Ferro-Cement Tank (RWCT 5000 gallons)

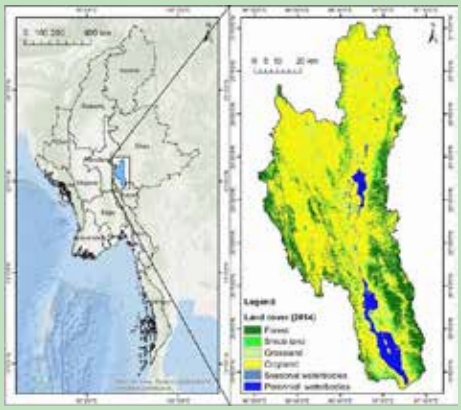
Myanmar – Moe Yey Hlung Kan / Community Rain Water Collection Tank

Rain Water Collection Tank (also known as Ferro Cement Tank), with holding capacity of between 3,000-5,000 gallons to conserve additional water for domestic usage during the dry season.

The Rain Water Collection Tank technology has been constructed in 8 locations across 6 villages in the project area by Myanmar Institute for Integrated Development (MIID) as a part of Water Sanitation and Hygiene (WASH) activities to address water scarcity by developing new technologies with community members around storage, transport, control, filtering, maintenance, and renovation of water resources, throughout 2015-17. The Taungyoe communities in and around Let Maung Gwe village track of Kalaw and Nyaung Shwe townships are tranquil and peaceful, yet are economically isolated and face hardship from changing conditions. While only a few miles from Myanmar's Inle Lake and active trade centres in Aungban and Nyaungshwe they face challenges of rugged terrain, labor-intensive water access, deforestation and erosion of agricultural land, and inadequate roads and community infrastructure. Our studies in the area have found that the geology is unsuitable for wells. The Rain Water Collection Tank also known as Ferro-Cement Tank (RWCT 5,000 gallons) was constructed using predominately the following key materials: Cement, Sand, Motor Brick, Stone, Square Mesh, Chicken Wire Mesh, MS rod, Wash-out Pipe, Out-let Pipe, UPVC downpipe, UPVC Elbow, UPVC Tee, Ball Valve, See Tape, OIC Glue, Gutter (PVC), Gutter-end Card, Gutter hook, Nipple GI Pipe, Bamboo Mat, Binding Wire, Socket and Zinc Plane sheet. The purpose of the technology is to secure access to and control over water resources in the southern Shan State rural uplands, is increasingly a vital issue for local communities. While the minimum daily water required for drinking, cooking and cleaning is considered to be 50 litres per person, in many areas where water is transported purely through manual labour, daily consumption is often limited to just 20 litres or less. Collecting water has become a significant daily chore, primarily for women and children who often spend hours a day collecting barely enough water for household consumption. For these households, there are limited alternatives for transporting and storing water other than physically carrying it in storage containers. Furthermore, the transportation process heightens the risk of microbial contamination that can result in water borne diseases and infection. Five major steps are required to construct the Community Rain Water Tank technology including laying the foundation, plastering, construction of tank frame, plastering the tank frame and lastly install the tank lid. Benefits of the technology include increased access to quality water, which reduces the time spent collecting water from less quality sources that are located significant distances away. Users particularly like about the technology that accessibility improvements allow for greater time to be spent on economic, cultural and social activities. Improving the water quality access decreases the risk of health issues related to mosquito and water borne diseases.

Left: Final Product: Rain Water Tank constructed an upland village of Shan State Myanmar. (Thura Kyaing)

Right: Establish the Tank Foundation Line (Thura Kyaing)



Location: Let Maung Gwe Village Tract, Nyaung Shwe Township , Southern Shan State of Myanmar, Myanmar

No of technology analyzed: 2-10 sites

Conservation measure(s): Structural

Land use type: Settlements

Climate: Semi arid

WOCAT database reference: MM QT 100

Related approach: NA

Compiled by: Claire Burgess, Thura Ky-aing (MIID), and Madhav Dhakal (ICIMOD)

Date: May 2017

The technology was documented using the WOCAT (www.wocat.org) tool.

Classification

Water use problems

- Increasing water demand for domestic uses.
- Rainfall is only source for domestic water supply.
- Ground water is not available, pump systems are costly for elevated and scattered hill settlements

Land use	Climate	Degradation		Conservation measure(s)	
					
Extensive grazing land	Semi arid	Physical degradation: Decline of water quality and quantity	Water erosion: loss of topsoil by water; gully erosion	Structural: masonry box. walls, check dams, dead fencing	Vegetative: plantation of tree and shrub species

Stage of intervention	Origin	Level of technical knowledge
Prevention Mitigation/reduction Rehabilitation	Land users' initiative: Experiments/research Externally introduced: 3 yrs ago	Field staff Lnd user

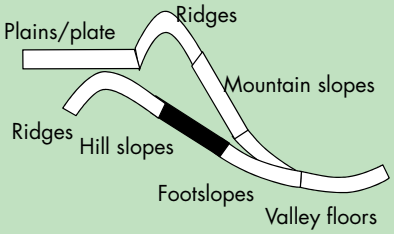
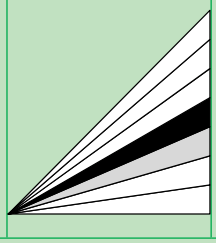
Main causes of local water scarcity

- Hill top settlements, water sources (streams and springs) are located down and far from settlements
- Ground water sources are not available

Main technical functions	Secondary technical functions	Legend
• improve water access, quantity, quality	• none	high moderate low insignificant

Environment

Natural environment

Average annual rainfall (mm)	Altitude (masl)	Landform	Slope (%)
>4000 3000-4000 2000-3000 1500-2000 1000-1500 750-1000 500-750 250-500 <250	>4000 3000-4000 2500-3000 2000-2500 1500-2000 1000-1500 500-1000 100-500 <100		 very steep (>60) steep (30-60) hilly (16-30) rolling (8-16) moderate (5-8) gentle (2-5) flat (0-2)

Main technical functions:	Secondary technical functions:
• water storage for dry season use in dry season	• access to clean water

Tolerant of climatic extremes: temperature increase; floods; decreasing length of growing period

Sensitive to climatic extremes: seasonal rainfall increase / decrease; heavy rainfall events (intensities and amount), wind storms / dust storms

If sensitive, what modifications were made/are possible: increase storage volume. Regular checking of pie and gutter after wind storms.

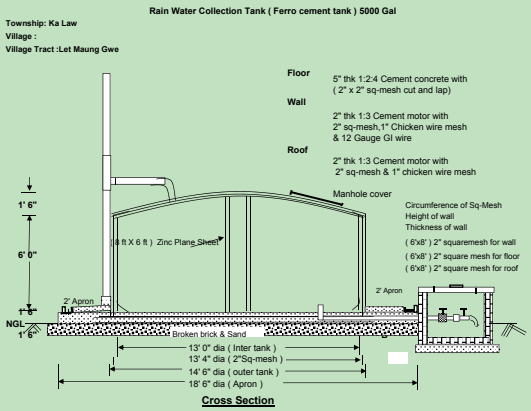
Human environment

Cropland per household (ha)

<0.5
0.5-1
1-2
2-5
5-15
15-50
50-100
100-500

Land user: individual / household, small scale land users, disadvantaged land users, men and women
Population density: Not Available
Annual population growth: Not Available
Land ownership: State
Land use rights: Leased
Water use rights: communal (organised) and open access (unorganized)

Relative level of wealth: Poor
Importance of off-farm income: from 10%-50% of all in-come
Access to service and infrastructure: low: health, educa-tion, roads & transport; drinking water supply & sanitation.
Market orientation: mixed (subsistence and commercial)



Technical drawing

System overview

Implementation Activities, Inputs, and Costs

Establishment activities

1. Site selection and community context (location should consid-er proximity for household domestic use) (Structural; before rainy season)
2. Skilled technicians sourced for construction (hired Mason group) (Structural)
3. Laying the Tank Foundation and plastering (Structural)
4. Construction and Plastering of Tank Frame (Structural)
5. Tank Lid Installation (Structural)
6. Platform (Structural)
7. Connecting piping to roof (Structural)

- there are some steps that can be taken to reduce potential damage to the Technology such as generating a strong structural reinforcement that is more tolerant to damage such as cracking - plaster must be applied with care to ensure the material gener-ates a watertight layer, ensuring a good distribution of quality wire mesh is utilized - the construction of the roof provides a strong barrier to reduce impacts of climatic extremes such as evapora-tion during dry spells, or contamination - it is important to apply the correct ratio of water to cement to generate a strong mortar for plastering, and to include a waterproof powder in the mixture.

- **Costs are calculated:** per Tech-nology unit
- **Currency used for cost calcula-tion:** kyat
- **Exchange rate (to USD):** 1300.0.

Establishment inputs and costs per ha

Specify input	Unit	Quantity	Costs per Unit	Total costs per input
Labour				
Skill Labour (Grade 1)	hours	25.0	5000.0	125000.0
Skill Labour (Grade 2)	hours	70.0	3500.0	245000.0
Equipment				
Binding wire 18 G	viss	6.0	2000.0	12000.0
Bamboo for roofing	no.	20.0	2000.0	40000.0
4" PVC gutter, end cad & rod to join down pipe	set	1.0	34000.0	34000.0
4" Gutter Hook	no.	12.0	500.0	6000.0
2" Ø UPVC down pipe 8.5 class (20')	no.	1.5	6000.0	9000.0
2" Ø UPVC Elbow	no.	6.0	1000.0	6000.0
2" Ø 8.5 PVC Socket	no.	2.0	500.0	1000.0
2" Ø UPVC Tee	no.	2.0	1000.0	2000.0
Plant material				
2" Ø UPVC Ball Valve	no.	1.0	2500.0	2500.0
Seal tape	no.	1.0	300.0	300.0
OIC Glue	no.	1.0	1200.0	1200.0
1/2"=3/15" MS Flat	viss	3.0	3000.0	9000.0
Construction material				
Cement	bag	42.0	7500.0	315000.0
1/2" Stone Chipping	sud	1.0	20000.0	20000.0
Sand	sud	3.0	40000.0	120000.0
6"x9" Stone	sud	3.0	20000.0	60000.0
Brick	no.	500.0	130.0	65000.0
2"x2" square mesh 10G (8'x6')	sheet	11.0	11500.0	126500.0
Chicken wire mesh (50'=1 roll)	roll	3.0	10000.0	30000.0
1/2" Ø MS rod (40')	sheet	8.0	7500.0	60000.0
Other				
1/4" Ø MS rod	viss	7.0	1500.0	10500.0
Man hole cover (MS)	set	1.0	30000.0	30000.0
2" Ø wash out pipe	set	1.0	20000.0	20000.0
2" Ø outlet pipe	set	1.0	20000.0	20000.0
Water repellent material	box	8.0	1000.0	8000.0
Bamboo mat (5.5'x 4.5')	no.	20.0	1000.0	20000.0
			Total costs for establishment of the Technology	1398000.0

Maintenance/recurrent activities	Maintenance/recurrent inputs and costs per jar per year (2017)		
1. Cleaning the tank once in a year 2. Emptying the first flush diverter of con-taminated water after rainfall events 3. Checking for leaks and damaged pipes	**Inputs**	**Costs (Kyat)**	**% met by users**
	Labour (6 person days)	15,600	100%
	Total	**15,600**	**100%**

Assessment

Acceptance/adoption
All users accepted the system. It was demonstrated 2 years back and it is too early to expect adoption by others.

Impacts of the technology			
Production and socioeconomic benefits		Production and socioeconomic disadvantages	
+	Increased drinking / household water availability for dry season	–	Loss of land occupied by tank
+ +	Increased drinking / household water quality		
Sociocultural benefits		Sociocultural disadvantages	
+ +	Improved health due to reduced frequency of water borne diseases		None
+ +	More time is available for recreation due to reduced stress upon community members (particularly women) to walk long distances for water collection.		
Ecological benefits		Ecological disadvantages	
+ + +	Increased water quantity / collection of water		None
Off-site benefits		Off-site disadvantages	
	None		None
Contribution to human well-being/livelihoods			
+ + +	Decreased workload due to reduced time for water fetching: on average 1.5 to 2 hours per day per household. The saved time used in recreational activities and child care.		
+++: high / ++: medium / +: low			

Benefits/costs according to land user	Benefits compared with costs	short-term	long-term
The Rainwater harvesting system was supported by a programme.	Establishment	Very positive	Very positive
	Maintenance/recurrent	Very positive	Very positive

Concluding Statements

Strengths and ➔ how to sustain/improve	Weaknesses and ➔ how to overcome
Community mobilisation and institution strengthening as a result of developing rules and regulation around communal Water management ➔ regularly revisit and update agreed rules as per need.	The coverage and storage capacity is not enough to full fill dry sea-sons demand for entire households' ➔ construction of more systems by analyzing total demand.
Health benefits by reducing the likelihood of mosquito transmitted diseases, and water borne diseases as the technology has a water tight lid ➔ Regular checking and cleaning the system.	Maintenance and reoccurring costs may cause some monetary losses as climatic conditions in the area impact regularly on the piping system ➔ if the community maintains the rules and regulations this should reduce any significant issues as the cost will be shared, and maintenance regularly monitored
Increases access to water by storing improved quality an accessible area of the village. Labor efficiency is increased due to regular access to quality water and treatment and improved quality techniques ➔ more such system should be constructed to improve access throughout dry season.	Sometimes villagers don't follow the rules and regulations for example washing near the tank using the water for bathing, which has some negative impact on the other villagers and can result in small conflicts ➔ discuss these issues during meetings
Reduces time spent collecting water from less quality sources that are located further away, time can be utilized for other livelihood, cultural and wellbeing activities ➔ Construction of additional system at accessible location in a community.	
Increased water contributes to supporting the conduction of cultural activities particularly during ceremony and festival periods ➔ Construction of additional system would contribute to cultural activities.	

Key references: None

Contact person: Joern Kristensen, Executive Director, Myanmar Institute for Integrated Development (MIID). No.12, Kanbawza Street, Golden Valley-1, Bahan Township, Yangon, Myanmar. Email: jkristensen@mmiid.org