



Interactive session – Hybrid Connet4WR Workshop for Botswana

05-05-2022

A virtual stakeholder workshop, organized under the [Connect4 Water Resilience](#) project as part of the wider [SHEAR programme](#), was held on the 5th of May. The workshop provided an opportunity to present and discuss the latest project results as well as to stimulate dialogues between stakeholders on the topic of drought and flood management strategies, related barriers and implications in the Limpopo river basin. The discussion took place in two sessions. First, a general overview of the project's path was provided, followed by presentations on key findings with a focus on the Botswana portion of the Limpopo River Basin. Stakeholders then took part in an interactive in-person session where they first explored upstream-downstream communication and then, they examined possible recommendations for improving forecasting and communities' preparedness. Strategies to mitigate the impact of drought and flood events were then discussed.

Discussion points after each session

Drought/flood strategies and information flow from community/government interviews

- **Upstream-downstream communication, GW over-extractions, communities perceptions**

Question: The presentation on the results of the community interview showed that communities in Botswana reported being affected by upstream over-extraction from communities in South Africa. However, these are only farmers' perceptions. Will there be a check if the farmers' perception is actually what happens in the field?

Answer: Interviewed communities reported that there are agreements with upstream communities but these are not respected. In general, our goal was to capture their perception and how they understand the system, so we don't know if this really happens on the ground. We also found from the interviews that governance institutions are there to handle cross-border agreement but they can't do much.

Question: How do you intend to discuss this upstream-downstream correlation and over-extraction in the conclusions and recommendations of this research?

Answer: It is important to understand the perspective of the communities, and the issues raised. Mainly in cross-border workshops you can have a comparison between different perspectives. In a publication we could not assert that there are over-extractions of SA communities and that these are impacting Botswana communities. However, we can report the different perspectives that emerged from the interviews.

- **Community preparedness and response to drought events**

Question: What are the traditional methods used by communities to respond to droughts and floods?

Answer: We have seen that they mainly try to anticipate drought events with traditional methods such as: observing specific plants and how they grow, changing colours of the leaves and observing the behaviour of birds.

- **Specification on drought preparedness**

Drought preparation: it is not food provision but subsidy of the food price for livestock.

- **Stakeholder engaged in the community and governance interviews**

Who are the stakeholders considered in this part of the research?

(e.g., farmers, communities, business people, government employees)

Answer: community discussion was restricted to the local communities. Governance interviews included the farmers' association, ministry of agriculture, department of sanitation, etc. We do not have large scale farmer, business people, industries. But in the farmer communities we considered both farmers and pastoralists.

Reply from participant: There are some biases in the results given the strong focus on communities at the expense of government officials. The results present contents concerning mainly the problems of communities and less about governance interventions. Not sure about other ministries, but many drought risk policies have been developed and implemented at the Ministry of Agriculture. In general, Botswana is very proactive in addressing the risk of droughts and floods. Therefore, a better representation of government institutions could change the results of these analyses.

Drought/flood management strategies

- **Feasibility of the implementation of injection wells using excess dam water in Botswana**

Question: how easy is to implement the injection well in the real world?

Answer: In reality, this strategy can be expensive and difficult to maintain. In addition to having a certain technical knowledge, it is necessary to have good operational management both of the reservoirs (dams) used for collecting the water to be injected at high rate into the wells and of the groundwater.

- **Injection wells**

Comments from participants: As the analysis carried out shows the basin's response to the use of the MAR strategy in the whole basin, it is not really possible to understand the specific influence of the implementation of this strategy only in Botswana. In the model results, the increase in GW level is more prevalent than I would have expected since MAR strategies have a very localized aquifer response. So the increase we see could also be the result of MAR strategies implemented in neighbouring countries. One suggestion would be to see how the aquifer responds if MAR strategies are implemented only in Botswana and then only in South Africa and so on. Or use multiple wells for injection and not just one near the selected reservoirs.

Answer: The change in GW level resulting from injection wells next to major dams is very local and restricted to a few localities considered (4 in Botswana and more in SA, ZIM, MZ). So this scenario does not have regional impact, i.e. the strategies applied in one country do not affect water levels in a neighbour counties. That would require some regional water level changes through more widespread MAR application. We can see the regional aquifer response to more widespread recharge by analysing the scenario that consider collecting rainwater through local ponds. The water level increase is significant and ubiquitous across the basin. The aquifer would respond in a similar way if instead of using ponds we would use infiltration wells as a direct recharge of the aquifer. In that case, the water level rise would even be higher because injection wells are less subject to evaporation/transpiration as losses. In such cases where there is a regional change in water levels, implementation of the strategy in one country may impact water resources in a downstream country.

Summary of the interactive session

Upstream/downstream communication

Current state and limitations:

- No proper communication
- Uncertain weather conditions
- Meteorology does not reach out fully in information dissemination
- National warning may be too generalized
- At times the communications may be internalized within departments and not fully disseminated to the stakeholder communities
- Covid-19 regulations restrictions
- Low turn-up for villagers to the Kgotla meetings (meetings convened by the village chief)

Recommendations:

- Improved stakeholder communication
- Integration and utilization of all communication platforms
- Encourage thematic working groups and social groups
- Education / Awareness workshops e.g. scheduled public classes on drought/flood management
- Regular Kgotla (official) meetings with the youth- they are better and quicker at sharing information through utilization of various social platforms.
- Communities must consult the appropriate offices namely those of the District Commissioner

Useful information from communities to government agencies:

- Experience and indigenous knowledge – based on
 - Re-occurrence and pattern of droughts and floods over the years
 - Impacts related to drought severity
- During extended droughts, some commercial farmers get unsustainably low yields and consequently the locals lose their jobs.
- Extension officers highlighted that they need advice on the accurate ploughing period based on the experience of farmers due to the erratic rains affecting Botswana as a whole. For example, some farmers start ploughing at the beginning of the rainy season and produce low yield due to scorching of plants whereas other farmers wait till the second or even third round of rains to start ploughing, resulting in a better yield.

Can forecasting to communities be improved and if so how? (e.g., accuracy, timeliness):

Accuracy- There is weak forecasting to communities because of:

- Limited forecasting technology at national level.
- Reliance on the use of grid method for rain-forecasting which is not precise in the sense that it does not cover all areas.

However these can be improved by

- Encouraging the nation to invest in up to-date and state of art technology.
- Availing resources and the required skills
- Adopting an integrated approach of information sharing to and from communities.

Timing- Use of early warning systems for drought forecasting and daily rain forecasting. The dynamic weather conditions need to be reported timely to prepare for upcoming forecasted events though they may be uncertain i.e. underestimated or overestimated in terms of magnitude.

How can communities be supported to prepare for drought and flood?

- Education and training: general awareness and open public teachings on drought and floods.
 - Be taught on how to prepare for droughts/floods
 - How to manage the resources available during the disaster events.
- For agriculture: communities need to be advised on:
 - which drought resistant crops to plant during drought,
 - how to practice mixed cropping,
 - growing livestock feed (in a case of a drought event)
 - the best ploughing methods e.g., row planting vs broadcasting. Practice integrated farming
 - doing soil testing regularly to improve soils.
- For water- communities should practice water conservation methods and are encouraged to use drip irrigation for optimal water usage. Rain water harvesting and sand dams are encouraged while also practicing conservation agriculture.
- Education on the recycling of treated waste water for irrigation.
- Utilization of wells: it was noted that farmers use the Limpopo River for irrigation and it is not a perennial river, therefore conjunctive use of boreholes was proposed and water extraction from other rivers was proposed to improve water resilience.
- Managing aquifer recharge; digging wells and encouraging the use of infiltration ponds. However, over-abstraction of these wells should be avoided as this could lead to a self-induced drought.
- For flood preparation
 - communities should be permanently removed from flood plains
 - communities should avoid overstocking as this may result in overgrazing and soil compaction eventually inhibiting infiltration and the area becoming a flooding plain due to increased runoff.
 - Practise afforestation, even though trees take a long time to grow, this can in the long run play a significant role in curbing floods
 - Construction of diversion channels/ storm water drainages
 - Use of gabions to reduce the speed of water

- Teaching locals on how to swim, in a case of a flooding event for self- rescue.
- For diseases associated with floods (malaria, bilharzia, cholera etc), they should buy treated nets, practice safe hygiene, get vaccinated and avoid open defecation, pit-latrines especially for the good of those living downstream of flood prone areas to reduce contamination.

Why do they think communities don't do much to prepare?

- Communities respond slowly to change
- Some are ignorant
- Some farmer reject interventions e.g. they assume fertilizers encourage weeds.
- They are prone to wasting- for instance, overuse of solar energy for water abstraction for daily use and irrigation may lead to over-abstraction of the water resource. Therefore, education on water utilization is needed.
- Some regard residential areas located in the in the flood plains as ancestral lands therefore refuse to be relocated.
- Some fear change and are very conservative and reluctant to change

Are there any governance perspectives on droughts/floods response management in Botswana that you have not heard of in this presentation?

- Proper information on the policies and management of drought/floods can be directly be obtained from:
 - A. The Office of the President
 - B. Disaster Management Office
 - C. Social workers office (SSCD)
 - D. NGO's e.g Red Cross
- The above organisations have the policies and the legal frameworks on drought/flood management and responses. Therefore direct/indirect consultation with the appropriate offices may be required for more information.

Drought & flood adaptation/mitigation actions

Drought and flood adaptation mitigation strategies missing from the list provided (Figure 1):

ANALYSED DROUGHT & FLOOD MANAGEMENT STRATEGIES:

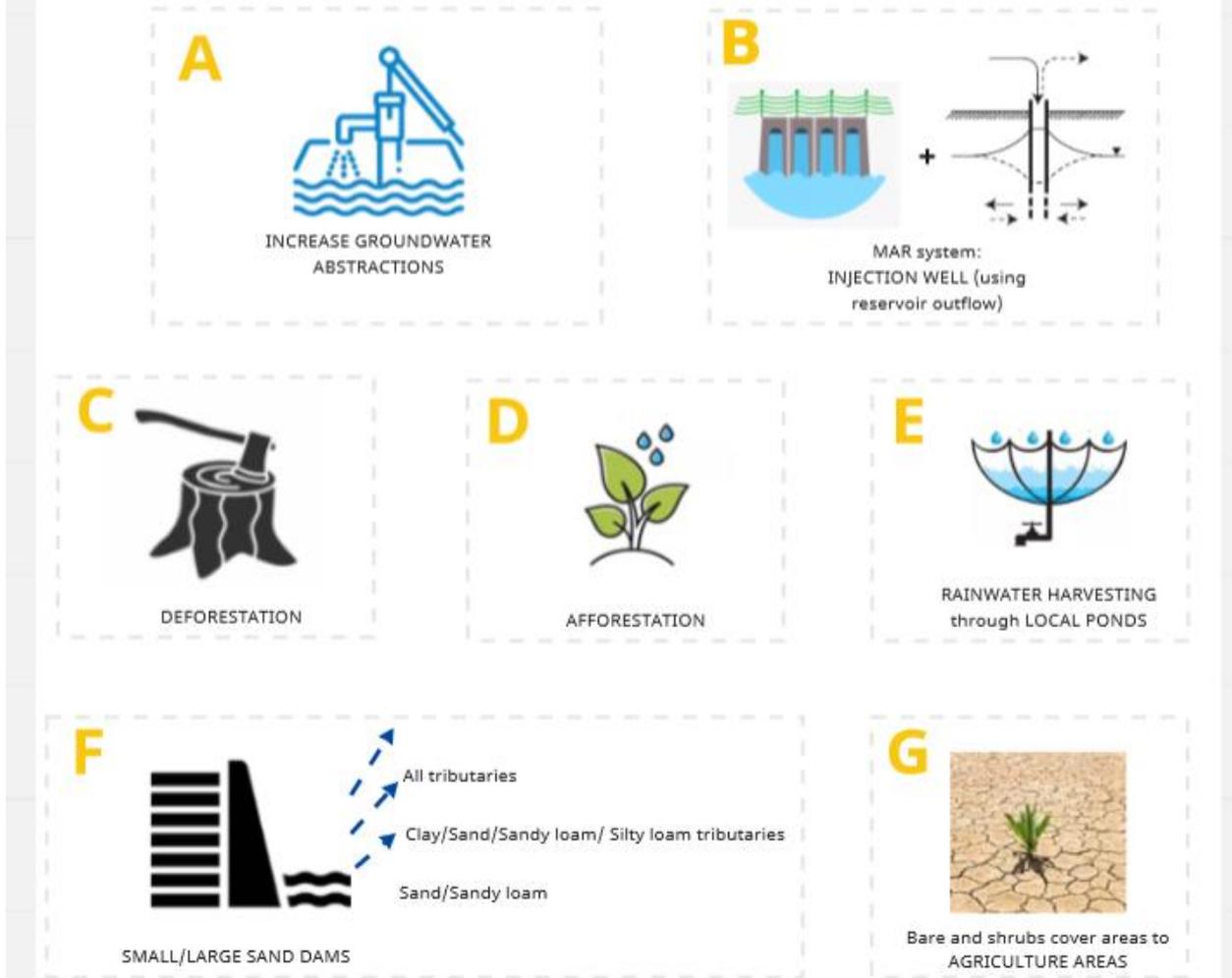


Figure 1. Drought & Flood management strategies analysed in Connect4WR

Table 1. Analysed drought and flood management strategies in the Connect4WR project- Botswana

Drought strategy	Vote	Side notes/Remarks
A	★★★	<ul style="list-style-type: none"> • A good drought mitigation measure • Potentially the best strategy under the context of climatic condition in Botswana • Has more benefits e.g. even during extended dry periods, water can still be available in boreholes. • Provides accessibility for water supply

		<ul style="list-style-type: none"> • Abstraction should be regarded as a vehicle for water supply in a sustainable way and not from the point of view of over abstraction. • However, it would be best to use A in combination with other strategies.
B	★	<ul style="list-style-type: none"> • A good strategy but expensive, but if achieved, it becomes a good investment • Results in sustainable aquifers and with sustainable abstractions, life span can be extended resulting also in increased storage. • Increased abstraction heads imply that more groundwater can be available particularly in combination with strategy A. • If A and B were to be combined, they would be a great strategy for drought control. • However, not readily open to exploitation like other strategies • Lack of regulations • Groundwater pollution potential
C		<ul style="list-style-type: none"> • This strategy was not supposed to be included. • It exposes bare land • Promotes floods • Inhibits ground water recharge • Affects rangeland capacity to control floods. • Trees act as wind breakers; their absence has a negative impact on the environment.
D	★	<ul style="list-style-type: none"> • It has low yields; impact not as much as harvesting rainwater. • Trees take a while to grow/reach maturity, therefore not sustainable at an early age of tree growth. Benefits only realised long term, not immediately • However, the good thing about afforestation is that it promotes infiltration and ground water recharge and inhibits floods
E	★★	<ul style="list-style-type: none"> • Cheap • Simple but effective in built up areas • Low to no maintenance • Needs proper storage to curb contamination • E and F can be regarded to be the same

F	★★★	<ul style="list-style-type: none"> The above comment for A remains, however, for maximum benefit, E and F should be paired and can be utilized during flooding events. Also, A and F could be ideal
G		<ul style="list-style-type: none"> Contradictory strategy

Which strategy can and which cannot realistically be implemented in Botswana in the next 10 years?

- The ones that are easy and cheap to implement or are already existing are rainwater harvesting (E), which is fairly easily, cheap and environmentally friendly. D also is a sustainable strategy and environmentally friendly, but trees take long to grow. Construction of Sand dams (F) is also a feasible and sustainable strategy during flooding.
- Because of the legal framework and delays in project funds as well as the lengthy process of feasibility studies, realistically the MAR strategy B cannot be implemented in Botswana in less than 10 years. However, B would be a good strategy for the country as it will lead to a longer life span of well fields thus unlimited supply of water in all seasons (24/7/365 days).
- The MAR strategy is an ongoing study in Botswana and the Department of Water Affairs (DWS) are still doing feasibility studies for it. So far the Palla road project has been completed and planned to be incorporated into Botswana's NDP 12. It was noted, however, that there are a lot of processes and procedures to be followed until such huge projects can be implemented in Botswana, considering environmental aspects, regulations, legal frameworks, policy and other aspects. Also depending on the funds from the government the project may take a little longer than the anticipated time. This project is expected to increase water reliability by 7% of the volume water that is currently obtained from the North South Career. Water for the MAR project will be drawn from the Letsibogo, Dikgatlong and Shashe dams.
- E and F are strategies that can harvest water and can therefore be combined and be used with either A or B.
- E and F will gather more water from the floods therefore controlling the floods while A and B will control the droughts.

Discussion/Analysis of strategy:

Drought strategy: A&E

<p>S</p> <ul style="list-style-type: none"> • Improved water supply at local level • Localized water supply • Supply is full time • Likely to enhance agricultural activity • Relative to B it is less costly 	<p>W</p> <ul style="list-style-type: none"> • Fees to be paid by local farmers because they have to drill wells. • Problems in the event that boreholes dry up • Both upstream and downstream users are impacted in the same way • No guarantee that drilling will lead to striking water i.e. hitting blanks (costs)
<p>O</p> <ul style="list-style-type: none"> • Well field expansion • Increased agricultural productivity particularly to lands adjacent to boreholes • Increased land value • Land is likely to attract investment opportunity 	<p>T</p> <ul style="list-style-type: none"> • Funds • Legal frameworks for the regulation of operations • Legal frameworks on water rights • Potential for ground water pollution • If not monitored, there can be over exploitation of resources • Competition for resources

S= Strength; W=Weakness; O=Opportunity; T=Threat

Drought strategy: A&B or B

<p>S</p> <ul style="list-style-type: none"> • The best initiative • Aquifer becomes sustainable. • Increased abstraction yields, more from the ground after abstraction. • Well fields have a life of 25years but if MAR is put into place their life span will increase to a 100 years or more. 	<p>W</p> <ul style="list-style-type: none"> • Competing uses • Lack of regulations because of infinite supply • Potential groundwater pollution • Costly • Time needed to study the aquifers so that one can know where to store the water.
<p>O</p> <ul style="list-style-type: none"> • DWS carried out a feasibility study for MAR at Palla Road in Botswana 	<p>T</p> <ul style="list-style-type: none"> • Limited technical skills • Expensive but the best

- DWS has stabled for the MAR Palla road project to be included in the National Development Plan 12 (NDP 12 master plan)

- Public perception- people have to buy into the idea of reusing recycled wastewater. Also to some, injecting water into the ground would be deemed as a waste.