Extension agents and farmers during farmer to farner exchange visit to Conservation farming host farmer (Issa Aliga)

Conservation Farming Basins In Annual Crops For Water Conservation (Uganda)

Tongo basin

DESCRIPTION

CF basins are constructed in the field to act as water storage containers. Water is conserved within the basins and plants can survive with this conserved water during periods of little rainfall and dry spells.

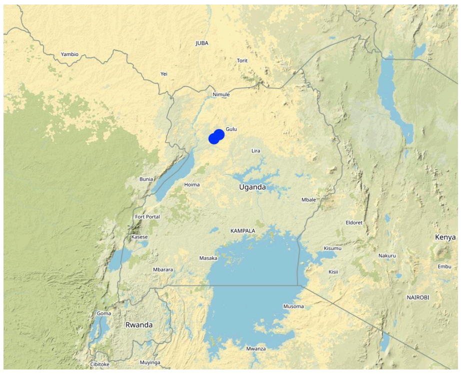
Farmers in Northern Uganda are observing changes in weather patterns. Rainfall has become unpredictable and unreliable for sustainable farming This forces farmers to adapt to these changes using available conservation farming technologies such as Conservation Farming (CF) basins.
CF basins are water conservation structures constructed in the garden during dry seasons. The basins store rainwater during rainy seasons and ensure water availability for plants during periods of little or no rainfall.

During construction of the basins, plant residues in the field are slashed and retained within the garden. A common hoe is used to excavate rectangular holes of about 30cm x 20cm, having a depth of 15cm. The top soil is put on one side of the basin while the subsoil is put on the other side. When the basin is ready, the top soil is put back into the hole to cover about half of the total basin depth. The basin is now ready for planting at the onset of rains. The spacing between basins depends on the type of crop to be planted. For groundnuts (Arachis hypogaea) it's 30cm x 30cm. The number of seeds per hole (seed rate) also depends on the crop. For maize, 3 plants per hole are to be planted, for groundnut, 6-8 plants per hole and for beans 6-8 plants per hole.

The basins are particularly important during critical growth periods such as germination, flowering and fruit seting if a sudden drought occurs. The basins conserve water, reduce surface runoff and support extended crop growth during dry seasons. After harvesting crop residues are put back into the basin to decompose so to build up humus in to basin.

Farmers who practice this technology have reported healthy crop growth and reduced risk of crop failure. However, construction of CF basins is labour intensive because good basins need to be constructed in the dry season when the soil is hard. However, this challenge is outweighed by the fact that basins only need to be constructed once every 3-4 years.

LOCATION



Location: Nwoya District, Northern, Uganda

No. of Technology sites analysed: 2-10 sites

Geo-reference of selected sites
- 32.00394, 2.63207
- 31.99963, 2.63519
- 31.88437, 2.53453

Spread of the Technology: applied at specific points/ concentrated on a small area

In a permanently protected area?:

Date of implementation: 2016

Type of introduction
- [ ] through land users' innovation
- [ ] as part of a traditional system (> 50 years)
- [x] during experiments/ research
- [ ] through projects/ external interventions

Prepared CF basins (Issa Aliga)

Photo showing conservation farming with mulch material (grass) in Nwoya District (Issa Aliga)

CLASSIFICATION OF THE TECHNOLOGY

Main purpose

- [x] improve production
- [x] reduce, prevent, restore land degradation
- [ ] conserve ecosystem
- [ ] protect a watershed/ downstream areas – in combination with other Technologies
- [ ] preserve/ improve biodiversity
- [ ] reduce risk of disasters
- [x] adapt to climate change/ extremes and its impacts
- [ ] mitigate climate change and its impacts
- [x] create beneficial economic impact
- [ ] create beneficial social impact

Land use

Cropland
- Annual cropping

Number of growing seasons per year: 2

Water supply

- [x] rainfed
- [ ] mixed rainfed-irrigated
- [ ] full irrigation

Purpose related to land degradation

- [ ] prevent land degradation
- [x] reduce land degradation
- [ ] restore/ rehabilitate severely degraded land
- [x] adapt to land degradation
- [ ] not applicable

Degradation addressed

soil erosion by water - Wt: loss of topsoil/ surface erosion

soil erosion by wind - Et: loss of topsoil

biological degradation - Bl: loss of soil life

water degradation - Hs: change in quantity of surface water

SLM group

- water harvesting
- surface water management (spring, river, lakes, sea)

SLM measures

agronomic measures - A2: Organic matter/ soil fertility

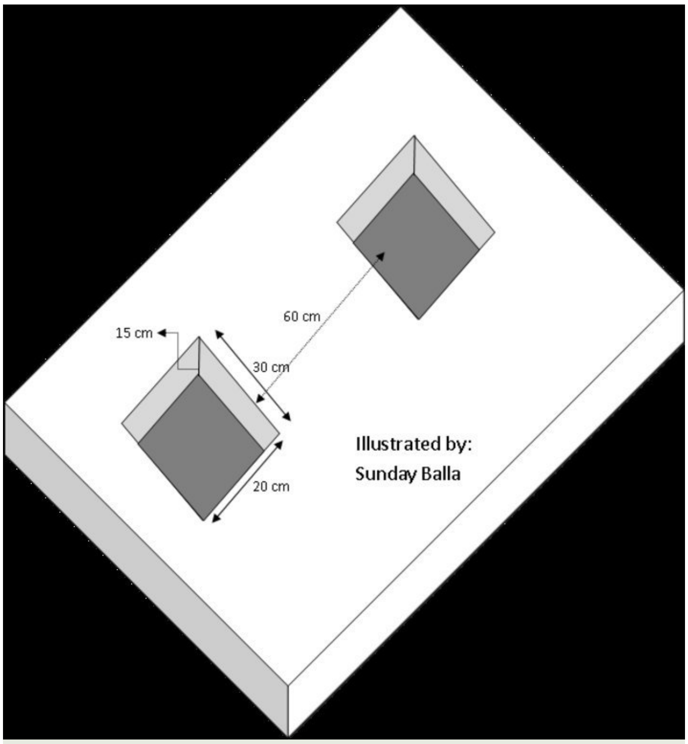
structural measures - S4: Level ditches, pits

management measures - M2: Change of management/ intensity level

TECHNICAL DRAWING

Technical specifications

None



Author: Sunday Balla

ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

Calculation of inputs and costs

- Costs are calculated: per Technology area (size and area unit: **Acre**)
- Currency used for cost calculation: **Uganda Shillings**
- Exchange rate (to USD): 1 USD = 3600.0 Uganda Shillings
- Average wage cost of hired labour per day: 5000

Most important factors affecting the costs

Labour for digging during establishment and clearing soil from basins during maintenance

Establishment activities

1. Slashing the field (clearence) (Timing/ frequency: dry season)
2. Constructing basins (Timing/ frequency: dry season)
3. Planting crops (Timing/ frequency: onset of rains)

Establishment inputs and costs (per Acre)

Specify input	Unit	Quantity	Costs per Unit (Uganda Shillings)	Total costs per input (Uganda Shillings)	% of costs borne by land users
Labour					
Slashing	person days	15.0	5000.0	75000.0	100.0
Construction of basins	person days	30.0	3000.0	90000.0	100.0
Planting	person days	15.0	5000.0	75000.0	100.0
Equipment					
CF hoe	no	5.0	12000.0	60000.0	100.0
Slashers	no	5.0	6000.0	30000.0	100.0
Plant material					
Seeds	kg	30.0	5000.0	150000.0	100.0
Total costs for establishment of the Technology				**480'000.0**	

Maintenance activities

1. Clearing soil from basins (Timing/ frequency: 3 years of establishment)

Maintenance inputs and costs (per Acre)

Specify input	Unit	Quantity	Costs per Unit (Uganda Shillings)	Total costs per input (Uganda Shillings)	% of costs borne by land users
Labour					
Labour	person days	15.0	3000.0	45000.0	100.0
Total costs for maintenance of the Technology				**45'000.0**	

NATURAL ENVIRONMENT

Average annual rainfall

- [ ] < 250 mm
- [ ] 251-500 mm
- [ ] 501-750 mm
- [ ] 751-1,000 mm
- [x] 1,001-1,500 mm
- [ ] 1,501-2,000 mm
- [ ] 2,001-3,000 mm
- [ ] 3,001-4,000 mm
- [ ] > 4,000 mm

Agro-climatic zone

- [ ] humid
- [x] sub-humid
- [ ] semi-arid
- [ ] arid

Specifications on climate

n.a.

Slope

- [ ] flat (0-2%)
- [x] gentle (3-5%)
- [ ] moderate (6-10%)
- [ ] rolling (11-15%)
- [ ] hilly (16-30%)
- [ ] steep (31-60%)
- [ ] very steep (>60%)

Landforms

- [x] plateau/plains
- [ ] ridges
- [ ] mountain slopes
- [ ] hill slopes
- [ ] footslopes
- [ ] valley floors

Altitude

- [ ] 0-100 m a.s.l.
- [ ] 101-500 m a.s.l.
- [ ] 501-1,000 m a.s.l.
- [x] 1,001-1,500 m a.s.l.
- [ ] 1,501-2,000 m a.s.l.
- [ ] 2,001-2,500 m a.s.l.
- [ ] 2,501-3,000 m a.s.l.
- [ ] 3,001-4,000 m a.s.l.
- [ ] > 4,000 m a.s.l.

Technology is applied in

- [ ] convex situations
- [x] concave situations
- [ ] not relevant

Soil depth

- [ ] very shallow (0-20 cm)
- [x] shallow (21-50 cm)
- [ ] moderately deep (51-80 cm)
- [ ] deep (81-120 cm)
- [ ] very deep (> 120 cm)

Soil texture (topsoil)

- [ ] coarse/ light (sandy)
- [x] medium (loamy, silty)
- [ ] fine/ heavy (clay)

Soil texture (> 20 cm below surface)

- [ ] coarse/ light (sandy)
- [ ] medium (loamy, silty)
- [x] fine/ heavy (clay)

Topsoil organic matter content

- [ ] high (>3%)
- [x] medium (1-3%)
- [ ] low (<1%)

Groundwater table

- [ ] on surface
- [ ] < 5 m
- [x] 5-50 m
- [ ] > 50 m

Availability of surface water

- [ ] excess
- [ ] good
- [x] medium
- [ ] poor/ none

Water quality (untreated)

- [x] good drinking water
- [ ] poor drinking water (treatment required)
- [ ] for agricultural use only (irrigation)
- [ ] unusable

Water quality refers to:

Is salinity a problem?

- [ ] Ja
- [x] Nee

Occurrence of flooding

- [ ] Ja
- [x] Nee

Species diversity

- [ ] high
- [x] medium
- [ ] low

Habitat diversity

- [ ] high
- [x] medium
- [ ] low

CHARACTERISTICS OF LAND USERS APPLYING THE TECHNOLOGY

Market orientation

- [ ] subsistence (self-supply)
- [x] mixed (subsistence/ commercial)
- [ ] commercial/ market

Off-farm income

- [x] less than 10% of all income
- [ ] 10-50% of all income
- [ ] > 50% of all income

Relative level of wealth

- [ ] very poor
- [x] poor
- [ ] average
- [ ] rich
- [ ] very rich

Level of mechanization

- [x] manual work
- [x] animal traction
- [ ] mechanized/ motorized

Sedentary or nomadic

- [x] Sedentary
- [ ] Semi-nomadic
- [ ] Nomadic

Individuals or groups

- [x] individual/ household
- [ ] groups/ community
- [ ] cooperative
- [ ] employee (company, government)

Gender

- [x] women
- [x] men

Age

- [ ] children
- [x] youth
- [x] middle-aged
- [ ] elderly

Area used per household

- [ ] < 0.5 ha
- [x] 0.5-1 ha
- [ ] 1-2 ha
- [ ] 2-5 ha
- [ ] 5-15 ha
- [ ] 15-50 ha
- [ ] 50-100 ha
- [ ] 100-500 ha
- [ ] 500-1,000 ha
- [ ] 1,000-10,000 ha
- [ ] > 10,000 ha

Scale

- [x] small-scale
- [ ] medium-scale
- [ ] large-scale

Land ownership

- [ ] state
- [ ] company
- [ ] communal/ village
- [ ] group
- [x] individual, not titled
- [x] individual, titled

Land use rights

- [ ] open access (unorganized)
- [x] communal (organized)
- [ ] leased
- [x] individual

Water use rights

- [ ] open access (unorganized)
- [x] communal (organized)
- [ ] leased
- [ ] individual

Access to services and infrastructure

health	poor		✓		good
education	poor		✓		good
technical assistance	poor		✓		good
employment (e.g. off-farm)	poor	✓			good
markets	poor				good

		[ ][✓][ ]	
energy	poor	[✓][ ][ ]	good
roads and transport	poor	[ ][ ][✓]	good
drinking water and sanitation	poor	[ ][✓][ ]	good
financial services	poor	[✓][ ][ ]	good

IMPACTS

Socio-economic impacts

Crop production	decreased	[ ][ ][ ][ ][ ][✓][ ]	increased	
crop quality	decreased	[ ][ ][ ][ ][ ][✓][ ]	increased	
risk of production failure	increased	[ ][ ][ ][ ][ ][✓][ ]	decreased	
land management	hindered	[ ][ ][ ][ ][ ][✓][ ]	simplified	
demand for irrigation water	increased	[ ][ ][ ][ ][ ][✓][ ]	decreased	Water conserved in basins

Socio-cultural impacts

Ecological impacts

Off-site impacts

water availability (groundwater, springs)	decreased	[ ][ ][ ][ ][ ][✓][ ]	increased

COST-BENEFIT ANALYSIS

Benefits compared with establishment costs

Short-term returns	very negative	[ ][ ][✓][ ][ ][ ][ ]	very positive
Long-term returns	very negative	[ ][ ][ ][ ][ ][ ][✓]	very positive

Benefits compared with maintenance costs

Short-term returns	very negative	[ ][ ][ ][ ][ ][✓][ ]	very positive
Long-term returns	very negative	[ ][ ][ ][ ][ ][ ][✓]	very positive

CLIMATE CHANGE

Gradual climate change

annual temperature increase	not well at all	[ ][ ][ ][✓][ ]	very well	
seasonal temperature increase	not well at all	[ ][ ][✓][ ][ ]	very well	Season: wet/ rainy season
annual rainfall decrease	not well at all	[ ][ ][ ][ ][✓]	very well	
seasonal rainfall decrease	not well at all	[ ][ ][ ][ ][✓]	very well	Season: wet/ rainy season

Climate-related extremes (disasters)

drought	not well at all	[ ][ ][ ][ ][✓]	very well

ADOPTION AND ADAPTATION

Percentage of land users in the area who have adopted the Technology

- [ ] single cases/ experimental
- [x] 1-10%
- [ ] 11-50%
- [ ] > 50%

Of all those who have adopted the Technology, how many have done so without receiving material incentives?

- [ ] 0-10%
- [ ] 11-50%
- [ ] 51-90%
- [x] 91-100%

Has the Technology been modified recently to adapt to changing conditions?

- [ ] Ja
- [x] Nee

To which changing conditions?

- [ ] climatic change/ extremes
- [ ] changing markets
- [ ] labour availability (e.g. due to migration)

CONCLUSIONS AND LESSONS LEARNT

Strengths: land user's view

- Constructed once every 3-4 years
- Does not require technical skills or sophisticated equipment to construct the basins
- Reduced chances of crop failures due to droughts

Strengths: compiler's or other key resource person's view

- Water storage efficiency is high
- Plant roots can easily access water from the soil

Weaknesses/ disadvantages/ risks: land user's viewhow to overcome

- Difficult to construct the basins Use a CF hoe

Weaknesses/ disadvantages/ risks: compiler's or other key resource person's viewhow to overcome

- Crop residues have additional functions to retain soil moisture

REFERENCES

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Resource persons
Sunday Balla Amale - land user

Full description in the WOCAT database
https://qcat.wocat.net/af/wocat/technologies/view/technologies_3307/

Linked SLM data
Approaches: Peer farmers as a village resource person for scaling Climate-Smart Agriculture (CSA) Practices
https://qcat.wocat.net/af/wocat/approaches/view/approaches_3323/

Documentation was faciliated by

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