

Interactive sessions – Workshop Limpopo organized by SADC, Connect4WR and IWMI

03-06-2021

A joint virtual stakeholder workshop, organized under two operational projects in the Limpopo Basin: Conjunctive Water Management in the Tuli Karoo and [Connect4 Water Resilience](#) as part of the wider [SHEAR programme](#), was held on the 2nd-3rd of June. The workshop was co-organized by IWMI and the Connect4WR teams, in collaboration with regional partners, Southern African Development Community Groundwater Management Institute (SADC-GMI) and the Limpopo Watercourse Commission (LIMCOM). The workshop provided an opportunity to present results of both projects and also to engage discussions about transboundary water resources management and resilience to floods and droughts in the Limpopo river basin. The discussion took place through three interactive sessions. First, each national group identified vulnerable and exposed areas to floods and droughts in the respective national portions of the Limpopo River basin. Then, the same groups discussed existing or new strategies that could increase resilience to extreme weather events. Finally, the implications of these strategies were discussed at the basin level in two transboundary groups. The discussion allowed the identification of management scenarios to increase resilience to droughts and floods in the basin. A summary of the interactive discussion is reported in this document.

Scenario summary

In this section, the national management scenarios co-developed with the workshop participants are reported below. Figure 1 shows the interactive map developed during the workshop with a graphic representation of the measures identified by country.

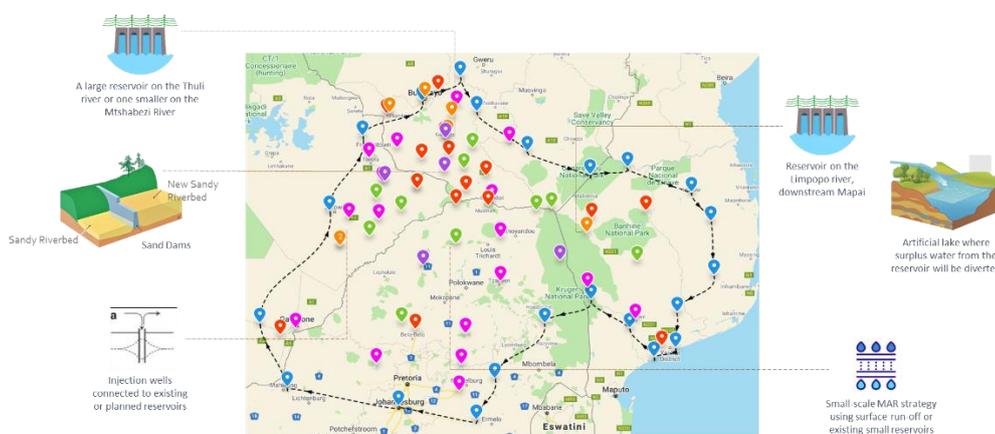


Figure 1. Management strategies, identified during the workshop, to increase resilience to drought and floods in the Limpopo River basin.

- Implementation of a large reservoir on the Limpopo River, near Mapai, **Mozambique**. The reservoir will be connected to an artificial lake, that will be located downstream the reservoir (more likely to the left of the river looking towards the estuary). Excess water during extreme wet events will be conveyed to this artificial lake, favoring the recharge of groundwater through natural infiltration.
- Construction of a large reservoir in Gwanda, **Zimbabwe**, to increase resilience to recurring droughts and reduce exposure to floods in the future (which will mainly be caused by the current intense logging and hence the lack of land cover). The large reservoir could be constructed on the Thuli river or a smaller one on the Mtshabezi River. This strategy, however, should be used within an Integrated Water Resource Management plan that also looks at soil conservation techniques. It would be interesting to understand how a large-scale reforestation project in the area would affect the water cycle. In addition, sand dams have already been built in some tributaries of the Limpopo River in Zimbabwe. Hence, it would also be interesting to understand the effect of an increase in the number of sand dams on groundwater recharge.
- In **Botswana**, one possible strategy is the implementation of injection wells of managed aquifer recharge. In that case, current or planned wells will be connected to existing or planned reservoirs. Excess water from the reservoirs during extreme wet events will be used to recharge the aquifer by injecting it into the wells. A pre-feasibility study has already been conducted with all the specificities for each scenario (Figure 1). Another strategy to explore is the implementation of sand dams on the tributaries (sand bed rivers).

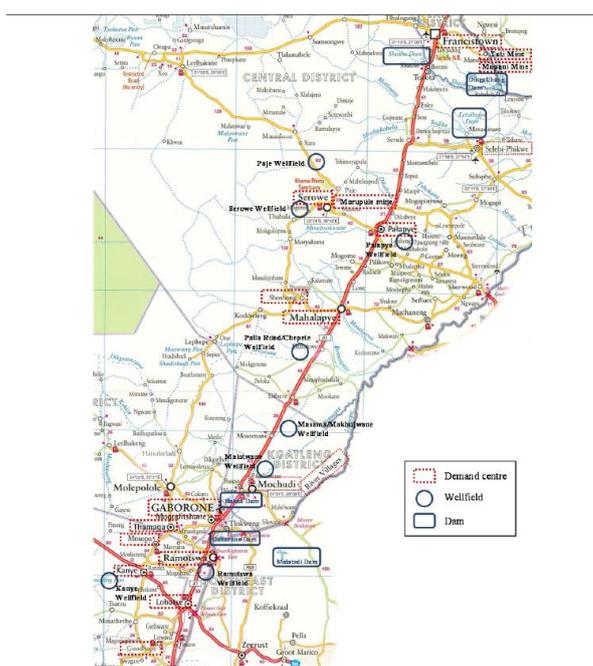


Figure A. Map showing the demand centres, wellfields and surface water dams included in this study.

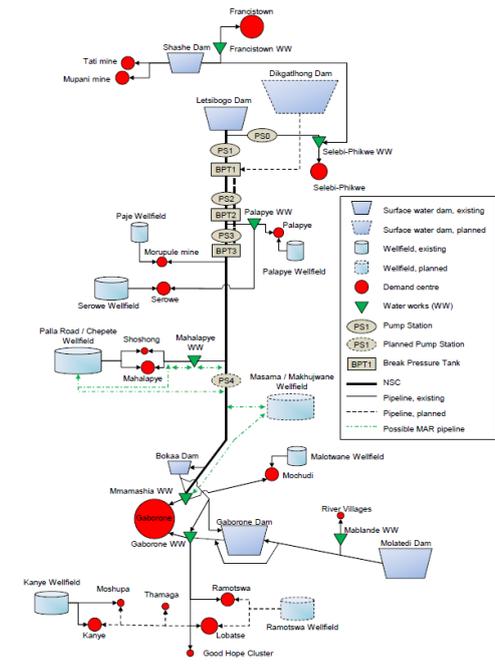


Figure B. Schematic illustration of the water supply system linked to the N.S.C.

Figure 2. Maps showing the demands centres, wellfields and surface water dams included in this study (on the left) and the possible water supply system (on the right).¹

- A possible strategy is the use of existing surface runoff or small reservoirs, dams or ponds (rainwater harvesting systems) as water sources for the small-scale MAR strategy to be implemented in different parts of the **South African** portion of the Limpopo River basin. It might be important to think about a MAR application in Mookgophong / Modimolle (South Africa), in order to increase drought resilience for the surrounding areas and near the Blouberg nature reserve.

LINKS to the developed Padlets (interactive material used during the workshop):

<https://padlet.com/alessiamatano/Limpopo>

<https://padlet.com/alessiamatano/Mozambique>

<https://padlet.com/alessiamatano/Zimbabwe>

<https://padlet.com/alessiamatano/Botswana>

<https://padlet.com/alessiamatano/SouthAfrica>

Overview of interactive group work by country

Mozambique

Session 1, Vulnerable and Exposed Areas:

- Coastal areas are the most exposed to flooding (mainly caused by storm surges) and are highly vulnerable due to their high population density. On the other hand, the villages of the Gaza province are mainly exposed to meteorological drought. To cope with these droughts, the population lives mainly near the Limpopo River, increasing their exposure to possible river floods. The areas close to the Bahine National Park are those most exposed to meteorological drought. For future exposure to drought and floods, participants highlighted areas downstream from Mapai. This is because there is a project to build a new dam in Mapai which could lead to an increase in the population downstream of the basin.

¹ Increase of Water Supply Safety by Managed Aquifer Recharge along the North-South Carrier – A pre-feasibility study, 2014



Figure 3. Areas most vulnerable and exposed to drought within the Mozambican portion of the Limpopo Basin.

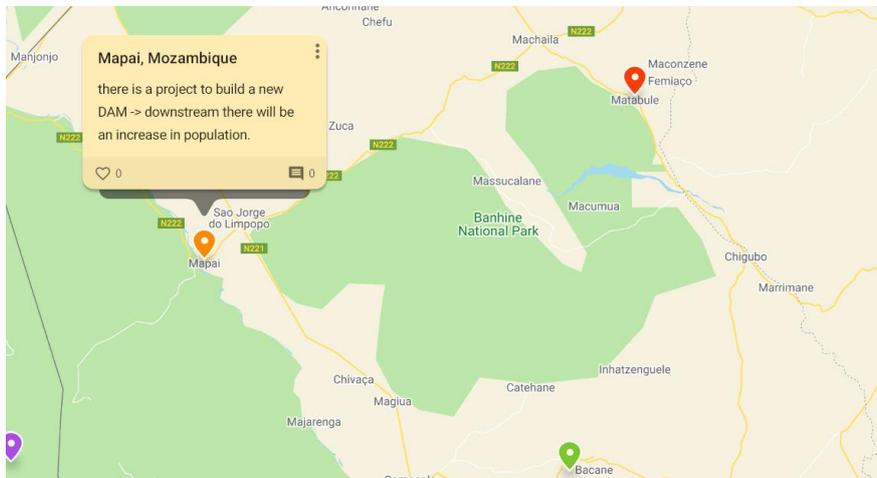


Figure 4. Areas whose exposure to drought could increase in the future.

Session 2, Strategies to tackle Drought & Flood:

- It is in program the construction of a new large dam on the Limpopo river, near Mapai. Excess water during extreme wet events will be diverted to an artificial lake, increasing aquifer recharge. The location of the lake would be on the left side of the river (looking toward the estuary) immediately downstream of the dam.
- Currently, dams have been implemented only on tributaries and their primary purpose is flood control. The dams are also used for agricultural purposes. They would like to investigate the multiple purpose of dams and optimize the dam operating rules in order to increase resilience during drought and flood events.
- Equally important for the participants, it is the development of an early warning system. A system is currently under development but should be improved and scaled at national level.

- Also in the first place, but slightly less important than the two previous measures, there is changes in land use. In this case, it would be important to understand the effects of different types of land use on the water balance.
- At the second place, we have: (I) the management of settlement patterns designed to reduce community exposure to floodplains; (II) the changes in crop patterns; (III) the rainwater collection systems; and finally (IV) the MAR techniques. Workshop participants will be interested in exploring MAR strategies where the water source is the excess water from existing reservoirs during extreme wet events.

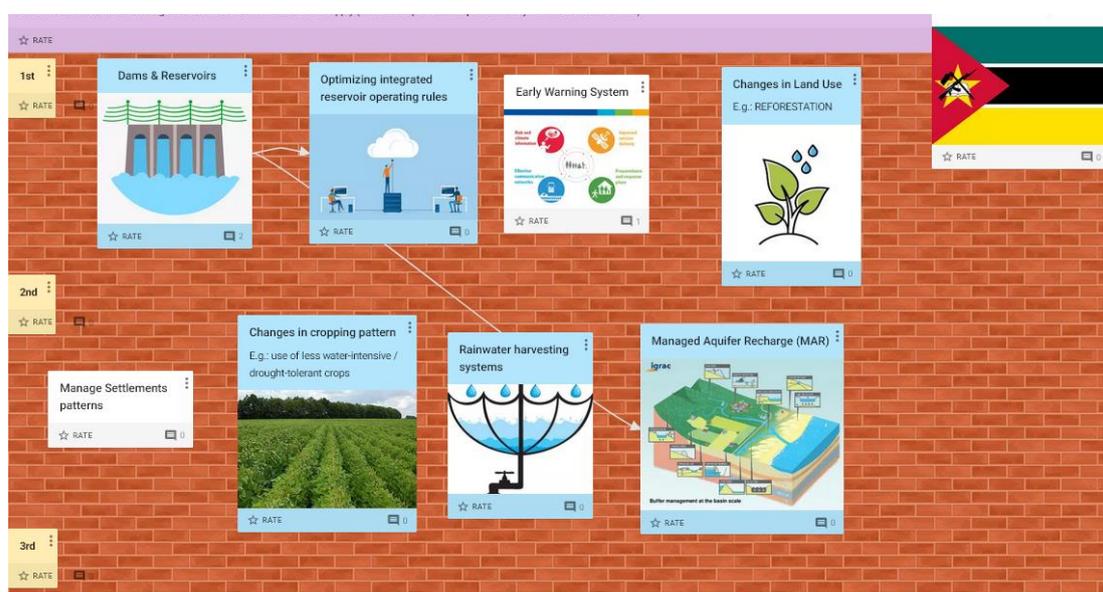


Figure 5. Final padlet on the list of strategies to increase resilience on drought and floods in the Mozambican portion of the Limpopo River basin.

Session 3, Considerations at basin scale:

It would be good to evaluate the impact of the large dam that will be built on the Limpopo River in Mapai and the effect of the artificial lake (connected to the basin) on the recharge of the aquifers.

Zimbabwe

Session 1, Vulnerable and exposed areas: Population in the Bulilima district, Ntabazindura, Gwanda and Legion Mine suffer from drought and water insecurity. The areas around the border with Botswana and South Africa, the Mazunga district and Guyu are the main ones exposed to drought but sometimes also to floods. In Gwanda district, population might suffer flash floods in the future due to intense tree cutting and therefore lack of land cover. Mzingwane might be vulnerable to flooding in the future too. Bulawayo is vulnerable to drought, and there is a plan to extract water from the Matopo aquifer. Plumtree is currently prone to drought and may also be exposed to flash flooding in the future.

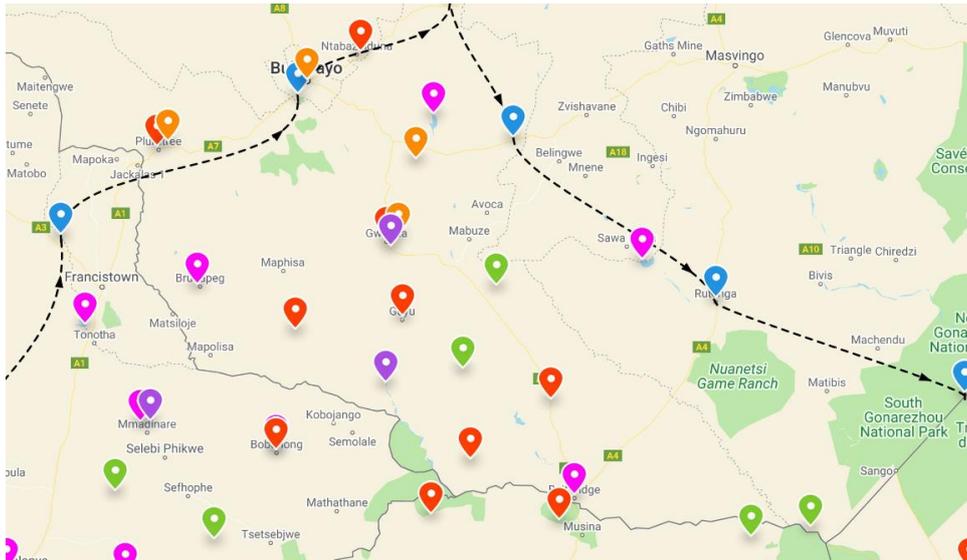


Figure 6. In red, areas currently exposed to droughts and floods. In orange, areas that might be exposed to flood and drought in the future. Most of the areas identified are exposed to drought and only a few are also exposed to floods.

Session 2, Strategies to tackle Drought & Flood:

- Land use changes are not regulated (or regulations are not enforced) by the government. There is a National Tree Planting Day. As a suggestion, the participants proposed the promotion of reforestation projects on a larger scale in arid regions. Participants have also suggested to promote the production of fodder: reduce drought and at the same time rejuvenate the soil. Linked to this topic, there is a project for Gwanda carried out by Dabane.
- Suggested options to manage drought and flood:
 - Collect surface runoff and divert it to reservoirs.
 - Promote local water supply through the installation of sand dams equipped with water points.
 - Increase environmental management to reduce run-off, reduce soil erosion (e.g. stone bunds, silt traps, stone gabions).
 - Install ponds along the river: the water can be used after floods (but perhaps the sedimentation will change, so further research is needed).
 - Implement large dam's irrigation schemes: this will allow people to move away from river systems but high intense floods will be a problem. People prefer individual farms.
 - Enhance Integrated Water Resources Management: Dabane is carrying out a project in Legion Mine area. Two micro-catchments of Shashani River.
 - EWS is existent but could be developed more.
 - MAR strategies: ZIMWA is exploring possible options.

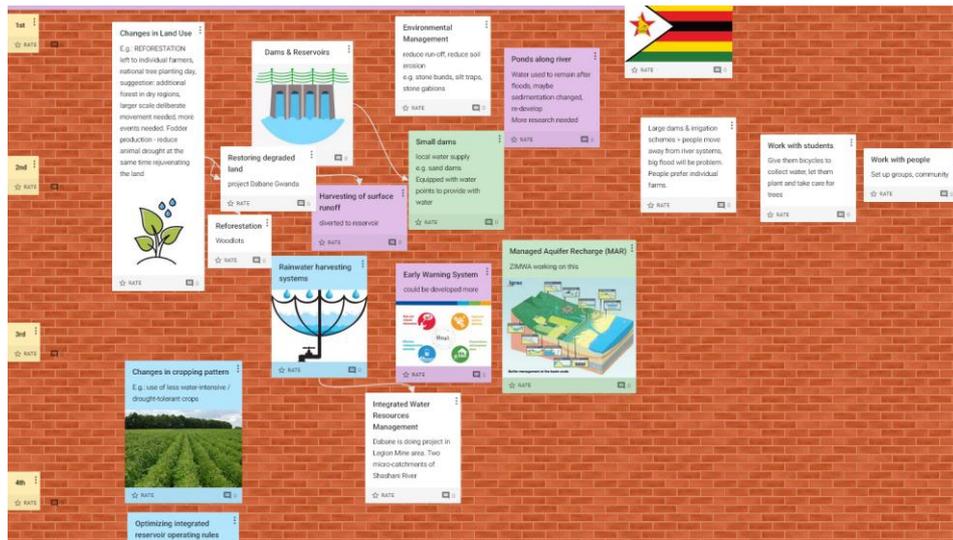


Figure 7. Final padlet on the list of strategies to increase resilience on drought and floods in the Zambian portion of the Limpopo River basin.

Session 3, Considerations at Basin Scale:

- Implementation of a large dam in Gwanda;
- Soil conservation technique (e.g., reforestation);
- Increase number of sand dams.

Botswana

Session 1, Vulnerable and Exposed areas: The Gaborone catchment and Ramotswa areas have experienced extensive flooding in the past, as well as all areas as far north as Mahalapye. The areas between Gaborone and Bobonong are susceptible to drought. The areas surrounding Bobonong are prone to flooding.



Figure 8. In red, areas currently exposed to droughts and floods. In orange, areas that might be exposed to flood and drought in the future.

Session 2, Strategies to tackle Drought & Flood:

1st place: stakeholder participants opted for the extension to the whole country of the current Early Warning System (EWS). An early warning system is already in place, but it should be extended to the whole country. Warnings' timing should also be improved. Furthermore, it will be useful to have an integrated information system since the information is currently divided into the different departments.

2nd place: the participants opted for the use of gray water for irrigation. This measure is already in use in some areas around Palapye and could be extended.

3rd place: the participants opted for MAR measures. Currently a MAR strategy has been implemented in the Botswanan portion of the basin by building a dam on a sandstone aquifer (Thune dam) and using the water to recharge the underlying aquifer.

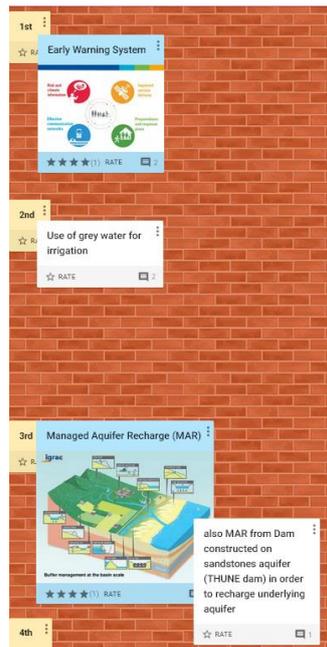


Figure 9. Final padlet on the list of strategies to increase resilience on drought and floods in the Botswanan portion of the Limpopo River basin.

Session 3, Considerations at Basin Scale:

- Sand dams could be implemented also in Botswana. Currently, this measure has only been implemented in Zimbabwe despite similar geology.
- Conjunctive use of dam for groundwater recharge with injection wells in Mmadinare, connected to the Letsibogo Dam in Botswana.
- Increase the use rainwater harvesting systems.

South Africa

Session 1, Vulnerable and Exposed areas:

Areas bordering Botswana are prone to recurrent droughts and floods, while areas bordering Zimbabwe have experienced mainly flooding. Drought events also occur in the central part of the national portion of the Limpopo River Basin. Kruger Park is currently exposed to both floods and drought. The situation might worsen in the future.

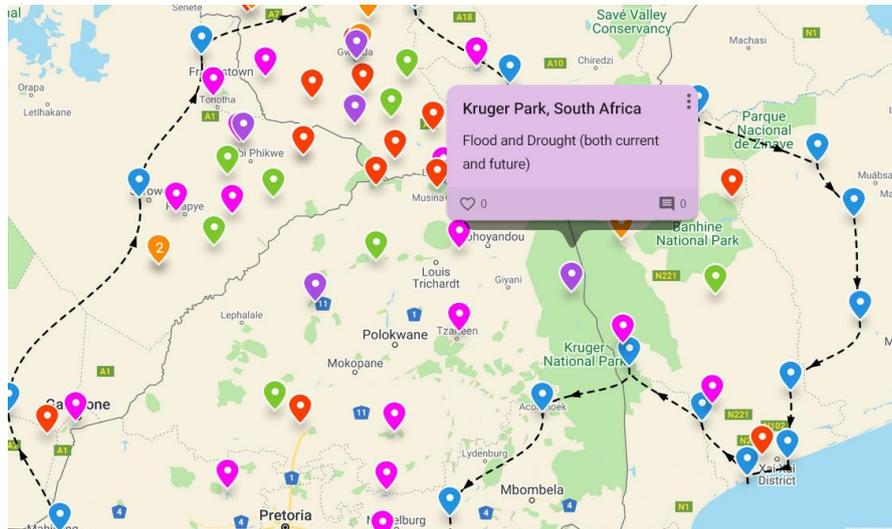


Figure 10. Workshop padlet where vulnerable and exposed to flood and drought have been mapped by the participants.

Session 2, Strategies to tackle Drought & Flood:

1st place: drought and flood EWS (already existing);

2nd place: Use of dams and reservoirs (already existing); Changes in cropping pattern (under development); Managed Aquifer Recharge (small scheme can be implemented at local level in order that the structures will require low maintenance); Rainwater Harvesting System; Optimizing integrated reservoir operating rules (already existing);

3rd place: Changes in Land Use (e.g., reforestation) (->most probably this strategy has been developed yet).

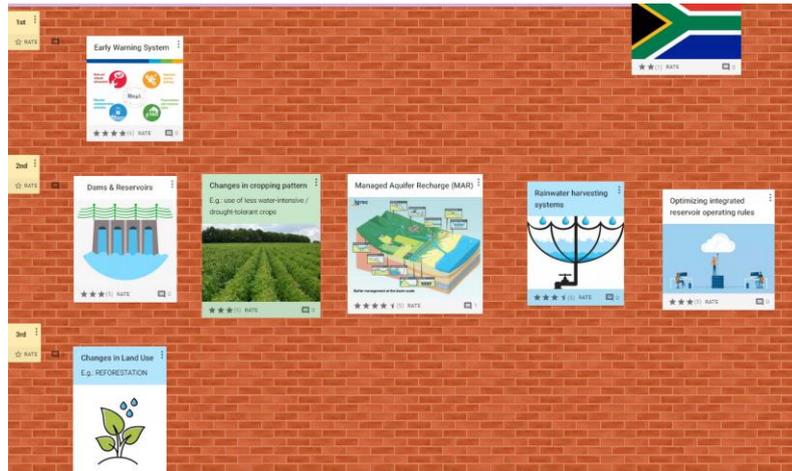


Figure 12. Final padlet on the list of strategies to increase resilience on drought and floods in the South African portion of the Limpopo River basin.

Session 3, Considerations at Basin Scale:

- Small-scale MAR strategy could be implemented in several locations in South Africa. It is important that they are small-scale projects, in order to reduce the possible maintenance effort by the community, but also to have a rapid implementation without the need for government approval. The idea is to use existing water sources as the main water recharge source (runoff, rainwater, existing lakes, reservoirs).
- Application of MAR strategy in Mookgophong/Modimolle (South Africa), in the surrounding areas and close to Blouberg Nature reserve in order to increase resilience toward drought exposure;

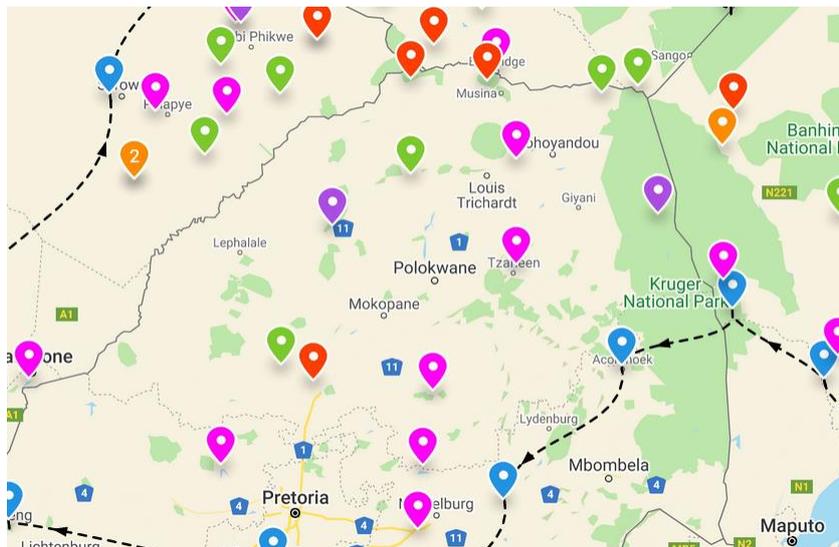


Figure 11. Green Map pins identify the potential locations for the implementation of MAR strategy in the South African portion of the basin.