Nthunguni Spring Project

A Proposal from the Kenya Water, Energy, Cleanliness and Health Project (KWENCH)

The purpose of this project is to construct a water supply system for four schools, five churches and eight commercial centres in Mbooni West District, Kithungo Location, Mbooni Constituency, Mbooni Division, Ngai Ward. Our local partner in the project is the Nthunguni Water Project self-help group. The water supply system will be built in two phases. During the first phase, KWENCH will construct four *in situ* storage tanks made of hard core and cement which will be filled with water from a perennial spring. The water will be tested and, if necessary to ensure potability, the Nthunguni Water Project self-help group will treat the water within the storage tanks on a regular basis. During the second phase, water from the storage tanks will be piped to tank stands located at the schools, churches and commercial centres where it will be stored in plastic, 10m3 tanks and sold at kiosks located at the bottoms of the stands. The flow of water throughout the project will be entirely by gravity. No water pumps will be needed.

A third phase will consist of the construction of eight composting toilet blocks equipped with hand-washing stations at the commercial areas where water points will have been installed. The composting toilets will be based on the *Fossa alterna* model, in which each toilet stall contains two composting pits. One, already full pit is covered with a concrete slab and allowed to compost as the second pit is used and begins to fill. Once the composting pits are dug, a layer of dried leaves, ash and clean soil will be placed in the bottom of the first pit to be used. After each use, the user will add a handful of a mixture of leaves, ash and soil. When the first pit is full, it will be covered and left to compost for three to six months while the second pit is in use. The compost generated in the pits will be clean, fluffy and odour-free! Each composting toilet bock will contain four stalls-two for men and two for women.

KWENCH and the Nthuguni Water Project self-help group will provide hygiene education to the students at the four schools where the tank stands and kiosks have been built while the composting toilets are under construction. The students will then educate their broader communities through dramatic presentations during the ribbon cutting ceremonies for the toilet blocks. Finally, the compost from the composting toilets will be used to support livelihood activities for the Nthuguni Water Project self help group in the form of growing trees, fruits and vegetables. The managing boards of the commercial centres will oversee the production and sale of compost from the toilet blocks. KWENCH and the Nthuguni Water Project self help group will also coordinate with agricultural retail outlets to make the compost available for sale to local farmers.

Project beneficiaries include 50 members of the Nthunguni Water Project self-help group, who will earn income from selling water from the *in-situ* storage tanks and arboculture/agroculture livelihood projects. Other beneficiaries include the 190,000 people who regularly work at or attend the churches and schools and who buy or sell at the commercial centres. Additional beneficiaries include the workers, skilled and unskilled, who will be hired from within the community to construct the project.

Budget

Phase 1: Construction of 4 *in-situ* concrete storage tanks (8 meter diameter, 225 m3 volume)

Materials for 1 tank

2” pipes 4 @ 4,000 16,000

Cement 600 bags @ 800 480,000

Water proof cement 1,600 bags @ 300 480,000

Gate valves 4 @ 3,500 14,000

4x2 timber 1,600 feet @ 90 144,000

6x1 timber 2,700 feet @ 60 162,000

6x2 timber 800 feet @ 120 96,000

3x2 timber 3,000 feet @ 40 120,000

Water proof black board 20 pieces @ 4,500 90,000

Manhole cover 2 pieces @ 5,000 10,000

4” nails 50 kg @ 250 12,500

3” nails 50 kg @ 250 12,500

2” elbow 4 @ 1,200 4,800

Union 4 pieces @ 1,250 5,000

Angle line 2x2 gauge 16 80 pieces @ 3,650 292,000

Flat iron sheet gauge 14 78 pieces @ 3,800 296,400

Boss white 16 gauge 100 pieces @ 500 50,000

Y16 metals 360 @ 1,800 648,000

Y10 metals 280 @ 1,500 420,000

Y8 metals 420 @ 850 357,000

Arching machine for compacting 192 days @ 1,000 192,000

Mixing machine 192 days @ 2,500 480,000

Binding wire 50 kg @ 150 7,500

 Subtotal 4,389,700

 x 4 storage tanks 17,558,800

Water testing 15,000

Labour for 4 tanks

6 masons x 6 days/week x 32 weeks @ 1,500/day 1,728,000

4 plumbers x 6 days/week x 32 weeks @ 1,500/day 1,152,000

3 steel workers x 6 days/week x 32 weeks @ 1,500/day 864,000

Labourers for constructing the tanks 10 labourers

 x 6 days/week x 32 weeks @ 400/day 768,000

KWENCH field supervisor 6 days/week x 32 weeks

 @ 1,500/day + food supplement 500/week 304,000

 Subtotal 4,816,000

 Phase 1 subtotal 22,389,800

 Administration (15%) 3,358,470

 Contingency (10%) 2,238,980

 Phase 1 total 27,987,250

Community contribution

Sand 720 tonnes @ 2,800 2,016,000

Ballast 150 tonnes @ 2,200 1,320,000

Labourers for digging foundation 20 labourers

x 6 days/week x 5 weeks @ 400/day 240,000

Labour for digging tunnels 20 labourers x 6 days/week

x 5 weeks @ 400/day 240,000

 Subtotal 3,816,000

Phase 2: Construction of 17 tank stands with water tanks and kiosks and connection of the tanks by pipes to the *in-situ* storage tanks and to each other.

a. 17 10m3 plastic water tanks @ 78,000 1,326,000

b. Tools for digging trenches for pipe-laying

Mattocks 50 @ 1,200 60,000

Shovels 50 @ 1,500 75,000

Pangas 5 @ 400 2,000

Axes 10 @ 800 8,000

 Subtotal 145,000

c. 17 40-feet high tank stands

Budget for materials for 1 tank stand

56 pieces 2x2 angle line @ 3,400 190,400

4x2 beams 16 @ 10,000 160,000

H bar 8 @ 8,840 70,720

Ground bolts 64 @ 250 16,000

Heavy gauge 4” flat bar 10 pieces @ 3,500 35,000

Joint bolts 460 @ 30 13,800

Paint 2 tins @ 1,800 3,600

Thinner 10 litres @ 800 per 5 litres 1,600

Brushes 4 @ 350 1,400

Welding rods 4 packets @ 3,000 12,000

2x6 timber 200 feet @ 120 24,000

Cement 20 packets @ 800 16,000

1” gate valves 4 @ 3,500 14,000

1” tap @ 1,500 1,500

1” nipples @ 100 100

1” ball valve @ 1,500 1,500

Iron plate ¼” @ 36,000 36,000

Grinding disks 8 @ 300 2,400

Cutting disks 15 @ 200 3,000

 Subtotal 603,020

 x 17 tank stands 10,251,340

d. Construction of kiosks at the bottom of each tank stand

Budget for materials for 1 kiosk

Iron sheets 4 @ 800 3,200

Steel door @ 15,000 15,000

Cement 12 bags @ 800 9,600

Roofing nails 4 kg @ 300 1,200

Nails 4 kg @ 250 1,000

Paint 3 tins @ 1,800 5,400

 Subtotal 35,400

 x 17 kiosks 601,800

 Budget for labour for 17 kiosks

Masons 2 x 30 days @ 1,500 90,000

Painter 4 days @ 1,500 6,000

Labourers 2 x 30 days @ 400 24,000

 Subtotal 120,000

Subtotal for construction of 17 kiosks 721,800

Community contribution

for 1 kiosk

Bricks 600 @ 10 6,000

Sand 1 tonne @ 2,800 2,800

Ballast 1 ½ tones @ 2,200 3,300

 Subtotal 12,100

 x 17 kiosks 205,700

e. Construction of dam at spring outlet

Cement 20 packets @ 800 16,000

3” pipe @ 4,000 4,000

3” T-joint @ 500 500

3” gate valves 2 @ 3,500 7,000

3” nipples 2 @ 250 500

3” union 10 @ 250 2,500

 Subtotal 30,500

Community contribution

Sand 4 tonnes @ 2,800 11,200

Ballast 8 tonnes @ 2,200 17,600

 Subtotal 28,800

f. Connection of dam to first storage tank (500 meters west of spring)

3” pipes 40 @ 4,000 160,000

3s” sockets 40 @ 120 4,800

3” bend @ 100 100

 Subtotal 164,900

g. Connection of first storage tank to tank at Mumani Primary School (800 meters southwest of first storage tank)

3” pipes 70 @ 4,000 280,000

1” sockets 70 @ 120 8,400

3” sockets 60 @ 120 7,200

1”x 3” T-reducer @ 300 300

Gate valve 2 @ 3,500 7,000

1” nipples 6 @ 100 600

1” elbows 10 @ 120 1,200

1” ball valve @ 1,500 1,500

 Subtotal 306,200

h. Connection of tank at Mumani Primary School to tank at Mumani Secondary School (600 meters southeast of Mumani Primary School)

3” pipes 60 @ 4,000 240,000

1” sockets 80 @ 120 9,600

3” sockets 60 @ 80 4,800

1” pipes 60 @ 800 48,000

1”x 3” T-reducer @ 300 300

1” gate valves 2 @ 3,500 7,000

1” nipples 6 @ 100 600

1” ball valve @ 1,500 1,500

3” union 10 @ 300 3,000

Subtotal 314,800

i. Connection of tank at Mumani Secondary School to tank at Mumani Shopping Centre (1 km south of Mumani Secondary School)

3” pipes 80 @ 4,000 320,000

1” pipes 60 @ 800 48,000

3” sockets 80 @ 120 9,600

1” sockets 60 @ 80 4,800

1”x 3” T-reducer @ 300 300

1” gate valves 2 @ 3,500 7,000

1” nipples 6 @ 100 600

3” union 10 @ 300 3,000

1” ball valve @ 1,500 1,500

 Subtotal 394,800

j. Connection of tank at Mumani Secondary School to fourth storage tank (800 m west of Mumani Secondary School), same as g, above.

Subtotal 306,200

k. Connection of fourth storage tank to tank at Kavumbu Market (2 km west of fourth storage tank)

3” pipes 160 @ 4,000 640,000

1” pipes 80 @ 800 64,000

3” sockets 160 @ 120 19,200

3”x 1” T-reducer 2 @ 300 600

3” union 20 @ 300 6,000

1” gate valves 4 @ 3,500 14,000

1” nipples 6 @ 100 600

1” sockets 80 @ 80 6,400

 Subtotal 750,800

l. Connection of tank at Kavumbu Market to tank at Kavumbu Anglican Church (200 meters north of Kavumbu Market)

3” pipes 20 @ 4,000 80,000

1” pipes 30 @ 800 24,000

3” sockets 20 @ 120 2,400

1” sockets 15 @ 800 12,000

1”x 3” T-reducer @ 300 300

1” elbow 10 @ 120 1,200

1” ball valve @ 1,500 1,500

1” nipple 4 pieces @ 100 400

 Subtotal 121,800

m. Connection of tank at Kavumbu Anglican Church to tank at Kavumbu Catholic Church (200 meters north of Kavumbu Anglican Church). Same as l, above.

 Subtotal 121,800

n. Connection of tank at Kavumbu Catholic Church to tank at Kavumbu Pentacostal Church (200 meters north of Kavumbu Catholic Church). Same as l, above.

 Subtotal 121,800

o. Connection of the tank at Kavumbu Pentacostal Church to tank at Kavumbu Primary School (200 meters north of Kavumbu Pentacostal Church) Same as l, above.

 Subtotal 121,800

p. Connection of dam to second storage tank (500 meters east of the spring) Same as f, above.

Subtotal 164,900

q. Connection of second storage tank to third storage tank (800 meters east of second storage tank)

3” pipes 70 @ 4,000 280,000

3” sockets 70 @ 120 8,400

 Subtotal 288,400

r. Connection of third storage tank to tank at Kyamuata Primary School (1 km southwest of third storage tank)

3” pipes 80 @ 4,000 320,000

3” sockets 80 @ 120 9,600

 Subtotal 329,600

s. Connection of tank at Kyamuata Primary School to tank at Katulye Shopping Centre (3 km west of Kyamata Primary School).

3” pipes 240 @ 4,000 960,000

1” pipes 20 @ 800 16,000

3” sockets 120 @ 120 14,400

1” elbow 10 @ 120 1,200

1” nipples 4 pieces @ 100 400

 Subtotal 992,000

t. Connection of tank at Kyamuata Primary School to tank at St. Joseph Katulye Catholic Church (200 meters to the southeast of Kyamuata Primary School) Same as l, above.

 Subtotal 121,800

u. Connection of tank at St. Joseph Katulye Catholic Church to tank at Kitooni Anglican Church (1 km) Same as r, above.

Subtotal 329,600

v. Connection of tank at Kitooni Anglican Church to tank at Kayamuata Shopping Centre (1 km south of Kitooni Anglican Church). Same as r, above.

Subtotal 329,600

w. Connection of tank at Kyamuata Shopping Centre to tank at Kiuma Shopping Centre (1 km south of Kayamuata Shopping Centre). Same as r, above.

Subtotal 329,600

x. Connection of tank at Kiuma Shopping Centre to tank at Soweto Shopping Centre (1 km south of Kiuma Shopping Centre). Same as r, above.

Subtotal 329,600

y. Connection of tank at Mumani Secondary School to tank at Kavutini Shopping Centre (2½ km south of Mumani Secondary School).

3” pipes 200 @ 4,000 800,000

3” sockets 100 @ 120 12,000

1”x 3” T-reducer 10 @ 30 3,000

1” elbow 10 @ 120 1,200

1” nipples 5 @ 100 500

1” gate valves 4 @ 3,500 14,000

1” ball valve @ 1,500 1,500

 Subtotal 832,200

z. Connection of tank at Kavutini Shopping Centre to tank at Kitooni Shopping Centre (1 km south of Kavutini Shopping Centre). Same as r, above.

Subtotal 329,600

Budget for labour for building tank stands and connecting pipes

Welders 4 x 6 days/week x 16 weeks @ 2,000 768,000

Masons 8 x 6 days/week x 16 weeks @ 1,500/day 1,152,000

Carpenters 3 x 6 days/week x 16 weeks @ 1,500/day 432,000

Painters 2 x 6 days/week x 8 weeks @ 1,500/day 144,000

Plumbers 2 x 6 days/week x 16 weeks @ 1,500/day 288,000

Labourers 15 x 6 days/week x 16 weeks @ 400/day 576,000

KWENCH field supervisor 6 days/week x 16 weeks

 @ 1,500/day + food supplement 500/week 152,000

 Subtotal 3,512,000

Transport of materials [[1]](#footnote-2) 75,000

Community contribution

Labour for digging trenches for pipes

100 labourers x 60 days @ 400/day 2,400,000

Phase 2 subtotal 23,163,440

 Administration (15%) 3,474,516

 Contingency (10%) 2,316,344

Phase 2 total 28,954,300

Phase 3: Composting Toilet Blocks and Hygiene Education

Budget for one composting toilet block

3-meter iron sheets 8 @ 800 6,400

Cement 30 packets @ 800 24,000

Y8 bars 20 @ 800 16,000

Iron nails 4 kg @ 250 1,000

Roofing nails 4 kg @ 300 1,200

Paint 4 tins @ 1,800 7,200

Doors 6 @ 15,000 90,000

 Subtotal 145,800

 x 8 composting toilet blocks 1,166,400

Labour for one composting toilet block

2 masons @ 1,500/day x 20 days 60,000

2 labourers @ 400/day x 20 days 16,000

Painter @ 1,500/day x 4 days 6,000

 Subtotal 82,000

 x 8 composting toilet blocks 656,000

 Subtotal for 8 composting toilet blocks 1,822,400

Community contribution

Sand 2 tonnes @ 1,500 3,000

Ballast 2 tonnes @ 1,800 3,600

Bricks 1,500 @ 10 15,000

 Subtotal 21,600

 x 8 composting toilet blocks 172,800

Hygiene Education

Tutor (4 people @ 15,000) 60,000

Consultant to design booklets on hygiene 40,000

Production of booklets on hygiene

(8 pages each @ 200 per booklet x 160 booklets) 32,000

Examination booklets (110 per booklet x 160) 17,600

Overheads made from hygiene booklet 1,700

Rental of projector (7,000 per toilet block) 56,000

Rental of public address system

(microphone, speakers, amplifier 7,000 per

toilet block) 56,000

Transport for projector and PA system

(6,000 per toilet block) 48,000

Snacks (70 for 8,000 people) 560,000

Sodas (35 for 8,000 people) 280,000

Drinking water for dignitaries

(8 cartons with 24 bottles each @ 2,000) 16,000

 Subtotal 1,167,300

Phase 3 subtotal 2,989,700

 Administration (15%) 448,455

Contingency (10%) 298,970

Phase 3 Total 3,737,125

Community contribution:

Soil, ash and leaves for adding to the pits of the composting toilet blocks after construction and after each use.

Handwashing stations, which will consist of reusable plastic bottles, string and soap.

Soil and seeds for producing fruit, vegetables and trees.

NTHUNGUNI SPRING PROJECT GRAND TOTAL: Ksh 60,678,675

Monitoring and Evaluation

KWENCH and the Nthunguni Water Project self-help group will request the institutions receiving water points and composting toilet blocks to commit to keeping records once the project construction and hygiene education components are complete for purposes of monitoring and evaluating the success of the project. During the first year of project operation, we will request the managing boards at each of the institutions receiving water points and composting toilet blocks to keep records of the numbers of people using these facilities, the costs of maintaining them, the gross income generated by them and the net income generated by them. Teachers at the four schools receiving hygiene education will be requested to observe and qualitatively record changes in student hygiene behaviour. The managing bodies of the commercial areas receiving composting toilets will be requested to keep records of the quantities of compost they produce. KWENCH and the Nthunguni Water Project self-help group will also survey students at the schools receiving hygiene education and community members at large to ascertain whether hygiene behaviour has improved at the end of the first year of project operation. The Nthunguni Water Project self-help group will check with each institution at the end of every quarter during the first year of project operation to ensure that records are being properly kept and to trouble-shoot in case problems connected with the project’s operation arise. The Nthunguni Water Project self-help group will work with KWENCH and the relevant institutions experiencing operational problems to try to resolve any such problems.

During the second year of operation, we will continue to track the indicators monitored during the first year. In addition, we will request the institutions receiving the composting toilet blocks to record the amount of income generated through sales of the compost to agricultural retail outlets. We will ask the agricultural retail outlets to track the amount of compost they sell to farmers and the net profit they make from these sales. KWENCH and the Nthunguni Water Project self-help group will survey members of the community to qualitatively ascertain whether productive time spent working or studying has increased as a result of closer proximity to water points, availability of a safe water source and availability of clean toilets and handwashing stations at the commercial areas. Further, we will ask community members whether there have been improvements in health related to improved hygienic practices and availability of safe water sources and whether agricultural income has increased as a result of using compost on crops. The Nthunguni Water Project self-help group and KWENCH will continue to trouble-shoot and to try to resolve project-related problems.

Indicators:

After 1 year of implementation:

1. Number of people using water points and ablution blocks, measured through examination of written records kept by managing boards overseeing commerce at their water points and composting toilet blocks.
2. Net increase in income generated through user fees, as measured through examination of written records kept by managing boards overseeing commerce at their water points and composting toilet blocks.
3. Quantity of compost produced by composting toilets measured through examination of written records kept by managing boards of the commercial centres that have received composting toilet blocks.
4. Observed change in hygiene behaviour in students in schools that received hygiene education and the in broader communities where hygiene education performances have been staged in conjunction with ribbon cutting ceremonies for ablution blocks, measured by surveys of students, teachers and community members.

After 2 years of implementation:

All of the indicators included above, with the addition of:

1. Decrease of productive time used in fetching water from distant springs through use of the water points as measured by surveys of customers of the water points.
2. Decrease in rates of water-related diseases related to drinking contaminated water as measured by surveys of families purchasing water from project water points.
3. Increase in time spent in productive activities as a result of having community toilet blocks and handwashing stations available at commercial areas and as a result of improved hygienic behaviour as measured through surveys of community members.
4. Revenue earned from sales of compost to agricultural retail outlets measured through examination of written records of managing boards of the commercial centres that have received the composting toilet blocks.
5. Net income earned by agricultural retail outlets by selling compost to farmers as measured by their record books.
6. Net income generated by farmers through the sale of seedlings, fruits and vegetables produced using compost from the toilet blocks.
1. Includes material for composting toilet blocks. [↑](#footnote-ref-2)