The Madagascar Water Project

MAINTENANCE TRIP REPORT

December 2017

<<Development of potable water resources, progressing to improvements in basic healthcare, hygiene, and sanitation in rural communities in Madagascar >>.

Summary

The program was conducted during December 2017, two months after the Phase V program. The maintenance trip goals were to:

1. To drill MWP43
2. To maintain and upgrade all existing wells MWP has built from Phase I through Phase V, from Vavony in the north to Mahanoro in the south.
3. To evaluate the performance of the pumps, including the 9 meter and 20 meter pumps recently used by the Project.
4. To bring continuous improvement on the Project

The report contains four parts:

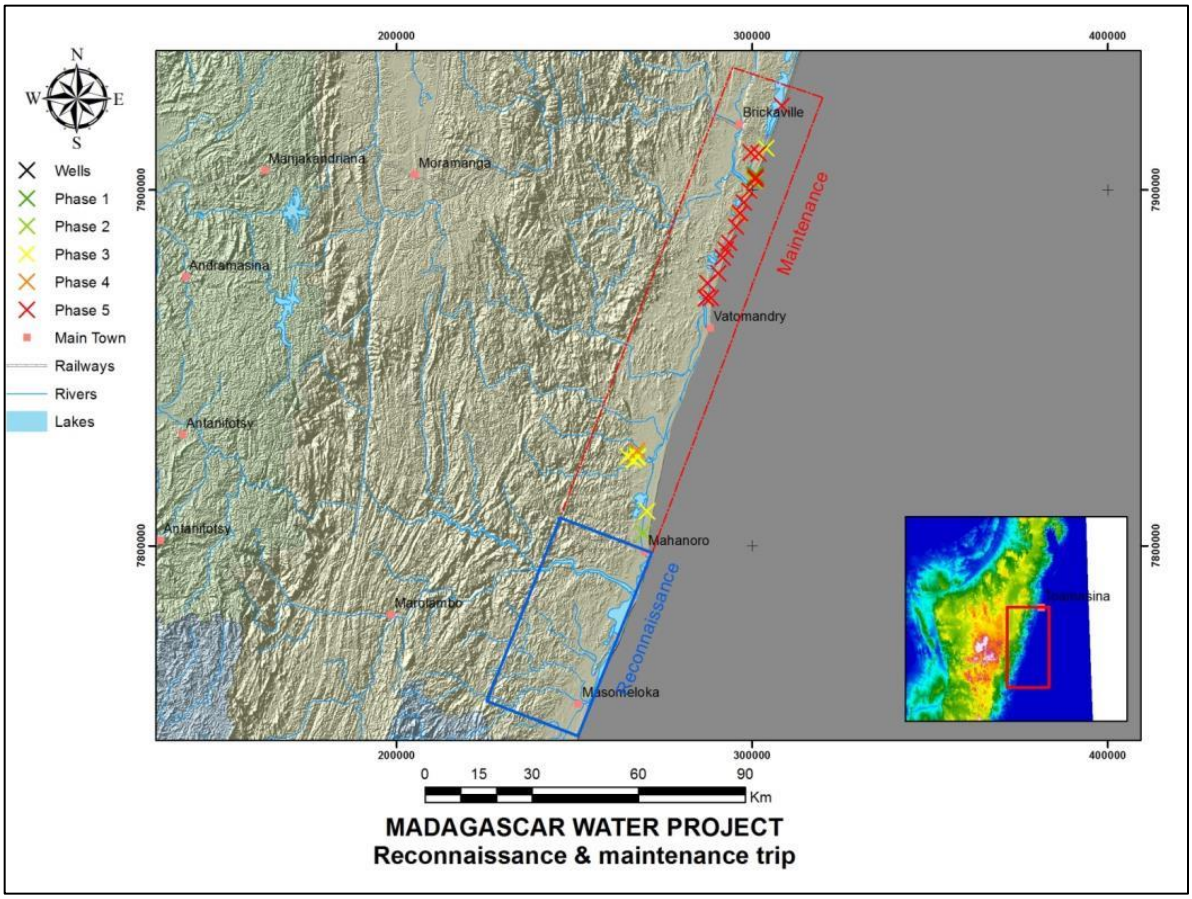
Part I: Detail of Maintenance in Each Village

Part II: Evaluation of Pump Performance

Part III: Well MWP-43

Part VI: Recommendations

Figure1: Area of interest



Part I: DETAIL OF MAINTENANCE IN EACH VILLAGE

a) ANDOVORANTO

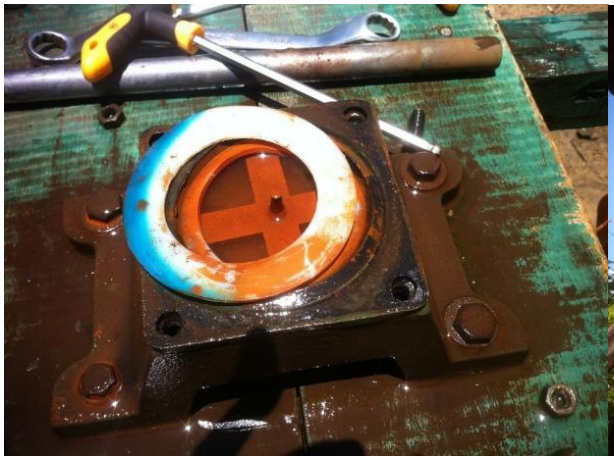
All of the wells in Andovoranto are working well. Well MWP-04 was leaking at its base and Well MWP-06 was weak. Performed routine maintenance of each well, checking the leather cups and tightening bolts, washers and nuts.

MWP-01: 9 meter pump
Working well, rubber cup still in good condition, bolt, nut, washer re-tighten

MWP-02: 9 meter pump
Working well, rubber cup still in good condition, bolt, nut, washer re-tighten

MWP-03: BatiMax pump
Working well, leather cup still in good condition, stabilization by washers

MWP-04: 9 meter pump
Working well, but leaking at base. Rubber cup still in good condition,



White seal should not be there

Rubber cup on 9m has shows little wear

Problem: one seal was incorrectly installed at the base of the pump.
Action: unscrewed the body of the pump; took out seal; tighten bolts, nuts and washers.
Result: works well.

MWP-06: BatiMax pump
Status: pump weak
Action: changed to new Batimax pump

MWP-08: BatiMax pump

Working well, leather cup worn, changed cup, stabilized moving parts with washers

MWP-09 Near Mayor's office: BatiMax pump

Working well, leather cup in good condition, stabilized moving parts with washers

MWP-26 CEG School: BatiMax pump

Working well with leather cup local made, changed to new cup, table needs to be changed

MWP-38 Elementary School: 9 meter pump

Working well, rubber cup still in good condition, tighten bolts, nuts, washers

MWP-40 Cocotree Hotel: 20 meter pump into cistern 5 meters above ground

Status: Working well with leaking, rubber cup in good condition, handle broken but fixed by them
Action: changed and fit all seals
Result: working well, no leaks

b) ANDAVAKIMENA: Ferry Crossing

MWP-05: 20 meter pump

Status: Working well, rubber cup in good condition, they took out the hose, handle broken but fixed by them

MWP-20: BatiMax pump

Working well, leather cup in good condition, stabilization by washers

c) ANDOVONA

MWP-28: 9 meter pump

Replacement for MWP-24, which goes dry seasonally

Well Depth: 7.0m BGL; Top of WaterTable:5.0m BGL; Steel Well Point (24")

Working well but volume of water produced not enough, pump works perfectly only in the morning and people have to wait a moment if they want to fill their bucket during the day, rubber cup still in good condition, bolt, nut, washer re-tighten.

d) VAVONY

MWP-29: 9 meter pump

Status: Working well, rubber cup in good condition, slab broken, fittings came loose

Action: repaired cement slab, re-tighten bolts, nuts, and washers

e) AMBODIVOARA

MWP-30: 9 meter pump

Status: Working well, rubber cup in good condition

Water is not drinkable as it smells bad with dark and reddish coloration, people use it only for washing,

f) MAHATSARA Mahanoro

MWP-10: BatiMax pump

Pump working well but table completely broken, so we took out the pump.

g) AMBILABE Mahanoro

MWP-11: BatiMax pump

Pump is working well but table needs to be changed, leather cup changed

MWP-21: BatiMax pump

Pump was not working, the plug on the piston had become loose and could not function properly. Replaced piston and cup. Pump now working well. Table needs to be replaced.

Plug loose in the inner piston which caused pressure loss, all kit replaced

h) TSIVANGIANA

MWP-12 Market: 20 meter pump changed to BatiMax pump

Photo upon arrival

This is a valuable well that demonstrates the importance of the Well Management Committee. After making repairs in October 2017, actions of the local Peace Corps Volunteer compromised the role of the Well Management Committee. In frustration, the Committee ceased to function.

Status upon arrival: the rubber cup was broken, pump did not work, fence fell down and no one took care of the well.
Actions: A meeting was held with the Well Management Committee, later with the Peace Corp Volunteer. Changed 20 meter pump to a BatiMax pump.
Current Status: Well Committee back in charge, pump working well, valuable lessons learned

MWP-17 School: BatiMax pump

Pump is working fine but table needs to be repaired, leather cup changed

i) AMPASIMBE

MWP-13: BatiMax pump

The pump was not working due to the leather cup which is broken. We changed it and it is working now

Broken leather cup

Sedera is changing the leather cup

j) AMBODIVARO

MWP-16: 20 meter pump

pump was working at very low flow, all was unscrewed, village tried to tighten it by using rope

Rubber cup broken

Pump was changed with the 20m pump from Tsivangiana, working well now

k) KALOMALALA

MWP-19 south side of village: BatiMax pump

Pump was working but leather cup was worn, cup changed, working well

MWP-31 north side of village: BatiMax pump
Replacement well for MWP-18, which seasonally goes dry

Pump working well, replaced leather cup

I) AMBOAKAMBATSY

MWP-32: BatiMax pump
Status: pump working well (at our surprise, the local guy had changed the leather cup with the spare we gave to him), fenced

Action: leather cup has been changed, one spare of leather cup left with Committee, pin replaced, put additional washer.

m) AMBODITAFARA

MWP-33: BatiMax pump

Replacement well for MWP-25 which seasonally goes dry

All checked well, pump works fine, no fence

n) SONDRARA

MWP-23: BatiMax pump

Always has a nice flow, everything good

MWP-35: BatiMax pump

The village is located next to the sea and a cut through where the sea intrudes into the Pangalana Channel. Although the well is only 60 meters from the MWP-23 well, this well has always produced sea water. At the request of the villagers, the pump was not taken off so they can use the water for washing.

Water is still salty, slight improvement. People use for washing

o) ANALALAVA

MWP-34: 9 meter pump

Works well, rubber cup in good condition, bolts, nuts, and washer re-tightened

p) MAHATSARA

MWP-36: 9 meter pump

Status: pump working well, everything good, pin washers reinforced

Note: Existing Bushproof well broken. We gave them PVC glue as per their request for the repair.

q) VOHITRAMPASINA

MWP-37: BatiMax pump

Leather cup was broken, we changed to new leather cup and everything is good

r) ANTSIRANAMIHANINA

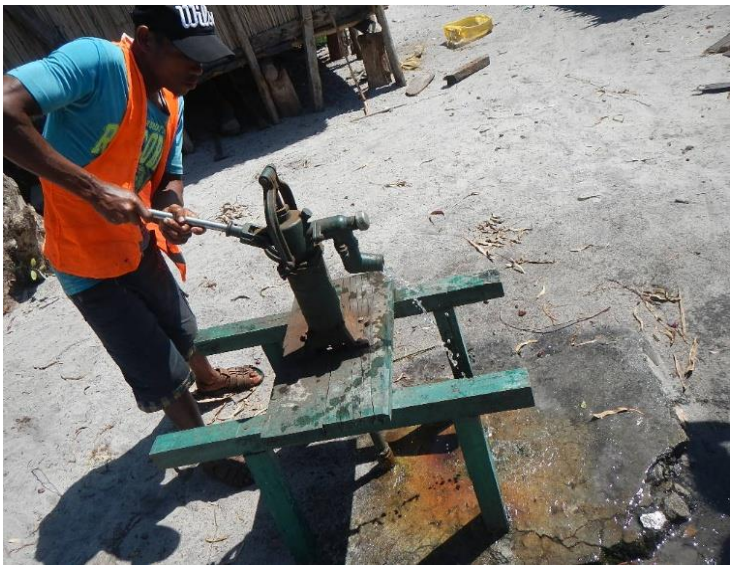
MWP-41: 20 meter pump changed to BatiMax pump

Status: the 20 meter pump was working but falling apart due to extensive use.
Action: changed to a BatiMax pump, trained two local people on maintenance, gave spare leather cup, all working well.
Note: Two existing Bushproof pumps broken in the village

s) AMBILAN'NY VARANTA

MWP-42: 9 meter pump
Water is not drinkable as it smells and has a dark and reddish coloration, people use it only for washing,

Note: The Bushproof pump present in the village which has been fixed by the local people, it smells also but not as much as ours, people can use for cooking.



t) MANAKAMBAHINY

MWP-39: BatiMax pump

The rebuilt Batimax pump has been replaced with a new Batimax pump

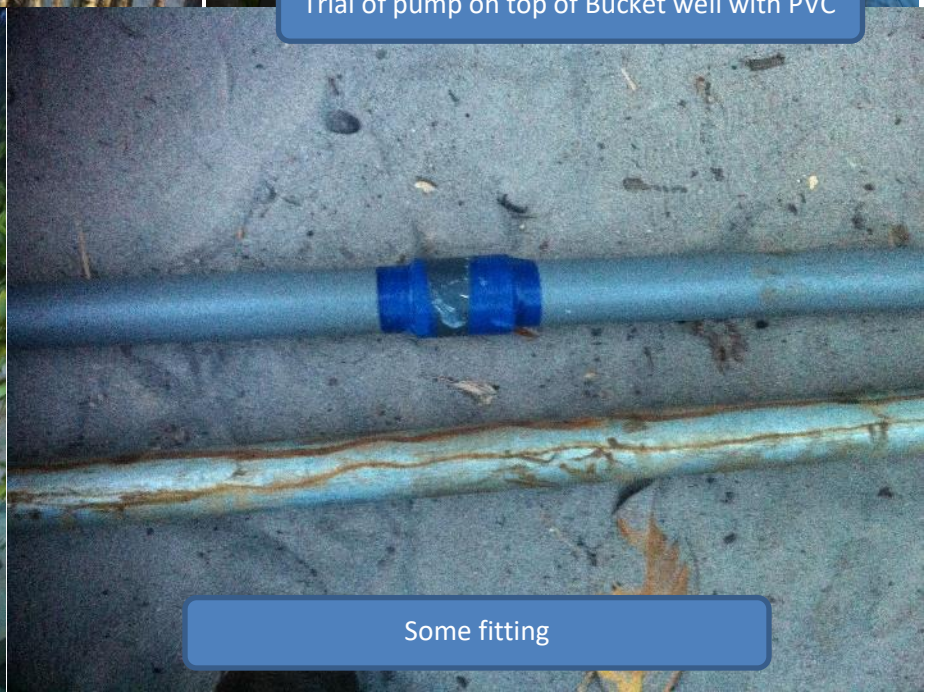
u) IVATO

The MWP placed BatiMax pumps over two existing bucket wells. The steel pipe used originally was replaced with PVC pipe

Some fitting

Trial of pump on top of Bucket well with PVC

Working



Some fitting

The Galvanized pipe installed into the two Bucket wells have been changed to PVC pipe

Part II: EVALUATION OF PUMP PERFORMANCE

a) PERFORMANCE SUMMARY

The 20 meter and 9 meter pumps were new to the Phase V program conducted in September 2017. Their performance is based on two months performance. The performance of the BatiMax pumps is based on three years of experience.

Performance Summary sorted by pump type:

TYPE	WELL	LOCATION	STATUS	OBS
20m	MWP05	Ferry cross	Arm broken two times, screws loose	Well maintained
20m	MWP40	Cocotree	Arm broken once, seal leaking, screws loose	Well maintained
20m	MWP16	Ambodivaro	Unscrewed everywhere, rubber cup broken	
20	MWP12	Tsivangiana	Arm broken once, rubber cup broken, screws loose	
20	MWP41	Antsiranamianana	Unscrewed everywhere	

TYPE	WELL	LOCATION	STATUS	OBSERVATION
9m	MWP01	Andovoranto	Everything ok	Well maintained
9m	MWP02	Andovoranto	Everything ok, some screws loose	
9m	MWP04	Andovoranto	Everything ok, leak	Installation error
9m	MWP28	Andovona	Everything ok	Well maintained
9m	MWP29	Vavony	Everything ok, some screws loose	
9m	MWP38	Andovoranto	Everything ok	Well maintained
9m	MWP34	Analalava	Everything ok	Well maintained
9m	MWP36	Mahatsara	Everything ok	Well maintained

TYPE	WELL	LOCATION	STATUS	OBSERVATION
Batimax	MWP03	Andovoranto	Still in good condition	Recent pump, well maintained
Batimax	MWP06	Andovoranto	Pump very weak	Old rebuilt pump (01 working year)
Batimax	MWP08	Andovoranto	Leather cup about broken	
Batimax	MWP09	Andovoranto	Still in good condition	Recent pump, well maintained
Batimax	MWP26	Andovoranto	Leather cup changed to local	
Batimax	MWP20	Andavakimena	Leather cup about broken	
Batimax	MWP10	MahatsaraMhn	Leather cup about broken	
Batimax	MWP11	Ambilabe	Leather cup about broken	
Batimax	MWP21	Ambilabe	All inside kit broken	Old rebuilt pump (01 working year)
Batimax	MWP17	Tsivangiana	Leather cup about broken	
Batimax	MWP13	Ampasimbe	Leather cup broken	
Batimax	MWP19	Kalomalala	Leather cup about broken	
Batimax	MWP31	Kalomalala	Leather cup about broken	
Batimax	MWP32	Amboakambatsy	Leather cup about broken	Changed recently
Batimax	MWP33	Amboditafara	Still in good condition	No fence
Batimax	MWP23	Sondrara	Still in good condition	Recent pump, Well maintained
Batimax	MWP37	Vohitrampasina	Leather cup about broken	
Batimax	MWP39	Manakambahiny	Leather cup about broken	

b) DISCUSSION

20 meter Pumps: all were new when installed
- 5 of 5 pumps became loose when multiple screws unscrewed
- 3 of 5 pumps suffered from broken pump arms when screw came loose
- 2 of 5 pumps had broken rubber cups with only two months of use

9 meter Pumps: all were new when installed
- 5 of 8 pumps had no problems
- 3 of 8 pumps had problems with screws becoming unloose

Batimax Pumps: age of pumps ranged from new to 3 years old
- 4 of 18 pumps had no problems
- 13 of 18 pumps had problems with the leather cup
- 1 of 18 pumps had mechanical problems

c) CONCLUSION

20m Pumps:

Strengths: slightly higher depth capability – perhaps 10 meters, high volume water production, can pump into a container,
Weaknesses: mechanically unsound, arm breaks, screws become loose, rubber cups fail, cannot support a lot of users, mechanically complicated, maintenance cannot be done locally

9m Pumps:

Strengths: work well, stronger than Batimax pump, need less frequent maintenance compared to the 20m pump and Batimax pump, have a slightly higher depth capability – perhaps 8 meters,
Weaknesses: Maintenance more complex than BatiMax pumps

Batimax Pumps:

Strengths: work well, mechanically simple, maintenance can be done locally with minimal support
Weaknesses: require more frequent maintenance - especially leather cup, depth capabilities are slightly less than the other pumps - 7 meters below ground;

d) RECOMMENDATIONS

With that experience, the following recommendations are made:

- The 9 meter pump is recommended for wells shallower than 8 meters because it requires less maintenance than the other pumps.
- The 20 meter pump is recommended when a cistern system is used and the number of users is limited.
- The BatiMax pump is recommended in wells shallower than 5 meters and on wells that they have been in use in the past.

Part III: WELL MWP-43

Well Data:

- Top of Water Table: 2.0 m BGL;
- Total depth: 4.5m BGL;
- Total height below pump: 6.4m
- Steel well point;
- Initial Rate: 30 liters/minute; New Batimax pump;
- X: 3000868.03 Y: 7902869.21;
- Drilled on December 7th 2017 by the Madagascar Team

Part VI: RECOMMENDATIONS

- Change and repair the tables as recommended. The MWP-10 table was completely damaged, and cannot support pump anymore. The following tables need repairs or replacement: MWP-26, MWP-13, MWP-10, MWP-11, MWP-21, MWP-17
- Put a larger cement foundation (same as Bush proof), to permit runoff to go farther away.
- Using Casing is helpful to drill in the south especially when the water table exceeds 7 meters