Camp: \_\_\_\_\_

Vehicle No. \_\_\_\_\_ District: \_\_\_\_\_

Description	Quantity (Liter)	Unit Price (ZMW/Liter)	Total Amount (ZMW)
Fuel for the promotion of COBSI for the month of _____, 2016			

Pre-Balance: \_\_\_\_\_ (Liter) (total amount of the account before provision)

Post-Balance: \_\_\_\_\_ (Liter) (total amount of the account after provision)

Requested by: \_\_\_\_\_ (Name of recipient)

Authorized by: \_\_\_\_\_ Signed: \_\_\_\_\_

Endorsed by: \_\_\_\_\_ Signed: \_\_\_\_\_

**Signatories for the authorization**

**Provincial TSB officer:** either PACO, PAO or JICA Project Team

**District TSB officer:** either DACO or SAO

**BEO/CEO:** both district TSB officer and CEO nearby

❖ Fuel is provided exclusively for the designated officers of T-COBSI project for proper operation of the project.

*Technical Cooperation Project on  
Community-Based Smallholder Irrigation*

# What's **T**-COBSI?



*Introduction to the  
T-COBSI Project*

**T-COBSI Project Team**



AP-1-1-41

## Objectives

4 Years: May 2013 to June 2017

### Overall Goal

- Increase Irrigated agricultural production in the target areas

### Project Purpose

- To promote and increase irrigated land through the provision of irrigation infrastructure for smallholder farmers in the target areas

**We serve the smallholder farmers**

## Target/Progress

In Net Three Years

Item	Target
No. of Extension Officers Trained	150
No. of TSB Officers Trained	35
No. of Permanent Sites Developed (w/ JICA Budget)	14
No. of Permanent Sites Developed (w/ MOA Budget)	36
Area Irrigated (ha) (JICA portion)	700
No. of Farmer Groups Benefited	700

2

## Achievement in 2014 Dry Season

**Permanent Weirs:** 7 sites under construction

### **Simple Weirs:**

No. of officers trained: 100 officers

No. of site developed: 253 sites

Area irrigated: 290.6 ha

(expected to increase by the end of 2016)

No. of beneficiaries: 4,377 farmers

3

# Achievement in 2015 Dry Season

**Permanent Weirs:** 4 sites under construction

**Simple Weirs:**

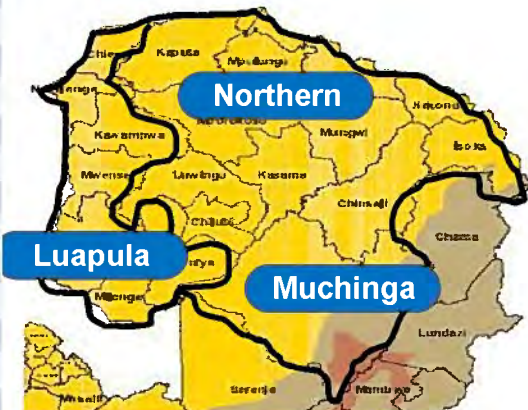
- No. of officers trained: 114 officers
- No. of site developed: 246 sites
- Area irrigated: 209.95 ha  
(expected to increase by the end of 2016)
- No. of beneficiaries: 7,083 farmers

AP-1-142

Province	District
Northern	Mbala
	Mungwi
	Kasama
	Mporokoso (w/Nsama)
	Luwingu
Muchinga	Mpika
	Isoka
	Mafinga
	Siwaang'andu
	Nakonde
Luapula	Chama (invited in 2014 & 2015)
	Kawambwa
	Mwansabombwe
	Mansa
	Chembe
	Mwense
	Chipili
	Milenge
	Nchelenge

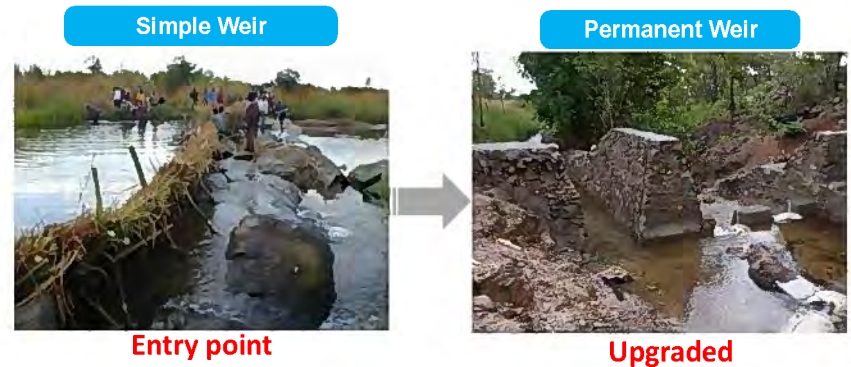
## Target Area

18 Districts where pilot project was implemented during the former study



# Project Approach

**Upgrading** simple one to permanent weir



Farmers need to get used to irrigated farming through simple weirs, ensuring the successful irrigation dev. with permanent weir

## COBSI Approach at a Glance

- **Simplified technology;**
  - Extension officers can be engaged in irrigation dev.
  - Farmers can construct, operate and manage
  - Constructed in a very **short time** (within a day)
  - Relies only on the local materials, thus **sustainable**
  - Constructed anywhere even in **Dambo areas**
  - **More number** of farmers can benefit
- **Learning process as Capacity Development**
  - Farmers can learn w/ simple schemes as an **entry point**
  - **Sustainability** is ensured when changed to permanent

# What's Simple-Weir?

**As an Entry Point**

## Simple but Functional



**Farmers themselves can construct and maintain**



# What's Permanent Weir?

**Stabilized Irrigation**

## Concrete Weir (L: 44 m)



AP-1-144

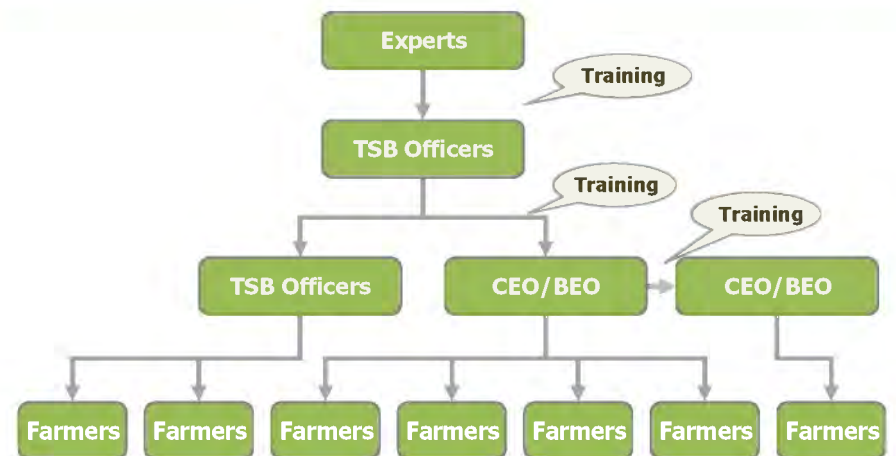
## Wet Masonry Weir



## Project Activities

14

## Irrigation Dev. in Extension



*Cascade-like dissemination of irrigation technologies*

15

## Annual Schedule

Season	Rain Season			Dry Season									
Month	1	2	3	4	5	6	7	8	9	10	11	12	
Training Modules				TOT	KOT					TSB	TSB	TSB	EVW

- **TOT:** Training of Trainers for KOT(2 days)
- **KOT:** Kick-off Training (5 days)
- **TSB:** TSB Training on Construction (1 day in May, July, Sept)
- **TOT :** Training of Trainers for MTT(3days)
- **MTT:** Mid-term Training (4 days)
- **EVW:** Evaluation Workshop (3 days)

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## Lecture on Irrigation Planning



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## Kick-off Training

### Water Resource Dev and Irrigated Farming

- Overview of T-COBSI
- COBSI approaches and schemes
- Gender, Institution and Environmental Consideration
- Field Observation
- Irrigation planning
- O&M
- Theory and field practice of simple weir construction
- Appropriate Farming Technologies
- Entry planning

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## Field Practice



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## On-farm Irrigation (Gravity)



## Market Research



AP-1-1-46

## Mid-term Training

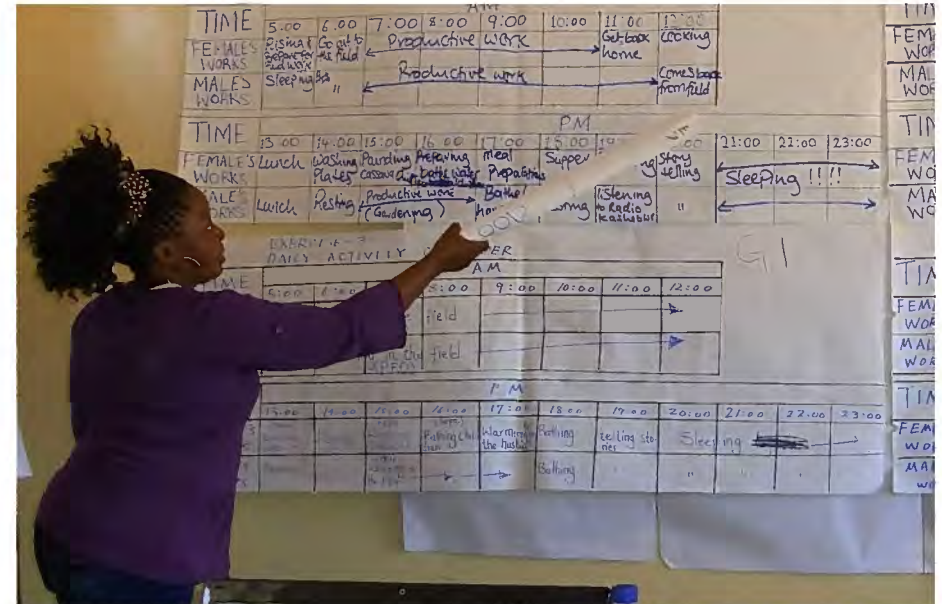
### Market-oriented Irrigated Agriculture (SHEP)

- Market research
- Selection of marketable crops
- Farming plan

### Gender Mainstreaming

- Role of female & male on farming
- Water and land distribution

## Gender Mainstreaming





# Permanent Weir Construction

## In collaboration with Farmers



## 11 Permanent Sites (2014 & 2015)



## Progress

Item	Target	2014	2015	Total	%
No. of Extension Officers Trained	150	62	70	132	88%
No. of TSB Officers Trained	35	38	42	42	120%
No. of Permanent Sites Developed (w/ JICA Budget)	14	7	4	11	79%
No. of Permanent Sites Developed (w/ MOA Budget)	36	0	0	0	0%
Area Irrigated (ha) (JICA portion)	700	291	210	501	72%
No. of Farmer Groups Benefited	700	253	246	499	71%

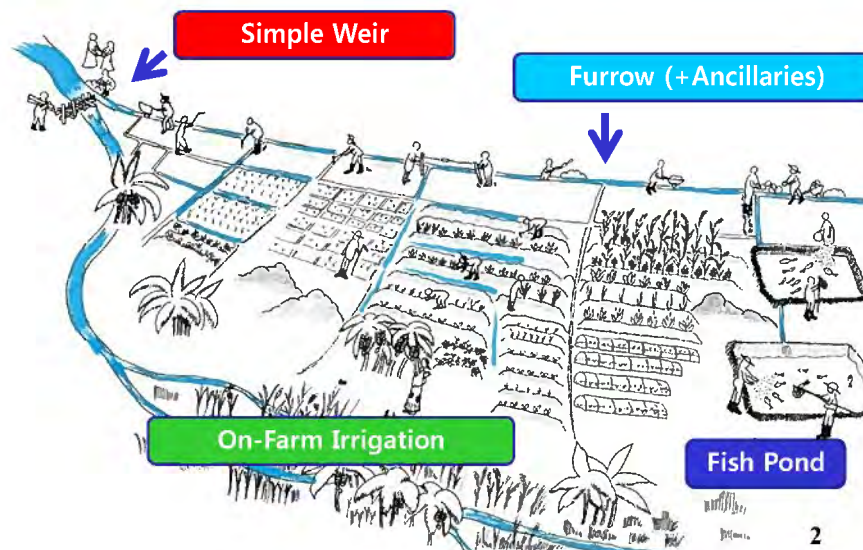


# Type of COBSI Schemes

## Contents:

- Weir type and construction method (theory)
- Canal alignment, ancillaries and potential diversion site (theory)
- Mobilization of Farmers (Dissemination material)
- Consideration on environment & society, and institution & gender
- Preparation of the field observation (distribution of gumboots)

## Facilities introduced by T-COBSI to lead the famers to Simple Weir Irrigation



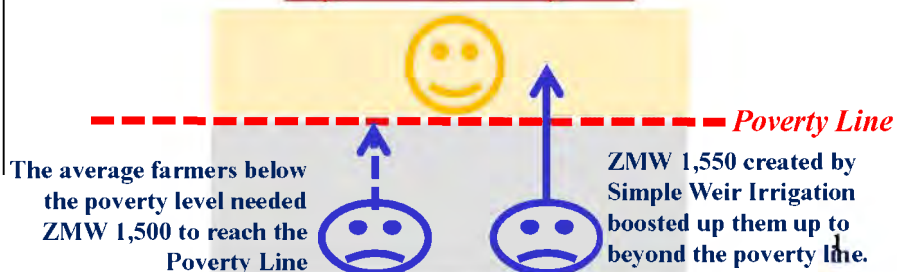
AP-1-1-49

## Impact gained by Simple Weir Irrigation

### The Fact observed in COBSI Study:

- An average farmer among those who are below the poverty line needed a supplemental income ZMW 1,500 to get over the poverty line.
- The average net income per farmers those who introduced the Simple Weir Irrigation was estimated as ZMW 1,550 which can therefore have an impact to raise the farmers to the poverty line.

### Beyond the Poverty Line



## Starting with Simple Weir "As Entry Point of Irrigation Agriculture"

When the farmers are used to irrigation farming by testing the Simple Weir, They proceed to the next stage, Permanent Weir-Upgrading.



# Simple Weirs

## 1. Single-line Weir



4

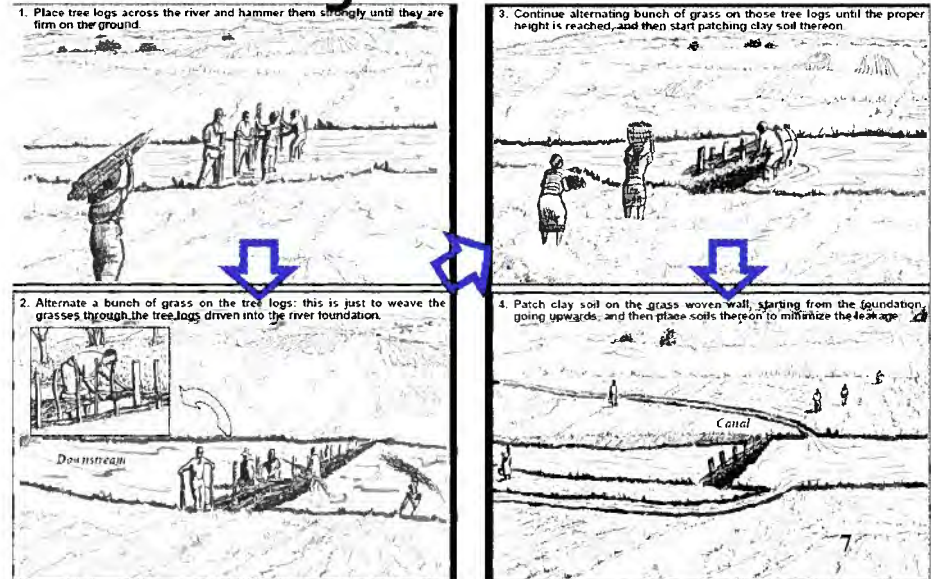
## Simple Weirs

4 Standard Types  
by COBSI's Experiences

1. Single-line Type
2. Double-line Type
3. Inclined Type
4. Trigonal Type

5

## How to Construct? - Single-line Weir -



## 2. Double-line Weir



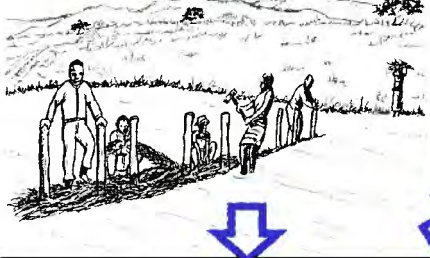
## 3. Inclined Weir



AP-1-1-51

### How to Construct? - Double-line Weir -

1. Place and drive tree logs across the river and alternate a bunch of grass within these trees, just as shown in No.2.4.



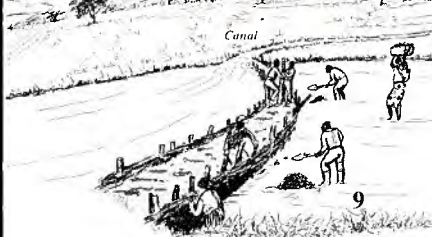
3. Make another line of tree logs woven with grasses about 70 - 150 cm downstream from the first weir.



2. After completing putting grass alternately put clay soil starting from foundation up to the top, and then ordinary soil on top of the clay and compact it just same as No.2.4.

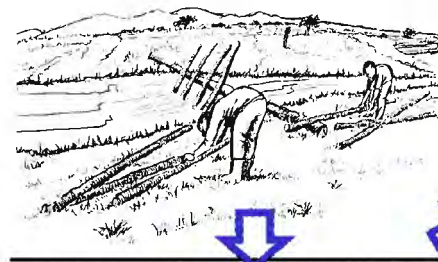


4. Place clay soil between the weirs and compact it, and continue the placing and compacting of the clay soil up to the required level.

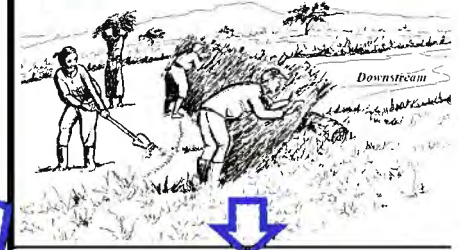


### How to Construct? - Inclined Weir -

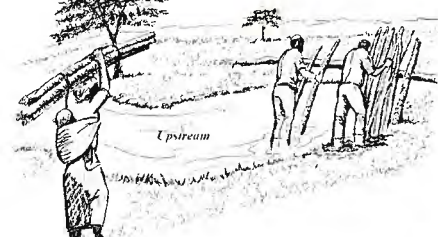
1. Put a big tree log traversing the whole stream width. The diameter of the tree is preferably more than 20 cm depending on the site condition.



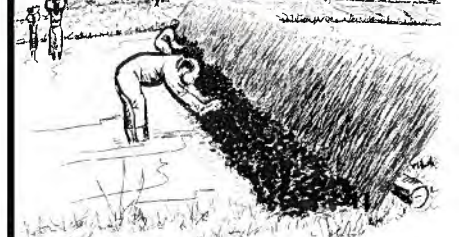
3. After completing the tree logs or the bamboo logs as in the second illustration, put grass cover on top, and throw clay soil underneath to minimize water leakage.



2. Put sizable tree or bamboo logs across the big tree log on an inclined position to the upstream. The inclination should be about 60-70 degrees from the ground.



4. Put clay soil on top thereafter and compact firmly with legs. Then add some ordinary soil to enhance sealing.



## 4. Trigonal Weir

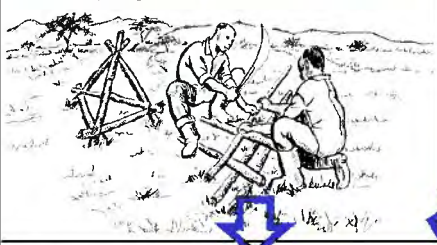


Front: Assembling twigs with grasses on the Trigonal-Supports

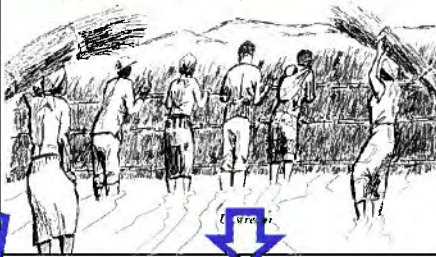
AP-1-1-52

## How to Construct? - Trigonal Weir -

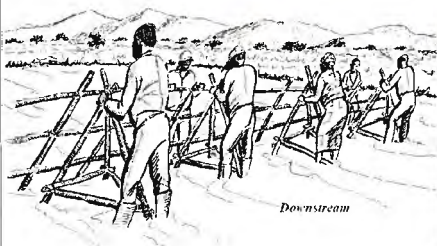
1. Cut tree or bamboo logs to a required size, depending on the height, which we want to tap water. Then construct number of trigonal stand structures depending on the width of the river.



3. Continue putting the grass on top of the horizontal members and put another layer of horizontal members again to tie them in position.



2. Place these trigonal stands across the river, and connect them by using horizontal members and tying them firmly. Then start putting grasses on the horizontal members.



4. Place clay soil on top of the grass firmly starting from the bottom up to the required level.



## Applicable Stream Conditions

Type of Weir	Stream Width	Stream Depth	Material of the stream bed, Others
1- Single-line	Wider	Shallower	✓ Ordinal soil foundation (soft foundation) of the stream bed ✓ Basic type
2- Double-line	Wider	Shallower	✓ Ordinal soil foundation (soft foundation) of the stream bed ✓ In case of much water leakage ✓ Applicable as a footpath (a bridge)
3- Inclined	Narrower	Deeper	✓ Both ordinal soil and rocky foundation of the stream bed
4- Trigonal	Wider	Shallower	✓ In case of rocky foundation of the stream bed

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## Simple Weirs

- Other Types:
1. Clay Masonry
  2. Sandwich Line

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A Clay Masonry Weir



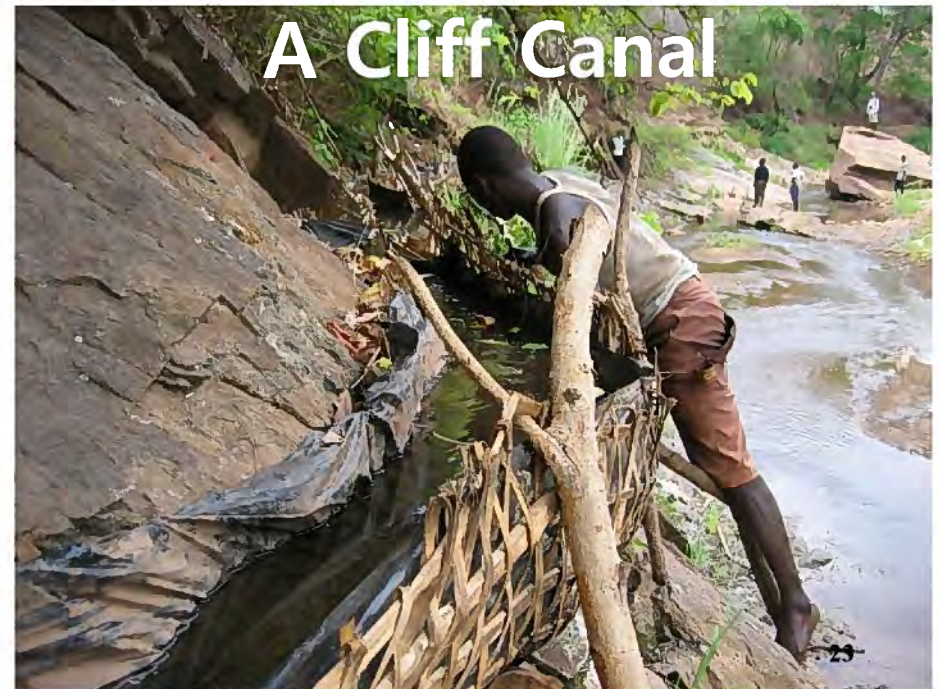
Permanent Weir  
*Upgraded from Simple Weir*

AP-1-1-53



**Sandwich Line**  
designed by a CEO of Mporokoso

# ***ANCILLARIES***





## Material in Locality



Grasses, Twigs, Soil, which they have in their locality

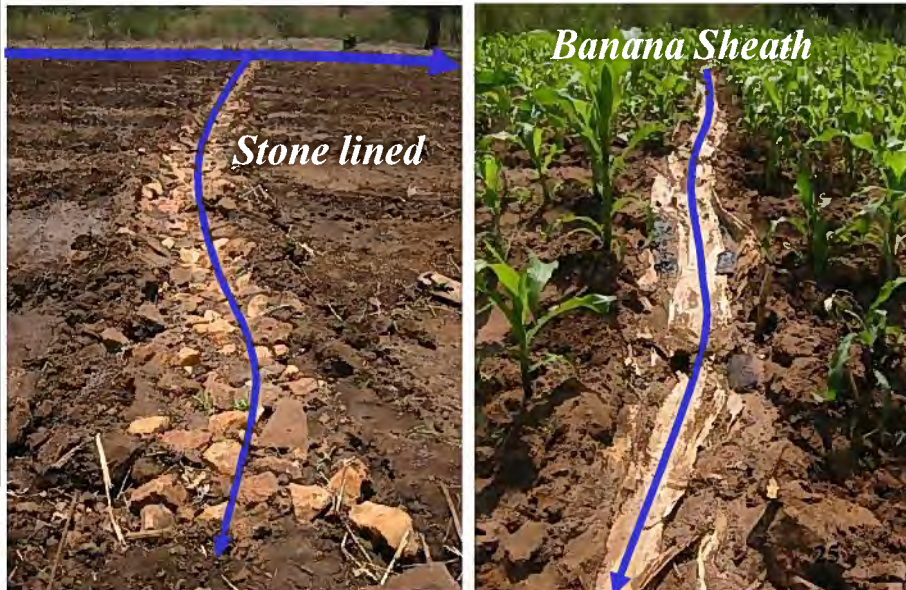
# Potential Diversion Place

*Where is the good place to put the simple weir?*

26

AP-1-1-55

## Canal Lining in Locality



*Stone lined*

*Banana Sheath*

## 3 Key Points

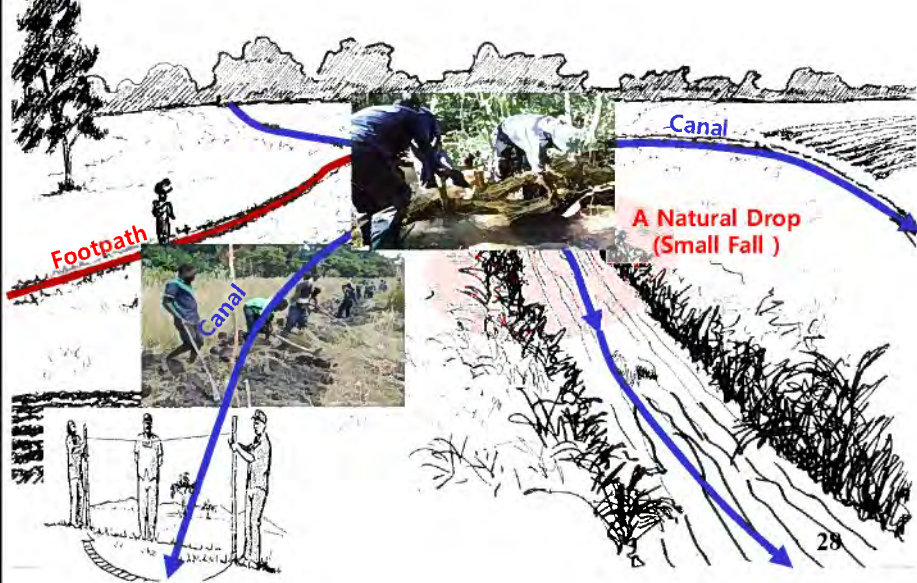
to find out the Potential Diversion Place

1. The stream should maintain perennial flow through a year
2. At just upstream of natural drops (upstream of Small Falls)
3. At near villagers' Footpaths which cross a stream.

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# Potential Diversion Place

Explore right upstream of a natural drop or near footpath



AP-1-1-56

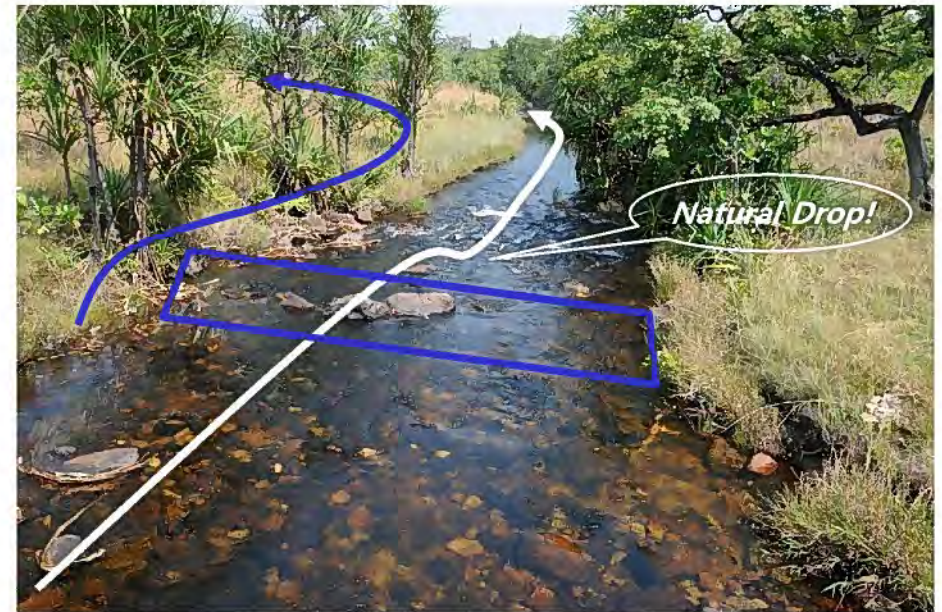
# A Potential Diversion Place



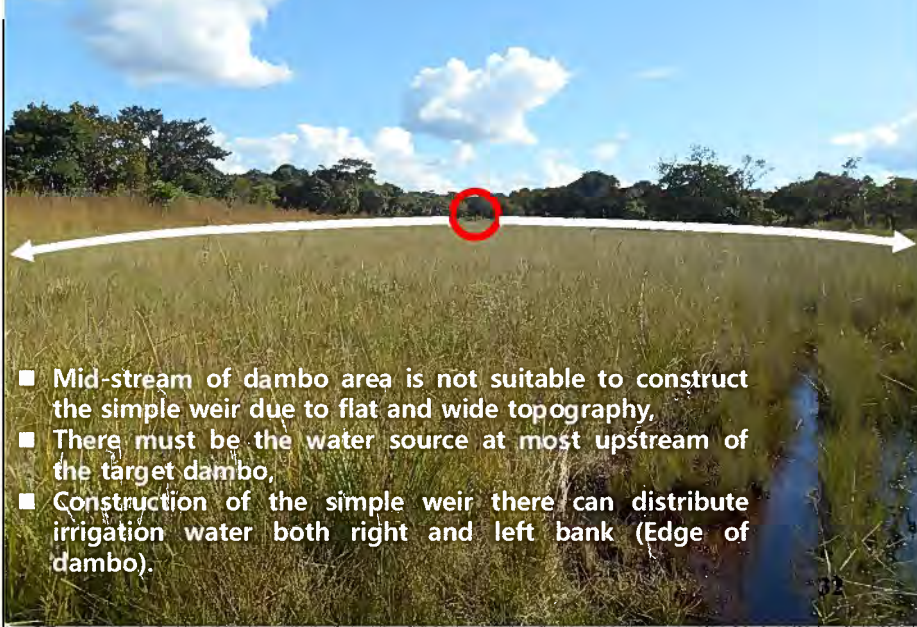
# A Potential Diversion Place



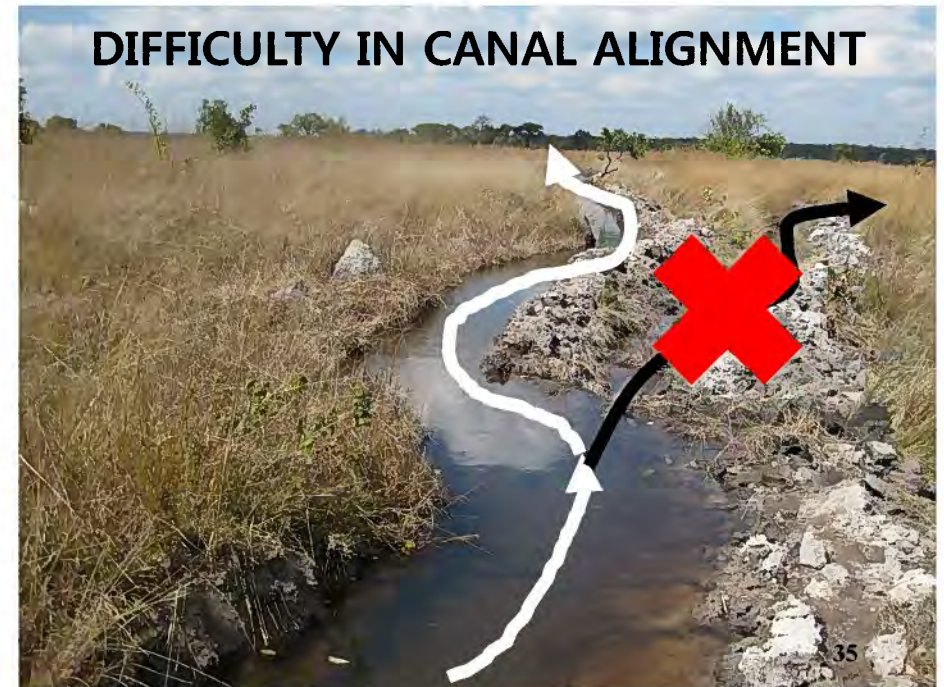
# A Potential Diversion Place



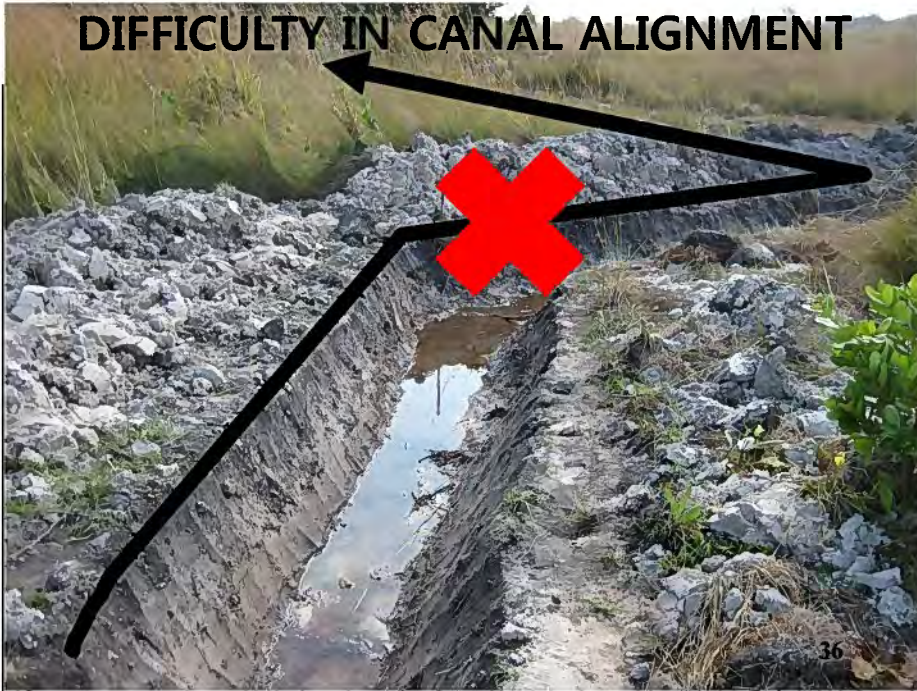
## A Potential Diversion Place in Dambo



# CANAL ALIGNMENT WITH SPRIT LEVEL



# DIFFICULTY IN CANAL ALIGNMENT



# CANAL ALIGNMENT WITH A SIMPLE TOOL



AP-1-1-58

# DIFFICULTY IN CANAL ALIGNMENT

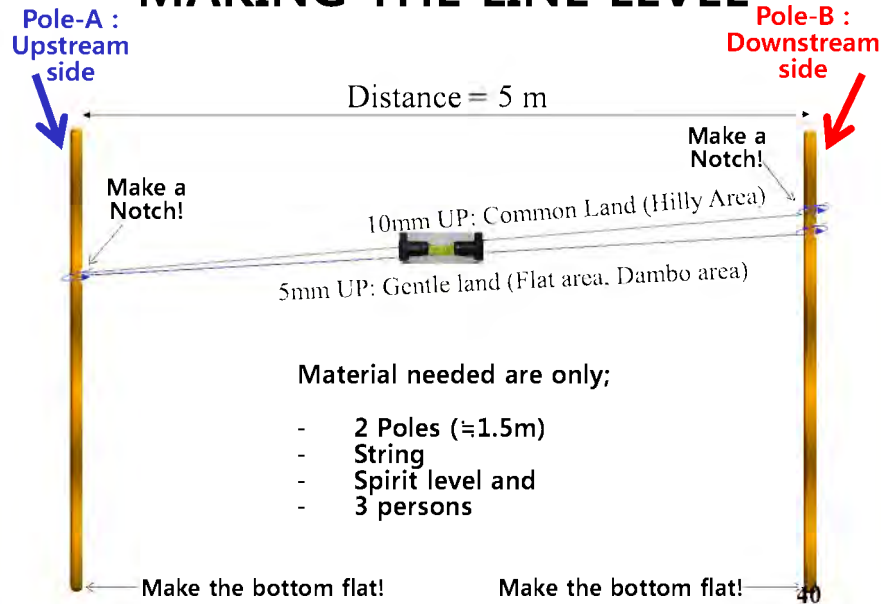


Dug too deep!

Struggling to raise out from the deep furrow

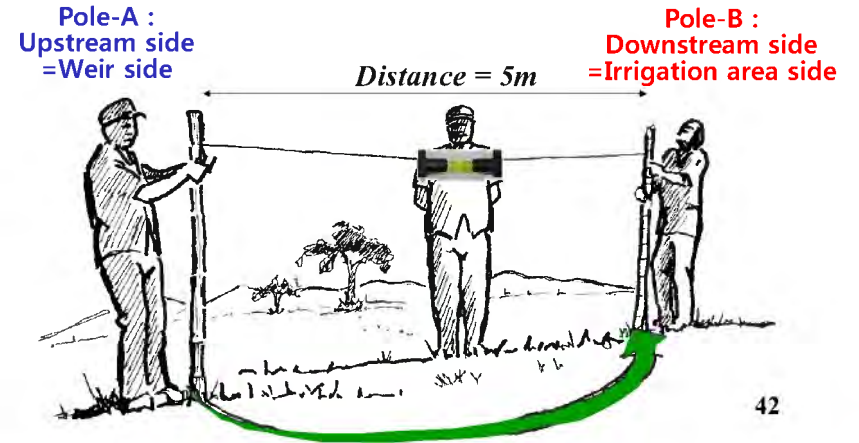


# MAKING THE LINE LEVEL



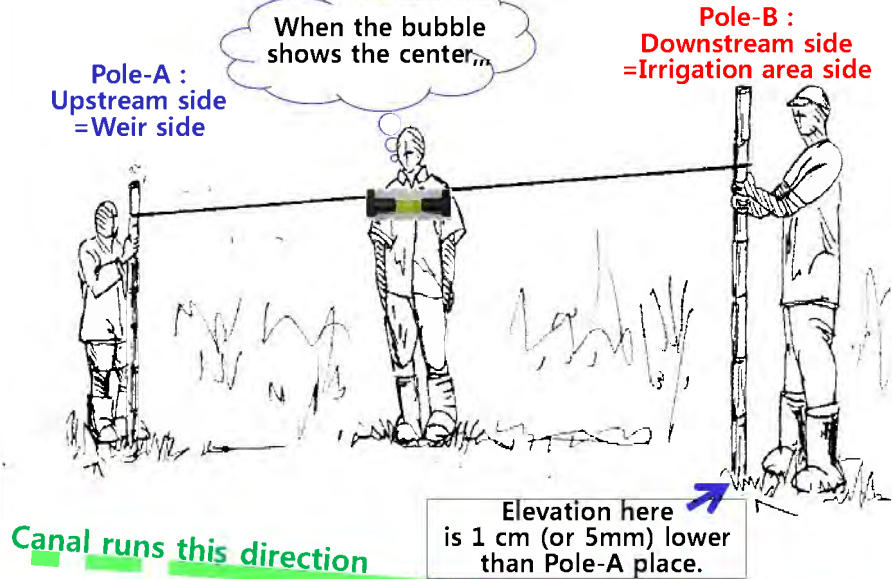
# COPING MEASURES

Distance	Off-set	Gradient	Land scape
5m	1.0 cm	1/500	Common land (Hilly area)
5m	0.5 cm	1/1,000	Gentle land (Flat area, Dambo area)



AP-1-1-59

# OFF-SET LINE LEVELING



# Taking Farmers to Simple Weir Irrigation (1)

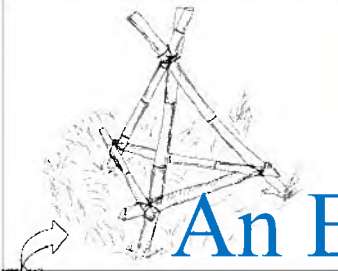
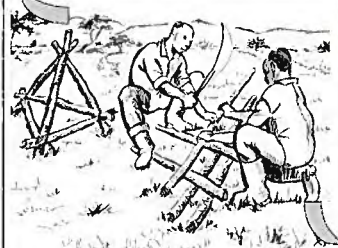
## 3 Key Words

Easy!  
Quick!  
and  
Low Cost – High Return!

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# 1. Technical Manuals (Picture Story)

S.4 Construction of A Temporary Weir: Trigonal Supported Wall Type (can be installed on a rock foundation where wooden log: can't be driven)

Step	Process:	Description	Remark:
1		<b>Assemble the Trigonal Prop (Standing Structure):</b> To support the brush dam made of grass/clay soil, the trigonal prop standing structures are assembled as shown in the left illustration.	The trigonal prop can be made of log/bamboo. The size of this structure is adjusted depending on the site condition with reference to the design tapping water level. As an example, each member is cut with a length of 1.3m for 0.5m of tapping water depth design. The diameter can be of the log/bamboo; one for the trigonal prop, around 7cm - 15cm each. The front of this structure, namely the upstream side, has an inclination to act as support for the fence made of log, bamboo, and grasses with clay soil, and lastly, to stand against the water pressure.
		<b>Refer to the Illustration:</b> Cutting of trigonal prop members and assembling of this structure.	An angle of inclination of the front face is around 70 - 80 degrees. To tie the members to each other, local materials such as natural grass/clay soil can be used.  The horizontal 3 members of the prop, forming the horizontal triangular, should be placed outside of the inclined members, so that it can stand more against water pressure.

An Example

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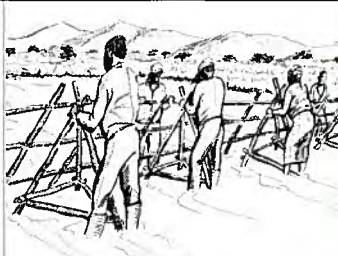

# Taking Farmers to Simple Weir Irrigation (2)

## Handy Manuals



*produced by T-COBSI for easy teaching and dissemination to the Community Peoples*

1. Technical Manuals
2. Posters
3. Leaflets

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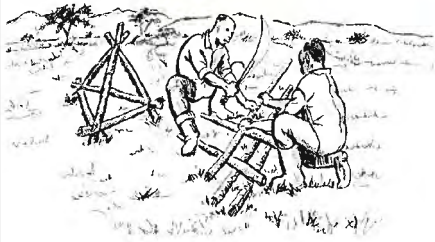
Step	Process:	Description	Remark:
2		<b>Set up the Trigonal Props across the Stream:</b> The trigonal props are set at the diversion point across the stream. Then, horizontal members are fixed to the trigonal props to keep them in place and in line to each other. At least, 3 horizontal members, i.e. upper, middle and lower members, should be fixed on the trigonal props. As a result, all of the trigonal props are connected by the horizontal members and will withstand the water pressure as one structure.	The trigonal props are placed at a proper interval in order to prevent this structure from falling down by water pressure. In case of a site in Mungwi district, the width of the stream at the diversion point was about 15m, and 10 trigonal props were set up giving an interval of 1.5m apart.  The diameter of fixed horizontal members can be around 3cm - 10cm each. The material can be wooden poles and bamboos.
3		<b>Place the Grasses on the Trigonal Props:</b> To tap the stream flow, the grasses are placed vertically in front of the trigonal prop, touching the bed level of the stream.	To reduce the water leakage, it is better to put the grasses very closely. In particular, at the bottom portion of stream, a lot of grasses should be used and should be placed tightly.  The horizontal member to be fastened on the top of the grass is the bottom one. Then the second and finally third on top. This helps to keep the grass very tight to the trigonal prop and indeed reinforces the trigonal prop.

47

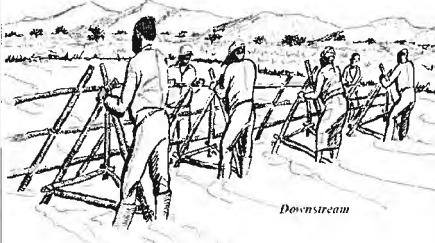
Step	Process	Description	Remarks
4		<b>Tie the Standing Grasses to the Trigonal Structure.</b> To prevent swelling out of the standing grasses, these grasses should be pressed against the trigonal prop by using horizontal members again tied with runners. Three horizontally parallel members, at the bottom, at the middle and at the top are finally fastened with the prop; or otherwise with the horizontal member already set behind the grasses. The grasses are thus sandwiched by those horizontal members set in front and behind.	To press down the grasses on the trigonal prop, another layer of horizontal member are put in front of grasses which are made to run parallel with the first horizontal member already placed at beginning but at a specified interval between each other and these are tightly tied to the first layer of horizontal member. In so doing, grass is tightly sandwiched between horizontal members.  The number of layer of horizontal member is dependent on the height of the trigonal weir. In general, 3 lines of horizontal members are placed.
5		<b>Put the Clay Soil on the Grass Fence.</b> Clay soil is placed on the grass fence starting from the foundation or streambed level. To prevent water leakage, the clay soil is patched on the grass fence. The clay soil is put not only on the grasses as a part of brush dam but also on the gap between the bottom edge of the grass fence and the natural ground/exposed rock foundation.	Putting of clay soil should be started at the bottom and much attention should be put at this stage. This is because this area is very critical in reducing water leakage and thus where the water pressure is the highest. A lot of clay soil should be placed at the bottom in order to make it water tight as much as possible to prevent leakage.

## 2. Posters (Four-Flame Story)

1. Cut tree or bamboo logs to a required size, depending on the height, which we want to tap water. Then construct number of trigonal stand structures depending on the width of the river.



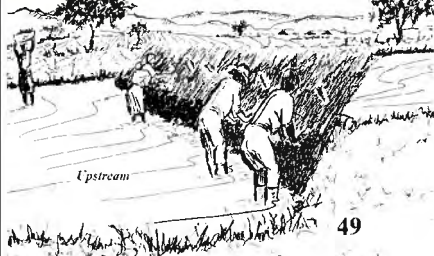
2. Place these trigonal stands across the river, and connect them by using horizontal members and tying them firmly. Then start putting grasses on the horizontal members.



3. Continue putting the grass on top of the horizontal members and put another layer of horizontal members again to tie them in position.



4. Place clay soil on top of the grass firmly starting from the bottom up to the required level.

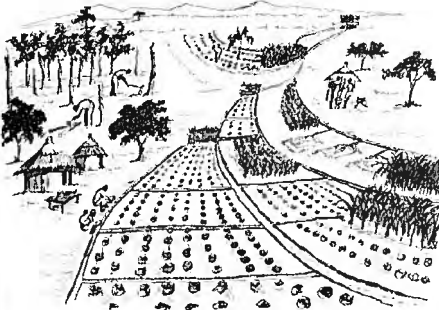


## 3. Leaflets

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)  
MINISTRY OF AGRICULTURE AND COOPERATIVES (MACO),  
REPUBLIC OF ZAMBIA

### STARTING IRRIGATION IN OUR LOCAL CONTEXT:

**Rather than waiting for someone else's support,  
why don't we try something we can do first?**



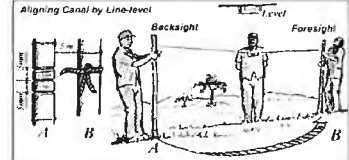
**SANYU CONSULTANTS INC., TOKYO, JAPAN**

Promote Irrigation as a Culture!

#### 4. ALIGN CANAL AND START DIGGING

The simplest way of aligning canal is to follow the water flow by gravity, namely, 1) dig the canal from the diversion point for example a 10 meter distance, 2) let the water flow in the dug canal, 3) deepen the canal and/or shift the canal alignment toward lower side (stream side) if the water does not run well, and 4) repeat the process until the end point.

Better way of canal alignment is to use spirit line level. Interval of the two poles should preferably be 5 meter, and one side of the tied points should be 0.5 - 1 CM HIGHER THAN THE OTHER. Pole with higher tied point should always be placed to the side, not like conventional alternate placing, 0.5 cm difference in 5 meter gives 1:1000 gradient suitable for gentle topography like dambo, and 1 cm gives 1:500 gradient adaptable for sloped topography. Note that in a very gentle plain like dambo where you can hardly find the B point in 5 m radius area, try 10 - 15m interval instead of the standard 5 m with 1 - 1.5 cm difference, whereby giving 1:1000 gradient.



#### 5. LAYOUT THE PLOT AND DO THE IRRIGATION

There are two irrigation methods adaptable for smallholders.

MAL 4 JICA

Thank you for  
your kind attention

# ENVIRONMENTAL AND SOCIAL CONSIDERATIONS IN IRRIGATED AGRICULTURE JICA T-COBSI KOT 2016



Table 1. Water Related Institutions in Zambia

Body	Governing Act	Role
Water Development Board (WDB)	Water Act of 1948	To control the use of all surface water resources in the country by allocating water rights to different users
Department of Water Affairs (DWA)	Water Act of 1948	Provide technical support to the Water Development Board Monitoring development of water structures in the country Monitoring of water levels in national rivers Conducting Geophysical surveys Hydrological and meteorological data collection and analysis for public use
Environmental Council of Zambia (ECZ)	Environment Protection and Pollution Control Act of 1990	Control of pollution in national water ways Issuing licences for effluent discharges Identifying areas that require Environmental impact assessments Setting standards for effluent Enforcing effluent discharge standards Policy formulation
National Water and Sanitation Council (NWASCO)	Water Supply and Sanitation Act of 1997	Regulate Water Supply and Sanitation Supervise the operations of newly formed commercial utilities Enforcement of water quality standards Regulating the levels of capital expenditure associated with meeting water quality standards Evaluating efficiency levels Giving incentives for improved performance Penalizing defaulters for negligence
Zambia Bureau of Standards (ZBS)	Zambia Bureau of Standards Act of 1982	Set standards for drinking water
Ministry of Health (MoH)	Public Health Act of 1978	Enforcement of water quality standards
Ministry of Local Government and Housing (MLGH)	Local Government Act of 1980	Physical implementation of the National Water Policy Service Provider in areas where Commercial Utilities have not been created

## Environment Related Institutions in Zambia

- Zambia **Environmental Management Agency**
- Zambia Wildlife Management Authority
- **Ministry of Lands, Natural Resources and Environmental Protection**
- Ministry of Mines, Energy and Water Development
- Ministry of Agriculture
- Zambia Wildlife Authority (ZAWA)

## Necessity of Environmental and Social Considerations

To work inline with **Laws and Regulations** of Zambia:

- ✓ Environmental Management Act
  - ✓ Land Act
  - ✓ Water Act
  - ✓ Forests Act
  - ✓ Agricultural Lands Act
  - ✓ National Heritage Conservation Act
  - ✓ Environmental Impact Assessment (EIA)
- Regulations**



## Document Citation

*Environmental Management Act* suggests categorization of Projects and conduction of respective environmental study per requirement.

**Environmental Impact Assessment Regulations** of Zambia states that:

- ✓ Dam and barrage covering a total area less than **25ha do not required** environmental impact assessment (**EIA**)
- ✓ Irrigation schemes covering an area less than **50ha do not** require **EIA**.

4

## Items of Environmental Concerns

Main **Items** to Consider for **Small Scale Irrigation Projects** are:

- Occurrence of **conflict** among communities/people
- Increase in income **disparities**
- Adjustment of **water rights**
- **Increase** in use of **agrochemicals**
- Outbreak/spread of **diseases**
- Increase in wastes
- **Damage** to historical, religious and cultural **assets**

6

## Document Citation

✓ Clearance of forest less than **50ha** does **not** required **EIA** (Forest Act)

✓ Any person shall have **right** to the primary use of public water which is found in its natural channel or bed at such places to which access may be lawfully had (Water Act)

✓ **Water use** for non-commercial purpose and for **subsistence** do **not** required **permit** (Water Act)

5

## Items of Environmental Concerns

- **Damage** to protected **flora and fauna**
- **Soil erosion** and land degradation
- **Changes** in surface and groundwater **hydrology**
- Effect on **flow regime** in the water course
- Sedimentation, inundation and **water stagnation**
- Deterioration of **water quality**
- Damage to landscape
- Drastic population increase
- **Infestation** of crop **pest and disease**

7

## Points of Attention

- **Items** of environmental concerns given here **are general** to small irrigation project. You may add or delete an item taking into account the **characteristics** of the project and the particular circumstances of the **locality** in which the project is implemented.
- In case of **temporary weir**, prior to withdrawal of water from river/stream you should **Notify** the water officer (authority) in the area.

8

## Points of Attention

- **Confirm** with local Forest Officers in your area regarding existence of **protected forest** or **species** in the proposed site, and seek guidance on the matter.
  - **Cutting** any tree with **more than 14-centimeter** diameter at breast height (about 1.3-meter) from ground surface, need **permission** from local **Forest Office** against **payment** as price of the tree.
- Example; **225 Kwacha** must be **paid** to Forest Office for cutting a Mukwa tree, and **175.5K** for a Mofu tree.

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## Points of Attention

- For **permanent weir**, you should apply to Water Resources Management Authority of Zambia through local water officer (authority) for **securing water permit**.
- To collect the **Application Form** for a water permit, and knowing relevant **procedure**, contact water officer (authority) in your area.

9

## Points of Attention

- **Cautiously**, trees within 60-meter distance from river should not be cut, and left for nature conservation purpose.
- In case **objects of historical, cultural, religious** values exist in the area, consult with the respective authorities and seek their guidance on the matter

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## General Guidance on Dealing with Environmental Issues Relevant to Small Scale Irrigation Projects

1. When **diverting water** to an irrigation scheme, some amount should remain **flowing** in its **original course** for **downstream** and **environment** purposes
2. **Land** for irrigation should be **levelled** to avoid water **stagnation** in the area, which could serve as **breeding spot** for insects/**mosquitos**
3. **Encourage** stay of **insect-eater birds** (bat) in the area, to **control** the **mosquito** population
4. **Prevent leakage** in canal system, and **overwatering** in the fields to minimize the soil **erosion/land degradation**.

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## How to Secure a Water Permit

Contact the local Water Office and fill the:

### APPLICATION FOR THE PRIMARY OR SECONDARY USE OF PUBLIC WATER

It contains items such:

- Full Name of Applicant:
- District:
- State whether the property is held on leasehold or freehold or other:
- Has property been surveyed?

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## General Guidance on Dealing with Environmental Issues Relevant to Small Scale Irrigation Projects

5. To assure that the diverted **water** is properly distributed and **well managed**, encourage establishment of **water user's group** and a **neutral organ to oversee** all the **water related issues**, including **operation** and **maintenance** aspects.
6. Encourage establishment of **Dispute Resolution Council** to assist in solving the water related disputes.  
Local **officers**, **NGO's** members and **reputable persons** in the community can be members of such **council**.

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## Items in *Application* for Water Permit

- Area of Property: ..... Hectares
- Water required from: ..... River
- Which is a tributary of: ..... River
- Amount of water applied for: ... cubic meters/day
- Purposes of water applied for:
- Domestic..... Stock..... Irrigation...

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## Items in *Application* for Water Permit

- Total **area** to be irrigated... .. hectares
- **Details** of any **dam, weir, furrow** Constructed/Proposed?.....
- **Names of other users** (particularly **downstream**) who might be affected by the granting of this application

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## After Submission of the *Application*

After submission of Application for Water Permit to local Water Office, their engineer will make assessment on all the aspects and prepare the ENGINEER'S REPORT ON APPLICATION FOR WATER PERMIT, which **contains items** such as:

- **Flow** at time of visit
- Method of **gauging**
- Estimated **minimum flow**

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## Attachments to *Application* form for Water Permit

- **Submit sketch, map** or plan, showing your property in relation to neighboring properties. The **river affected** and the site of works in existence or to be constructed must be indicated as accurately as possible.
- **Simple directions** of the road to the property from any well-known landmark, to enable a **visit of inspection** to be made without difficult.

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## *Items* in ENGINEER'S REPORT ON APPLICATION FOR WATER PERMIT

- Month in which flow ceases each year, if non-perennial
- Catchment's Area
- Method of obtaining water, including conservation works
- Cost of above works
- Water Officer's comments and recommendations

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## Procedures for Obtaining Permission to Cut Trees

To obtain a permission for cutting trees with 14cm diameter at 1.3m height do as follows:

- ① Visit the Forest Officer in your area
- ② Take him/her with you to project site for marking and counting the trees to be cut
- ③ Pay fee of the trees and get receipt. Price List is available in Forest Offices.
- ④ Start cutting the designated trees

20

# THANK YOU



## Protected Trees in Zambia

**Forest Act** states that: “No person shall without a license fell, cut, fashion, burn, injure, take or remove any protected tree, except in or from any land vesting in any person as freehold or leasehold.”

Regarding restrictions concerning protected trees consult with Forest Officer in your area.

21

# Institution & Gender



## 1. Institutions

### What is the importance of organizing an INSTITUTION ?

- ☞ An **Institution** is the key to the sustainability of project in terms of...
- Operation of the scheme**  
(ex: Check the water level of weir & canal, Intake of proper water, Rotation of water to each plot, etc)
- Maintenance of the scheme**  
(ex: Collecting water user's fee for future maintenance, cleaning weir & canal, Weeding, etc)
- Coordination among users and up streamers & down streamers**  
(ex: Rotation of water among users, Making regulation, Holding periodical meeting, etc)

How about the situation in COBSI/T-COBSI sites ?

### Questions

1: How many households does one irrigation scheme cover ?

2: How many members does the irrigation committee include average ?

Let's see.....

4

## Chairperson's another role

Rank	Other role	No. of Sites
1	Village headman	26
1	Village committee member	26
3	Village committee secretary	13
4	Village committee chairperson	7
4	Cooperative chairman	7
6	CCPU member	6
6	NHC member	6
8	Village Committee Trustee	5
8	Lead farmer (MAL)	5
10	Church leader	4

6

## About Irrigation scheme

☞ Each scheme has average **35 households** (= 176 beneficiaries)

☞ **Irrigation Scheme Committee(ISC):**  
Average **10.2 members** (Chairperson, Vice-CP, Secretary, Vice-Sec, Accountant, Ordinal members, and Trustees)

☞ **ISC is categorized as one of the village Groups.** ⇒ So, ISC needs to communicate with Village Committee (VC), Cooperative and so on.

☞ **How ISC members chosen?**

- Elected by member (77%), Voluntary(14%), Elected by village representative(9%)

⇒ It seems that ISC is independent from existing village committees ??

5

Half of the ISC Chairpersons in our project sites have other roles in their community;

village head, village committee's chairperson and Secretary, Cooperative Committee's chairperson, CCPU member, NHC member, Lead farmer, Church leader and so on.

These are important roles in each community.

⇒ ISC members are mostly connected to existing village committee.

So, you need to communicate with the village committee when you start project for the permission and coordination.

7

## Let's see their activities

### Maintenance works in each schemes

Most of maintenance works are well done in each schemes;

- Check water flow: 84%
- Patrol Furrow: 87%
- De-silting furrow: 77%
- Cleaning and weeding Furrow: 88%
- Repairing weir: 77%
- Repairing furrow: 83%

Around  
80% sites  
^ \_ ^

LOW!  
> \_ <

But...

De-silting Weir: 58%

Many temporary and permanent weirs are suffered from silting. **It may cause influx of silt to canal and silt in canal.** Cleaning the weir to de-silt is strongly recommended.

8

### -Water User's fee : collecting in only 6.3% of sites

(24 sites of 382)

The amount and the use are described in the table below...

K	Unit	No. of Sites Responded	Use of Water Users' Fee
5	Year	2	For pumping water from the river,
10	Year	2	To buy fertilizer, seeds, and food for meeting
20	Year	4	To buy farming inputs (seeds, chemical fertilizer and pesticides), For maintenance of furrow. For renewal of certificate, To contribution towards funeral, For gatherings and meetings.
25	Year	2	For maintenance of furrow, To de-silt and buy food when working in the furrow.
30	Year	1	To use during cleaning of the weir
40	Year	1	For the maintenance of furrow
50	Year	2	For clearing the group garden, To maintain the water furrow and renewing water rights
5	Month	1	For maintenance of scheme
60	Year	1	For maintenance of scheme
100	Year	1	For weeding of the furrow.
200	Year	1	For maintenance of the weir.
TOTAL		18	

10

### Management of committee

- Written regulations : 44%
- Water rights Registration: 5%



Simple weir : Needs Notification to Min of Water  
Permanent weir: Needs Application to Min of water

- Registration of Institution: 17%
- Periodical meeting: 74%. Holding mostly once a month

9

### The purposes for collecting a fee are..

- To accumulate money for future maintenance.
- To develop the scheme as farmer's planning.
- To protect the scheme from vulnerability which caused by lack of saving.
- ✗ **The collecting fee is not for protecting original member's right. It is for future use.**



So it is recommendable to

- Set the payable amount
- Push ISC's Treasurer to keep record of collecting and also announce periodically to members.

11



## -Conflicts:

Only 17% responded the existence of conflict, but it is suspected to be more conflicts existing.

### -Conflicts occurred....

Between upstreamers and downstreamers

Among users for water rotation,

Miscommunication between ISC and Village committee.

☞ **TSBs ,BEOs and CEOs are expected to be good listeners of what happens and to be good coordinators**



As a result, farmers tend to protect their irrigated land from outsiders and do not allow more outsider to irrigate together.

⇒ So, respecting their cautious, you are expected to direct them ....

-Not to extend canal more than the allocation to members if they do not accept new members.

(Remember more extension always needs more maintenance work force.)

Encourage ISC members to discuss with Village Committee when outsiders request to participation.

(Outsider's participation is also village committee's matter.)



## Acceptance of new member

ACCEPT	NOT ACCEPT
78%	22%

Nearly 80% of sites says they can accept out siders  
But actually, only half of the sites have accepted outsiders....

ACCEPT	NOT ACCEPT
54%	46%

Reasons for non acceptance include...

Inadequate irrigated land, landownership and distance from outsiders, so on.

# Suggestions

When you disseminate the irrigation technology, you need to ...

- ✔ Smooth communication with existing village association, especially before construction, and through the project implementation.
- ✔ Encourage ISC to collect the water user's fee/membership fee for future maintenance.
- ✔ Advice ISC to NOTIFY or APPLY for Ministry of Water for the construction of simple & permanent weir.
- ✔ Communicate officer from Ministry of Forestry for environmental cautious.

16



18

## 2. Gender Main Streaming

17

### What is gender main streaming?

Women are major contributors to agriculture in Zambia. And there is a tendency of high profit increase after involving women into farming.

- 1 . Empower women who are willing to learn from us.
- 2 . Encourage male farmers to understand the role and engagement of women in farming.

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## Gender issues on the Irrigation Project

### Specific Role for Men and Women

#### O&M: Construction Repairing of weir

☞ tends to be mainly Men's work.

#### Daily Maintenance Work

(De-silting of impound, maintenance of furrow, on-farm water management)

☞ tend to be Equal Work



## Women's Land Rights

☞ Gender based issue has been tackled for long time in Zambia however the women's land rights issue has been left out of discussion in the past.

But there are **trends of movement to entitle the land rights to women** nowadays. (Ex: Article as provided)

### How about situation in our project sites?

Basically the land use is decided by men as custom. However..

☞ Some women have their own "**women land**", which is inherited by women's parents or allocated by village head when women get married.

- Women can plant whatever they like without husband decision.
- Women can sell the product from this land and able to use the money from profit by her decision.
- Women's land is mostly rain-fed land.

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### Cultivation and harvesting

☞ Equally shared however....

Weeding, Irrigated Vegetable which needs gentle skill to hand tend to be female work.

### Marketing

☞ Physical power (carrying product, selling rain-fed maize) ⇒ tend to be Male work

☞ More women keep money.

☞ More men make decision to spend money.

21

## Suggestions

23

☞ Encourage the women's involvement to the project.

☞ Be good listener for female irrigator or women in village who are willing to participate in our project.

☞ Try to negotiate ISC and village committee for the allocation to women group if there is a request from them.

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AP-1-1-74



## INTEGRATED SOIL FERTILITY MANAGEMENT

## CLIMATE SMART AGRICULTURE (CSA)

PRESENTER: Lawrence Bwembya  
Senior Agricultural Specialist- Land Husbandry  
Ministry of Agriculture  
Northern Province

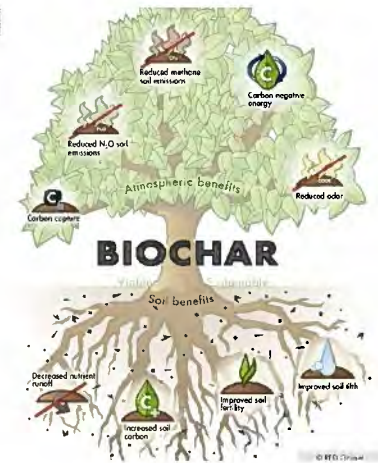
### What is Biochar?

- Derived from the words “char” due to the heating process called ‘charring or pyrolysis’ and ‘bio’ due to its high bio-physical effect in soil.
- Biochar is made using crop residues e.g rice husks or coffee husks
- The residue is heated in the absence of oxygen at high temperatures from 250°C to 500°C



## Characteristics of Biochar

- Increases crop yields from average quantities (Steven Joseph and Johannes Lehman; Environmental Management- Biochar, 2009)
- Has high P,K and Organic C
- High pH of above 8.0 and hence controls the problem of soil acidity
- Removes carbon dioxide gas (CO<sub>2</sub>) from the atmosphere (up to 200% its weight per year) and hence contributes to reduction of global warming.



### Making Biochar

- Biochar is made at different scales of production; at industrial level and at household level.
- By-products include vinegar. It can be tapped and used as insecticide

# Making Biochar at Household level

Simple equipment required



Using rice husks (Fire inside cone)



4

# Making biochar without any equipment



*Making fire on grasses and small branches*

5

# Final Product-Biochar



5



*Gently put the rice husks on the fire  
Then, wait and see*

*Different from burning, pyrolysis is done  
by fuming the husks with less oxygen*



*After some hours (2-4 hours), you will see black husks  
(pyrolyzed one) on the surface. Then, put the fresh  
ones from the bottom of the heap on to the top  
(gently mix).*



*All the husks became black  
(pyrolyzed); then pour water  
to extinguish fire.*

*At least 2 buckets of water  
per heap may be needed to  
completely put out fire.*



*To avoid re-flash, break  
the heap and completely  
cool them down.*

**Completed!**

*Use of biochar on holes*



*Put it on holes for  
transplanting*

*Mix with fertilizer and  
soils*

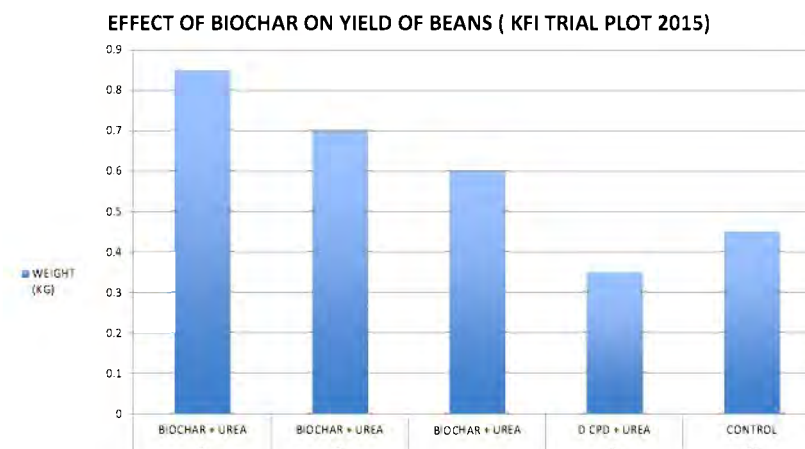


## Use of biochar on holes



Put it on line for direct seeding

## EFFECT OF BIOCHAR - RESULTS ON BEANS YIELD



14

## Attention

- Be careful of spreading fire, especially a windy day
- Completely put out fire; due to high temperature, husks can easily re-flash than you might imagine
- Biochar is not rich in Nitrogen; apply nitrogen fertilizer or such with biochar
- Once again, ISFM is essential for the permanent field under irrigation where land is repeatedly cultivated

Source (in Japanese):

<http://okomenotakayama.com/kuntan.html>

<http://jiburi.com/smoked-rice-hull/>

[http://park14.wakwak.com/~aozora\\_saien/kunntann.html](http://park14.wakwak.com/~aozora_saien/kunntann.html)

## Climate Smart Agriculture (CSA)



15



## WHAT IS CLIMATE SMART AGRICULTURE?



- CSA is a more productive and resilient form of agriculture where agricultural resources; water, soil and organic matter are used more efficiently and sustainably.

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## Climate Smart Agriculture



- CSA has a **Science Based** recommendation as to why it is important to practice.
- It is a combination of Agroforestry and Conservation Farming
- Conservation Farming is simply the observation of 3 principles; i) Minimum soil disturbance ii) Residue retention and iii) Crop rotation
- Application of organic manures, Organic Fertilisers Green Manure, Biochar etc.

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- It is a **deliberate** undertaking to **reduce poverty** and **increase food security** for the ever increasing population.
- Backed by considerable changes in **national** and **local governance**, **legislation**, **policies** and **financial mechanisms**



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## Importance of CSA Practices in Irrigated Agriculture



- Increased Water Holding Capacity of soil
- Reduced water loses through evaporation
- Increased nutrient retention and yields
- Reduced Green House Gas Emission (N<sub>2</sub>O)
- Removal of more carbon dioxide (CO<sub>2</sub>) from the atmosphere by biochar
- Optimum soil temperatures

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## Important Principles to Know in Climate Smart Agriculture

- CSA will contribute positively to keeping our environment conducive for living i.e limit temperature increase for not more than 2<sup>o</sup> c in the next 40-50 years)
- Industrialized countries emitted the highest amount of GHG's but impacts are more felt in the sub-sahara (point in fact)



20

## Important Principles to Know in Climate Smart Agriculture cont'.

- Crops produced under CSA are healthier and have higher returns



22

## Important Principles to Know in Climate Smart Agriculture cont.



- Full potential of soil richness does not come during the first season of CSA practices. It is a gradual. Fields which are also subjected to irrigation during offseason become richer faster than rainfed fields. Why?

21

## Challenges and Measures to take in order to adopt CSA

- Agricultural Policy should provide direction and other policy documents e.g. the SNDP, NAPA should be operationalized
- The Business as Usual (BAU) attitude :- Provision of new guidelines in existing government programs e.g FISP, Farmer Field Schools, Cooperatives

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**Thank you for listening! ANY  
QUESTIONS??????**



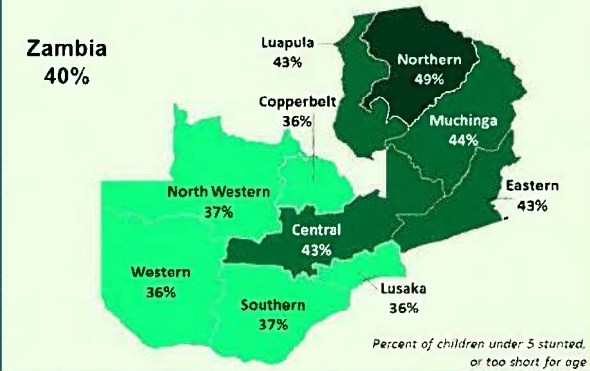
## POST HARVEST HANDLING OF ORANGE MAIZE GROWN UNDER IRRIGATION

PRESENTER: ELIZABETH N. KAPUKA  
FOOD AND NUTRITION OFFICER

AP-1-1-82

## National outlook

### Child Stunting by Province



## INTRODUCTION

1

- ▶ Many people in rural Zambia have inadequate money to afford expensive vitamin A rich foods such as Milk, eggs, liver and cheese. Zambian government has recognized the dangers of hidden Hunger and has put in place Interventions Such as sugar Fortification programme to increase consumption of vitamin A.
- ▶ Many Zambians eat large amounts of maize between 300 to 400grams per day this represents consumers an opportunity to promote growing of maize under irrigation so that people can be eating orange Maize through out the year for improved nutrition.

## OBJECTIVES

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- ▶ To know the various Methods of orange maize processing and utilization for food and nutrition security improvement.

## WHAT IS NUTRITION

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- ▶ Nutrition: is the process of nourishing the body by taking in and utilizing foods.
- ▶ Nutritious: Availability of nutrients in food that is necessary to support life
- ▶ Nutrient: Chemicals ( organic or inorganic that provide nourishment to the body. They help to build and repair body tissues ,provide energy and insure proper functioning of the body organs and systems .Nutrients can be classified as MACRO nutrients or MICRO nutrients .
- ▶ Macro nutrients include proteins, lipids and carbohydrates generally needed in substance amounts while Micro nutrients include minerals of eg Vitamin A, Iron and Zinc which are generally needed in very small amounts. Under nutrition is a Form of malnutrition resulting from food insufficient to meet dietary requirements

6  
Stunting. Low Height for Age, reflecting a sustained past episode or episodes of under-nutrition:



## Cont...

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- ▶ Micro Nutrient deficiency Disorders result from lack or shortage of different minerals and Vitamins in the body.
- ▶ The common public health micro nutrient deficiency disorders in Zambia include Vitamin A deficiency, Iron Anemia deficiency.

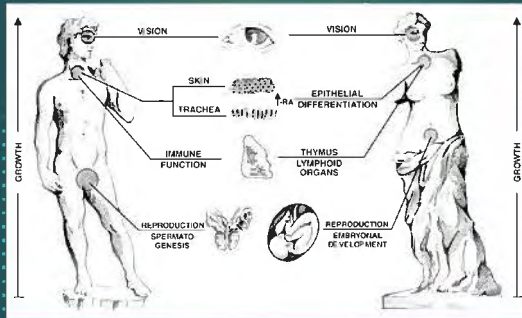
## SOURCES OF VITAMIN A

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# FUNCTIONS OF VITAMIN A

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# SOME INTERESTING RECIPIES FROM ORANGE MAIZE

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- ▶ In Zambia maize is mainly consumed as fresh maize, porridge and nshima.
- ▶ what other ways can maize be processed for consumption?
- ▶ What are popular recipes from vitamin A orange maize.

# 1 ORANGE MAIZE SCONES

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## Ingredients:

- 1 175g butter
- 2 cup sugar (preferably icing sugar)
- 3 large eggs, lightly beaten
- 1/2 cup wheat flour
- 1/2 table spoon baking powder
- 1/2 cup milk
- 1/4 table spoon baking powder
- 3/4 table spoon grated coconut
- 250 grapes, dried fruit (optional)

# Cont.... METHOD

11

- 1 In a large bowl, beat the butter and sugar together until light creamy.
- 2 Add the eggs, a little at a time beating well between additions.
- 3 Sift the flour, baking powder, and coconut grates together.
- 4 Slowly add to the creamed mixture with milk.
- 5 Gently fold the ingredients together.
- 6 Spoon the mixture into greased muffin/scone pan, filling each hole to about 2 thirds full.
- 7 Bake in a preheated oven at 180 degrees for 15-20 minutes or until the scones are lightly brown and firm to touch
- 8 Serve as a snack.

## 2 ORANGE MAIZE BREAD

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### ▶ INGREDIENTS

- 1 1/2 cups maize meal
- 2 1/2 cup wheat flour
- 3 2 teaspoon sugar
- 4 1 teaspoon instant yeast
- 5 1/4 teaspoon salt
- 6 2 eggs
- 7 1 cup milk
- 8 3/4 cup oil or melted margarine
- 9 100g fruit raisings (optional)

## LEFT OVER NSHIMA FRITTERS FROM ORANGE

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### MAIZE INGREDIENTS

- 1 2 cups grated left over nshima (mashed using either hand or a grater)
- 2 1 cup wheat flour (sift the flour together with baking powder)
- 3 1/2 teaspoon heaps of sugar / or according to the required sweetness in the family
- 3 1 large onion chopped into a very small cubes
- 4 2 eggs
- 5 1 1/2 teaspoon baking powder
- 6 1/2 liter milk or water, cooking oil for frying

## CONT.....

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### METHOD

- 1 Sieve together orange maize flour baking powder, salt and sugar
- 2 Add milk, eggs, oil and mix well
- 3 Spread the dough in a greased baking pan
- 4 Bake for 45 minutes in a hot oven

## LEFT OVER ORANGE MAIZE

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## METHOD

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1. Mix grated nshima with chopped onion or pepper.
2. Add flour to the mixture and salt adding milk or water bit in very little until the dough is thick and mixed.
3. Don't make the dough very soft because it shall start sucking cooking oil when frying.
4. Heat the cooking oil in a medium sized pan to about 75 degrees Celsius so that the fritters are cooked inside.
5. Scoop at least 75 grams of the mixture into the pan and cook until they are slightly brown.

## Cont....

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- ▶ Step 8 Let farmers take the lead during the field day but observe all protocols.
- ▶ Step 9 Start the field day on time and farmers should explain step by step all the processes of laying out the field demonstration plot, irrigation techniques, disease control and other lessons learnt.
- ▶ Step 10 Allow visitors to ask questions to which farmers and officers should respond.
- ▶ Step 11 Conclude discussions with main points learnt, challenges and provide advice accordingly.
- ▶ Step 12 If possible serve participants with orange maize lunch or snacks.

## HOW TO CONDUCT A FIELD DAY

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- ▶ Step 1 Plan for a field day with farmers when crop is fully mature.
- ▶ Step 2 Invite other farmer groups and other stakeholders in the Community.
- ▶ Step 3 Plan with farmers and aim to cost share expenses of the field day with the farmers.
- ▶ Step 4 Arrange the venue and prepare all materials.
- ▶ Step 5 Prepare the programme.
- ▶ Step 6 Advertise the field day.
- ▶ Step 7 Support field day with IEC Materials and media coverage, let the farmers voice be heard.

THANK YOU FOR YOUR ATTENTION!

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# Cooking process of Orange Maize Cookies & Breads

By Elizabeth Kapuka

### Adding Milk to orange maize mealie meal



### Mix well



Make a ball



Shape forms



Extend the dough



Start baking!



Orange maize Bread



It is ready!



It is baked!





Bon Appetit !

Let's make Sandwich with fresh  
Lettuce!



# Appropriate Farming Technologies

*Make the best use of irrigation*

1. Introduction of New Crops and Farming Method
2. Companion Cropping



AP-1-191

## 1. Introduction of New Crops and Farming Methods

*- Derived from RESCAP Manual -*

## 1. NERICA drilling using line marker

### Benefit:

1. Grow best in Dambo with abundant water
2. Can be grown as an upland crop w/ irrigation
3. Irrigation supplements the early stage of rain-fed cultivation
4. Short maturity period (120 days)
5. Weeding is done easily.

### Limitation/Risk:

1. Low temperature (below 17 C) affects the yield



### Districts:

Mporokoso, Luwingu



## 2. New beans varieties

### Benefit:

1. Market is readily available
2. Profit is moderate.
3. Good for soil fertility maintenance.

### Risks:

1. Avoid steeply sloping land, very sandy and shallow surface soils or near a swamp
2. Maggot attack
3. Bean beetle attack

### Districts:

Luwingu and Mporokoso



### 3. Maize with Sunhemp green manure

**Benefit:**

1. Market readily available
2. Improved varieties available
3. Soil fertility improvement

**Districts:**

Mporokoso ,Luwingu, Chinsali, part of Nsama

**Risks:**

1. Fertilizer requirement for maize is high; so soil fertility maintenance is a key for sustainable production
2. Seed availability of Sunhemp seed



### 6. Vitamin A enriched crops for nutrition improvement



Orange Maize



Orange Sweet Potato

4. Irrigated Irish potatoes during dry season using improved variety and furrows



5. Use of Tephrosia vogelli as botanical acaricide for animal/ pesticide for vegetables



## 2. Companion Cropping



A Cultural Approach for Better Vegetable Production

## Advantages of Companion Cropping

1. Avoiding pests and diseases
2. Accelerating growth of crops
3. Improving farming environment



Note: effect of companion cropping is not as immediate and strong as compared to agri.-chemicals

### 1. Avoiding Pests and Diseases

1. Confusing pests [pushing approach]
  - Insects prefer particular types of crops
  - Mix a type of crop the pest doesn't like
2. Decoying pests [pulling approach]
  - Planting a couple of plants that the insect prefers out side of farm plot
  - Apply more amount of fertilizer for the "decoy" plant as it attracts insects more
3. Getting help from natural enemy [banker plant]
  - Planting "host" plants for the natural enemy of the insects

## 2. Accelerating Growth of Crops

1. Maximizing space efficiency
  - Combine taller crop and shorter crop that can grow under shed (ex. maize and soybean)
2. Improving soil fertility
  - Planting legume crops (ex. tomato and G-nuts)
3. Bad Combination
  - There are some bad combinations, suppressing the growth of each crop (ex. potato and cabbage)

### 3. Improving Farming Environment

1. Cover Crop
  - Cover the soil surface by which soil moisture can be kept at a certain level, which contribute to maintaining a population of microorganisms
  - Even weeds can be used if it is well controlled
2. Green Manure
  - Improve soil fertility (ex. clover, sorghum, marigold, and sunhemp)
  - It also acts as cover crop and banker plant

## Recommended Combination

### Ex. Cabbage and lettuce

- Cabbage worm attacks only *brassica* family (cabbage) but not *compositae* (lettuce)
- In addition, cabbage worm doesn't like the smell of lettuce



Note: effect may vary depending on the environmental condition of the farm

## Recommended Combination

### Ex. Basil and Rape/Cabbage

- Basil suppresses striped flea beetle, a common pest of brassica family like rape.
- Basil also discourages aphid and spider mite
- However, it doesn't work against cutworm, cabbage worm, and diamondback moth



Note: effect may vary depending on the environmental condition of the farm

## Recommended Combination

### Ex. Maize and Soybean

- Corn borer, a pest of maize and stink bug, a pest of soybean inhibit to each other
- Soybean is tolerant to shade made by tall maize plants
- Soybean provides maize with a positive effect of nitrogen fixation



Note: effect may vary depending on the environmental condition of the farm

## Recommended Combination

### Ex. Tomato and Groundnut

- Tomato is susceptible to excessive moisture; G-nuts stabilizes the soil moisture
- Rhizosphere, or root area, of both crops are different, avoiding excessive competition
- G-nut acts as a banker plant, maintaining ladybeetle, a natural enemy against aphid
- G-nut improves soil fertility



Note: effect may vary depending on the environmental condition of the farm



# Recommended Combination

## Ex. Sweet Potato and Soybean

- While S-potato is growing, soybean can utilize the space—productivity increases
- S-potato acts as cover crop, keeping soil moisture against strong sunshine
- Both crops improve soil fertility with different mechanisms



Note: effect may vary depending on the environmental condition of the farm

# General Combinations

Family	Crop	Okra	Cabbage	Rape	Maize	Pumpkin	Watermelon	Lettuce	Basil	Ginger	Carrot	Irish Potato	Chili Pepper	Tomato	Eggplant	Paprika	Strawberry	Sweet Potato	Pea	Groundnuts	Onion	Garlic	Green Onion	
Malvaceae	Okra																							
Brassicaceae	Cabbage							⊗	⊗	⊗	×													
	Rape							⊗	⊗	⊗	×													
Poaceae	Maize													×	×			⊗						
Cucurbitaceae	Pumpkin																					⊗	⊗	⊗
	Watermelon																					⊗	⊗	⊗
Compositae	Lettuce		⊗	⊗																				
Lamiaceae	Basil		⊗	⊗									⊗		⊗									
Zingiberaceae	Ginger																							
Apiaceae	Carrot																							
Solanaceae	Irish Potato		×	×										×	×	×								
	Chili Pepper																							
	Tomato																							
	Eggplant		⊗	×																				
	Paprika																							
Rosaceae	Strawberry																							⊗
Convolvulaceae	Sweet Potato																							
Leguminosae	Soybean				⊗																			
	Pea																							
	Groundnuts																							
Liliaceae/Allium	Onion																							
	Garlic																							
	Green Onion																							

⊗ Particularly Favorable   ⊗ Appropriate   × Needs to be avoided

# Combination **NOT** Recommended

## Ex. Cabbage and Potato

- Chemicals derived from both plants suppresses the growth to each other
- Combination of *Brassica* (cabbage/rape) and *Solanaceae* (eggplant/ tomato) is generally not recommended



Note: effect may vary depending on the environmental condition of the farm



## T-COBSI Kick-off Training 2016

### Introduction

- Demo plots include New Technologies learned in KOT, where applicable
- Objective
  1. To promote gravity irrigation as a labor saving technology
  2. To promote sustainable methods of agriculture through use of companion crops, and biochar
  3. To promote consumption of nutritious crops throughout the year

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### Demo Plot

- One T-COBSI Irrigation site is selected where “**demo plot**” is established for appropriate farming technologies.
- Improved farming is practiced under irrigation for demonstration of the technologies learned in KOT
- Volunteer farmer(s) is (are) needed to provide his/her farm land (**10m X 10m X 4 Plots**)

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### Demo Plot cont'd...

- **Seeds and fertilizer** for the defined technologies are provided by the **JICA Team**.
- A **field day** is organized by CEO for the demonstration of your demo plot. You demonstrate the result, harvest, process to your fellow CEOs and neighbor farmers.

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## Market-oriented Farming

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- Whole area of “demo site” where “demo plot” is established is the target
- Market-oriented farming technologies, which will be trained in the Mid-term Training (MTT) is practiced.

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## Criteria of Demonstration Site cont'd..

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- Farmers group is motivated and conducting irrigation farming
- Should be selected by district representatives (**it's you!**)
- Training material for market-oriented farming (textbook, flipchart, marker, weighing scale, etc.) will be provided at MTT

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## Criteria of Demonstration Site

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- One T-COBSI irrigation site in each district
- Either “new development” site or “improved” site during 2016
- Irrigation site developed by the BEOs/CEOs who participated in KOT and MTT in 2015
- Located accessible to the market (**Important**), with which market-oriented farming is carried out (Mid-term Training)

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## Schedule

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Activity	April/ May	Jun	Jul	Aug	Sep	Oct
Training	KOT				MTT	
Irrigation development	★	★	★	★	★	★
Establishment of Demo Plot		★				
Market-oriented Farming		Application and demonstration of appropriate technologies			★	Practice of market research, farm planning

Demo site will be selected during CAC meeting when they plan where to develop for irrigation.

If no site is developed by the end of June, then, last years site can be considered

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## Monitoring Method

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- Detailed monitoring method is introduced at the MTT (Mid-term Training) in September



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## What to do with Demo Plot?....

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- Arrangement of plot (standard type of layout provided, 10m X 10m X 4 plot)
- Necessary inputs: Seeds, fertilizer and some chemicals
- Officers responsible: TSB and CEOs need to discuss.
- Schedule: Needs to be planned by CEO after the selection of the irrigation site

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## What to do with Demo Plot?

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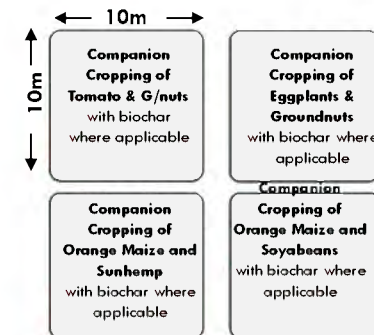
- Types of technologies to be introduced
  - Gravity irrigation (must)
  - Contour ridge (option)
  - Nutritious crops (selective: orange maize)
  - Biochar (option depending on the availability of materials)
  - Companion cropping (selective)
  - "RESCAP" new crops (option)

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## Example of the Layout

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- Basic plot size: 10 m X 10 m X 4 Plots
- Visible from outside preferably near a road



### Technologies Applied

#### Base:

- Contour ridge
- Gravity Irrigation (furrow, or sunken)

#### On-farm

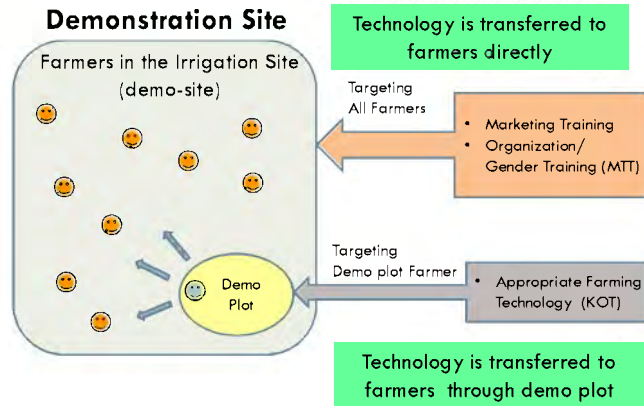
- Green manure
- Bio-char
- Companion cropping
- Nutritious crops

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# Training for Demonstration Site

Conducted by BEOs/CEOs

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## Any questions

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# Thanks

## Thank you for your Attention.