uMhlathuze Catchment Monitoring and Management

Mhlathuze Water 11 March 2019

UWASP
uMhlathuze Water Stewardship Partnership

NatuReS

Purpose of the training

- The purpose of this short training is for all stakeholders to understand and learn to use the Goedertrouw spreadsheet, informing dam releases.

- To achieve optimal water releases each person should fill it in as if they were the sole person deciding on the dam releases.

- Filling the info individually allow stakeholders to gain a better feel for the quantities and avoid mistakes.

- Stakeholders should try different releases and see what the effect is at the bottom weir.

- Once satisfied with the result stakeholders should post it on the what's app group

- The water release is than agreed on what's app based on the information posted by stakeholders along the catchment.

- Stakeholders can than fill in different figures to model releases for later in the week.

- Assistance with use of the spreadsheet will be provided until everyone feels comfortable to inform the release.
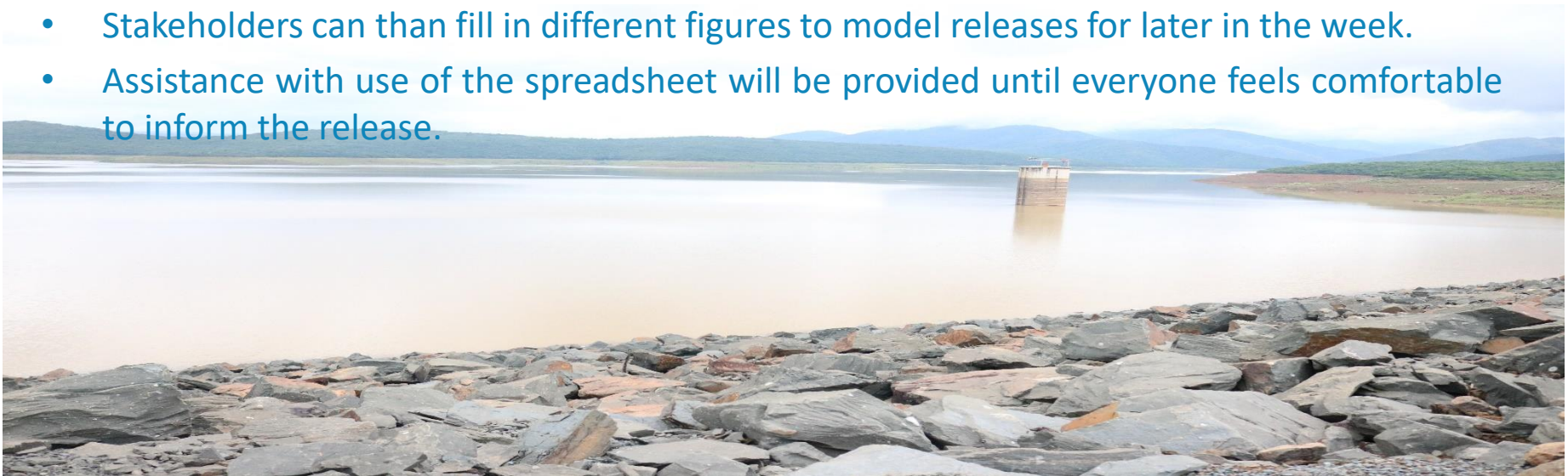
Map of the catchment

- Please insert here a map of the catchment with the location we discuss in the presentation (just to give a spatial understanding). I put few pictures here if we want to visualize the map further

The uMhlathuze Spreadsheet

Column A contains the dates.

Column B represents the dam level from the Midmar sheet sent out daily. It is useful to plot a graph and see the trend in level. Cobus will send those data after receiving your email address

Column C gives the past releases and the formula sets each day forward at the same flow as the previous day. This is the most important column, as it allows you to see the effect of changes in release today or tomorrow or the next day.

Column D represents the flow at the P230 derived from a formula

Column E is the level at P230.

Column F is the level at the Mhlathuze Weir up until today

Column G is the spillage from the weir calculated from the shape before construction.

The uMhlathuze Spreadsheet

Overview of the spreadsheet

Column H is the deficit in flow over 24 hours when the weir level has dropped.

Column I is the release that should be arriving at the weir over the last 24 hours based on the previous release

Column J is water use in the catchment derived from column I and is the total use in the catchment less spills but allowing for the deficit or surplus in the weir.

Column K is expected Water Use

Column L is the difference between the estimated use (K) and the water arriving at the weir (J)

Column M represents abstraction figure from the weir for both the MW and Tronox
Column N: Tronox values

The uMhlathuze Spreadsheet

Spreadsheet operationalisation

Column A If there is significant rain recorded that morning right click and add a comment on the rainfall. This is important to understand how the flow is affected later in the week. Adding the information as a comment to the cell is useful and does not add an extra column

Column C allows you to see the effect of changes in release today or tomorrow or the next day, by setting a new flow today it will change the flow at the Mhlathuse weir in **column I** at some future date.

Column D: Do not type on column D.

Column E:Only change column E when the p230 reading comes through. Pumping information received from what's app should be added in a comment form to the values in column E

Adding the **pump rate** as a comment allows to see how much water is arriving at Heatonville. Changes at the dam normally take double the time to reach the bottom of the catchment compared to Heatonville **P230** is past the Heatonville pump station, so when the pumps are on, the flow reduces a little later. This reduced flow is what is heading for the Mhlathuze weir, so when the pumping increases you should consider releasing more.

Irrigators should warn the group when it is getting drier or wetter so we can anticipate the change in pumping.

The uMhlathuze Spreadsheet

Column F :level at the Mhlathuze Weir up until today. There are two ways to estimate the future level of the Mhlathuze Weir.

1) is to assume values manually and see if the use column (J) matches the expected use (K) on future dates. This is very time consuming, unfortunately.

2) We will cover another method in future training.

Column G will have to be recalculated when DWS produces a DT table for the new weir.

It appears that floods are being released from the scour each time it rains, so it makes it very hard to know how much water is coming down after a rain event and when it is likely to stop flowing. For now one will have to use the P230 flow as an indicator.

The uMhlathuze Spreadsheet

Column H is the deficit in flow over 24 hours when the weir level has dropped. It means the actual use has been more than the release reaching the weir. If the deficit continues the weir will fall too low for abstraction.

When there is a surplus this column will have a minus sign. Don't worry about this.

Column I is the release that should be arriving at the weir over the last 24 hours based on the release on previous days. There is a complicated formula used to calculate the travel time to determine this which has been derived from 3 years of experience, but is still only an approximation.

The flows can take more or less time depending if the catchment is wet or dry.

Column J is derived from column I and is the total use in the catchment less spills but allowing for the deficit or surplus in the weir. This is the most important column as it reflects all uses

Do not change the formulas in columns G to J, just copy them down up to two weeks in advance.

The uMhlathuze Spreadsheet

Column K is the estimated use in the catchment based on the weather patterns and the past few days use. Try to fill it in for the next few days plotting a short term graph of actual use to see if it is going up or down, but the weather is still the biggest factor. Reduce the estimated use (K) on the days when rain is expected and shortly after.

Column L is the difference between the estimated use (K) and the water arriving at the weir (J). Alter the flow (C) for today and the days that follow so that (J) and (K) are similar and that (L) will be close to zero.This is where skill and experience is needed firstly to estimate future use and secondly to try and match this use with the correct releases.

Column M should be filled in with the abstraction figure from the weir for both the MW and Tronox.

Tronox can be filled in in **column N** and added with a formula to see the trend in use from the water board.

 J is more important than M and N as it reflects ALL use.
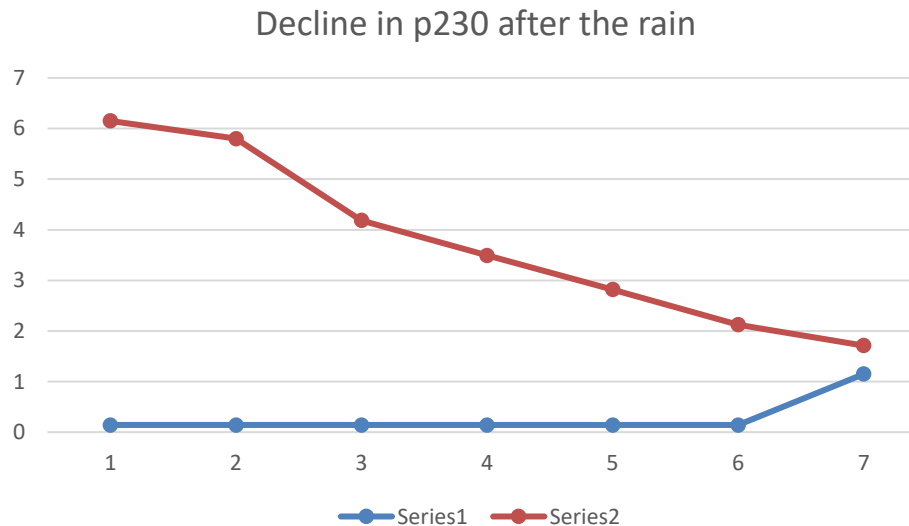
The uMhlathuze Spreadsheet

21. You can also draw graphs to help you estimate use and flow. Here is a graph from late February showing the reduction in release in anticipation of rain and the P230 flow spiking after the rain.

Reduction in releases in anticipation of rain
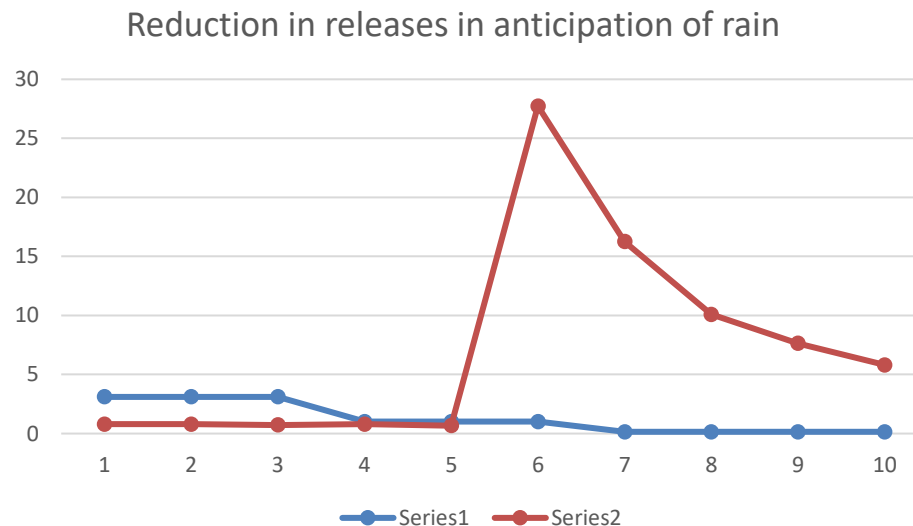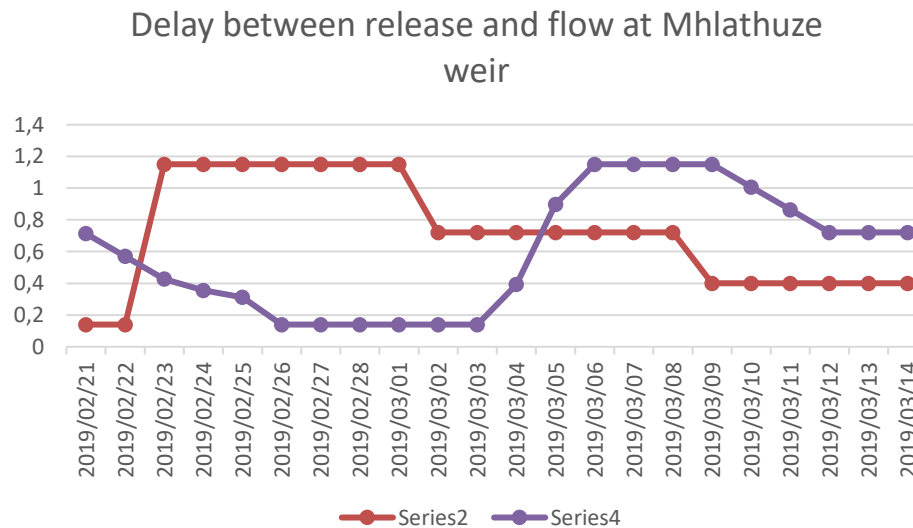
The uMhlathuze Spreadsheet

22. This graph shows the decline in the p230 after the rain, and the release timed to reach the lower river before the flow stops. This requires experience and practice with the spreadsheet.

Decline in p230 after the rain

The uMhlathuze Spreadsheet

23. This graph shows the delay between the release and the flow at the Mhlathuze weir.

Delay between release and flow at Mhlathuze weir

The uMhlathuze Spreadsheet

Considerations

The flow at the weir was normally very sensitive to rain or release changes. It now appears very stable, which gives little idea how the water balance is actually working.

One of the problems with the current operation is that there is apparently no flow going to the estuary. It may be that the scour is being operated regularly to release surpluses, but this is not being communicated. This means that the releases could be too high, but we are not aware of it.

Alternately the flows may be so low that MW is only drawing what they can get and thus this is not a fair reflection of the demand. If there is sufficient water in the lakes to make up the shortfall, this is OK, but if the lakes get too low again the situation could change without warning.