Water Evaluation Platform Workbook

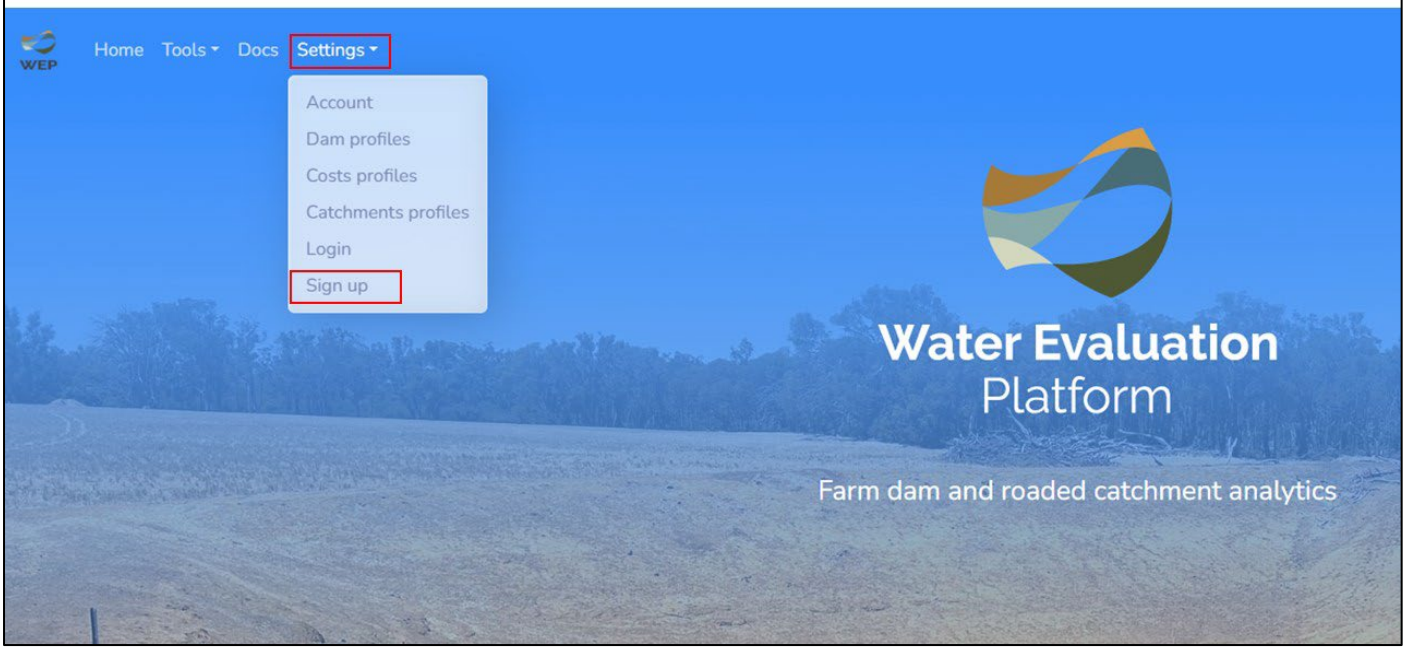
WEP is an interface to dam water modelling tools to explore the performance and costs associated with different dams, roaded catchments, and evaporation treatments on your farm.

https://waterevaluationplatform.app/dam/

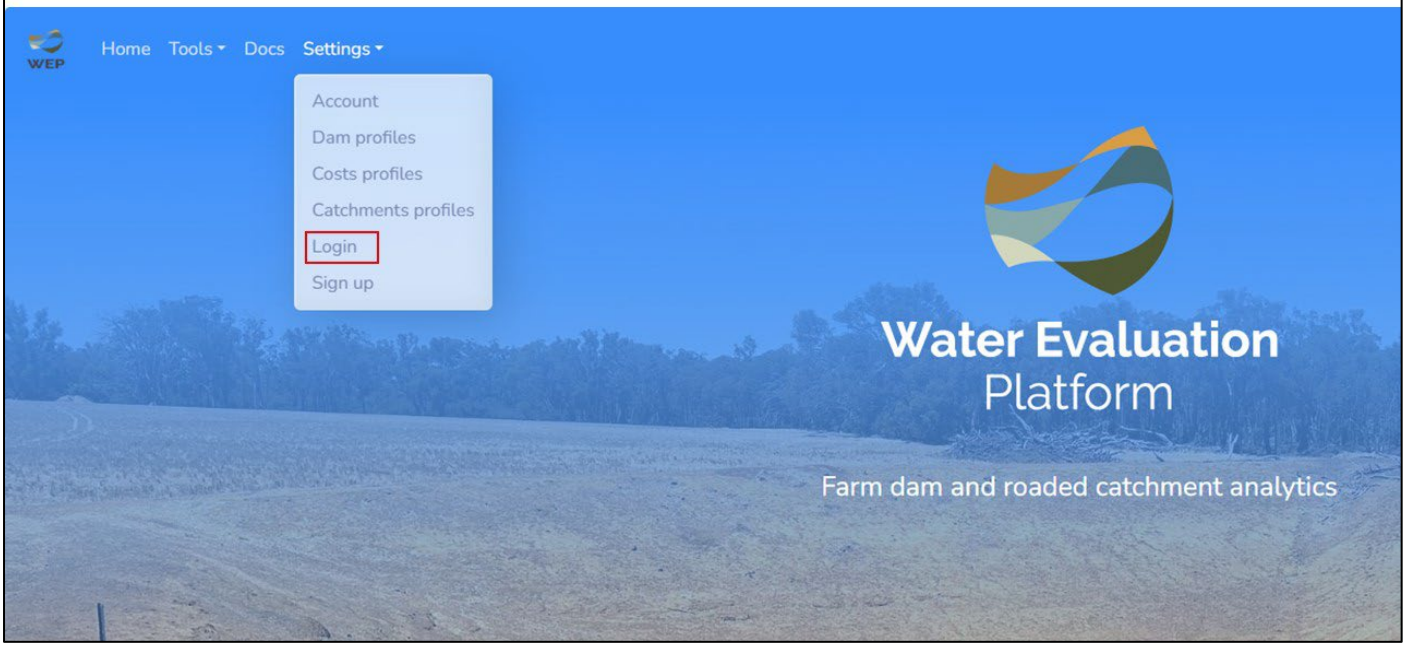
The Water Evaluation Platform is jointly funded through the Australian Government's Future Drought Fund and the Western Australian state government's Agriculture Climate Resilience Fund.

This workbook was developed by South West NRM's FEaST2030 project, supported by the Australian Government through funding from the Natural Heritage Trust under the Climate Smart Agriculture Program.

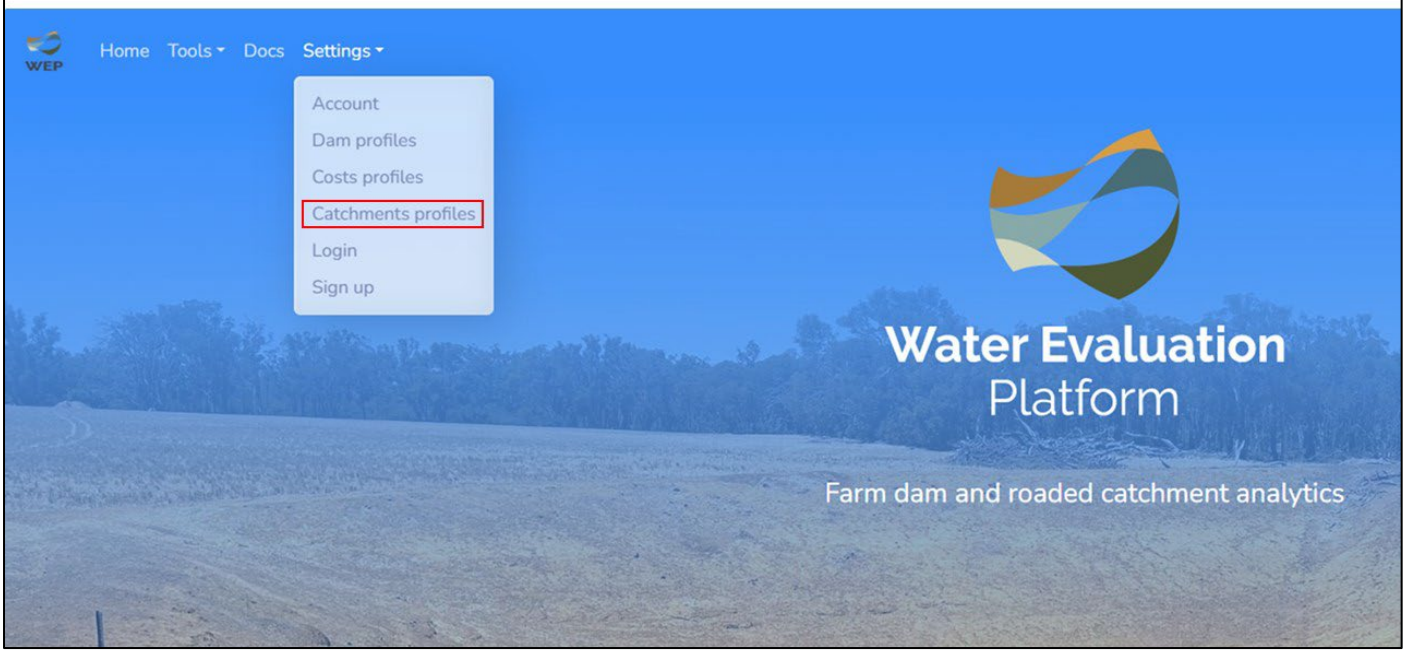
1. Create an account: Click on settings and sign up



2. Login

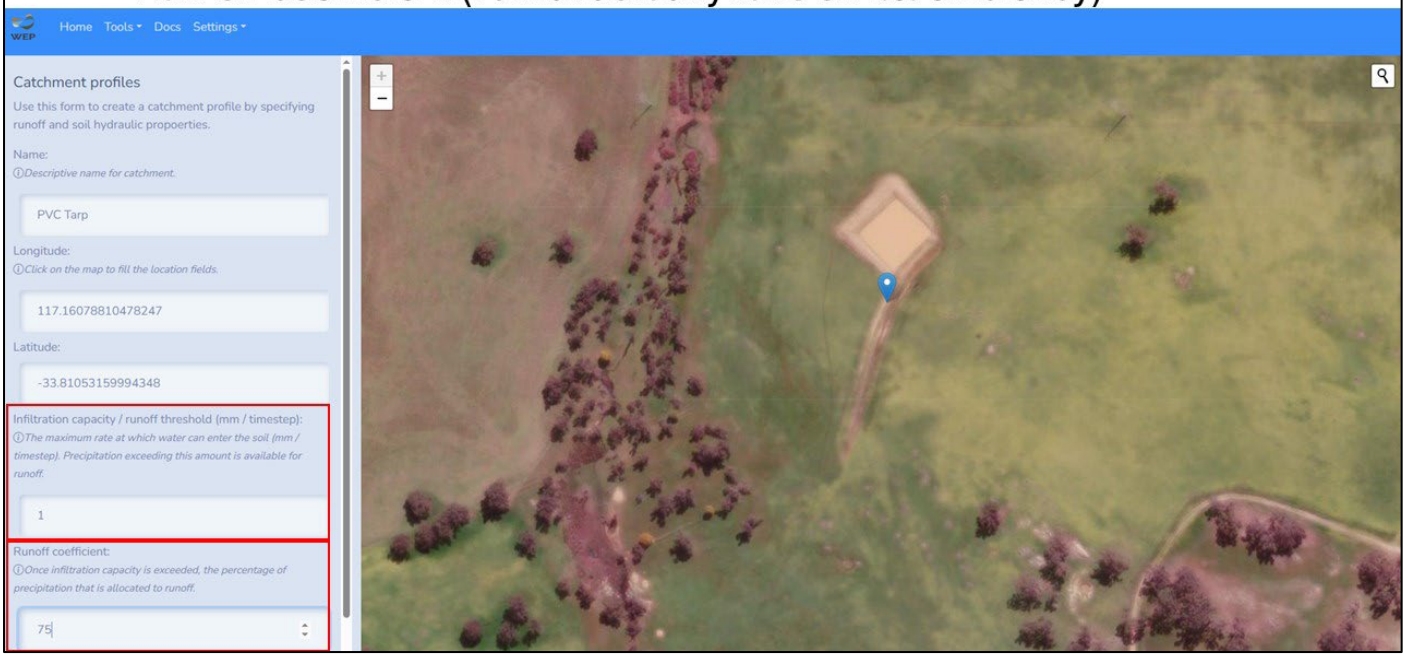


3. Create a catchment profile.



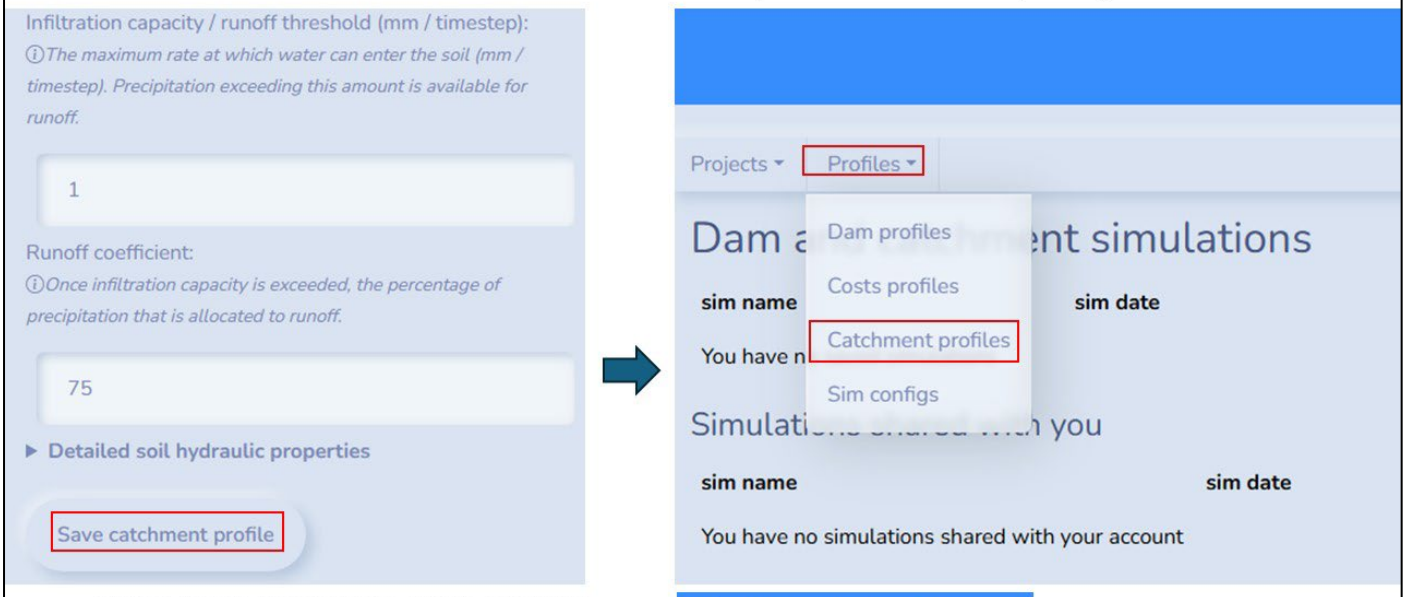
4. Use search or pan map to your farm (click and drag) and click location of planned catchment. Coordinates generate automatically.
5. Name the catchment.

6. Describe run-off potential:
- Infiltration Capacity (amount of rain required before run-off occurs)
- Run-off coefficient (% that actually runs off i.e. efficiency)

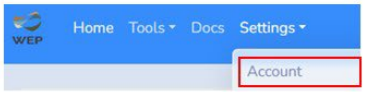


Practice: A tarp can run after 1 mm of rainfall, and a compacted clay lined catchment can run at 10 mm or as low as 4 mm. Natural catchments may run at 25 mm. The Run-off co-efficient (% that actually reaches the dam) may be reduced by weeds, rill erosion, stock interference etc. For this example, assume a PVC tarp with an infiltration capacity of 1 mm and and run-off co-efficient of 70%.

7. Save the profile. Your "Accounts" page appears.
8. Click on "Profiles" and "Catchment profiles" to find your profile.



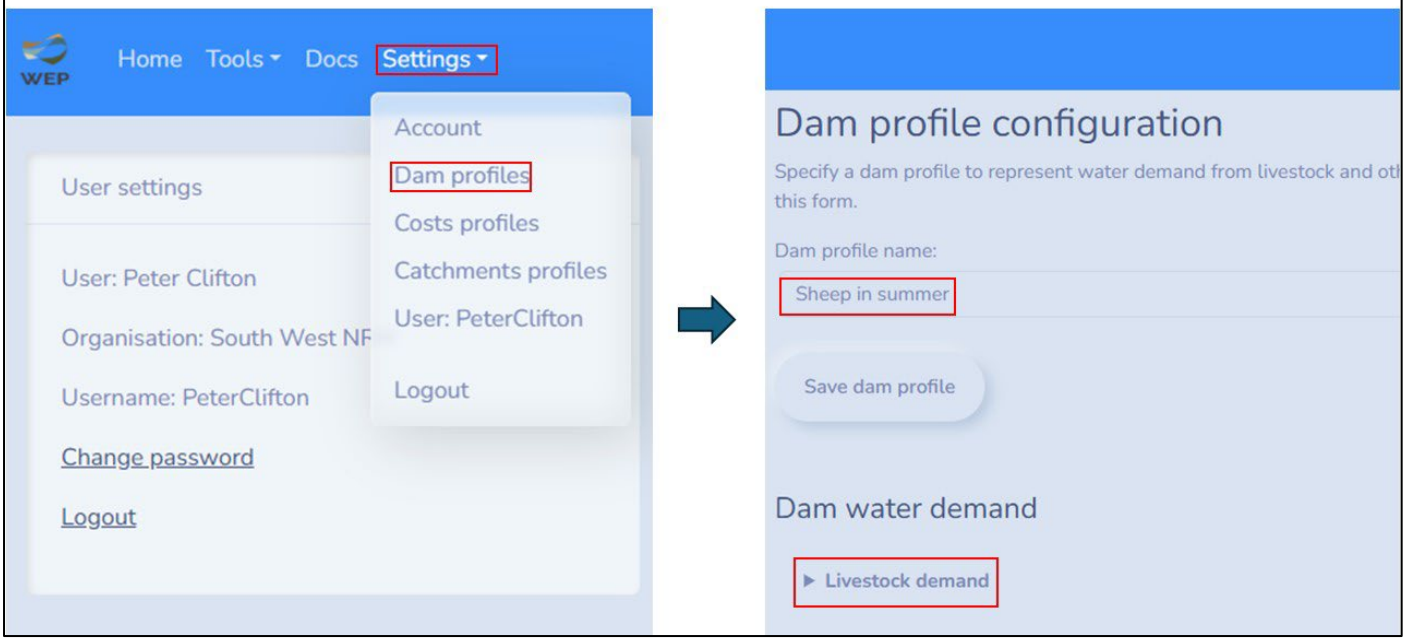
Note: Your Accounts page can be accessed under the "Settings" tab



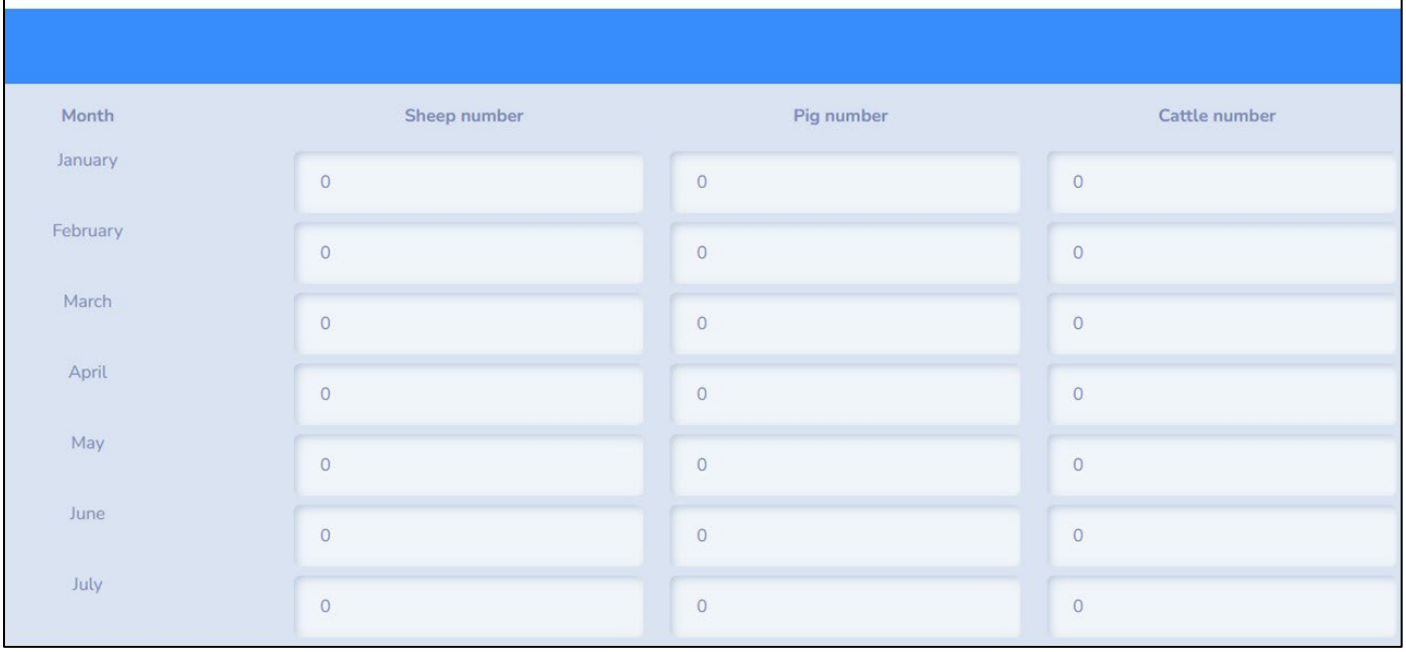
9. Create a Dam Profile

10. Name the profile (e.g. Sheep in summer),

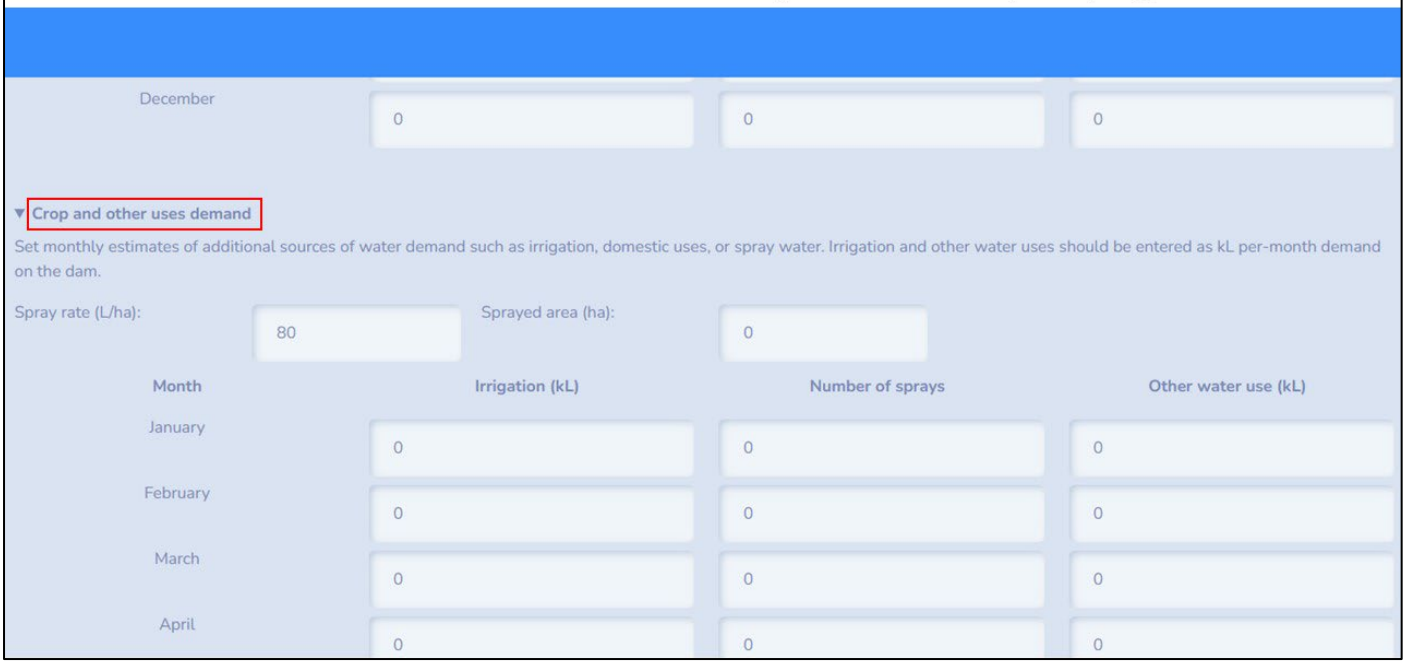
11. Click on "Livestock demand".



12. Specify the number of animals drinking from the dam in each month of the year.



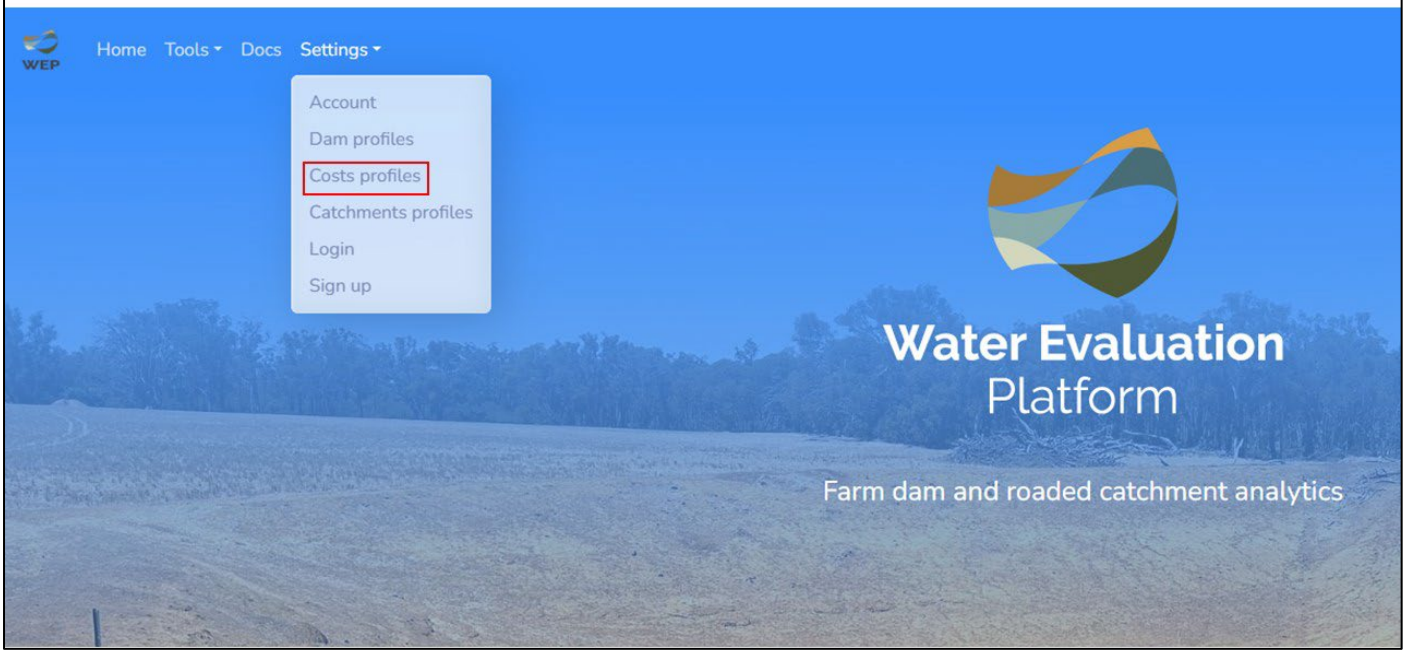
13. Specify demand from crop and other uses.
14. When done, click on “Save dam profile” at top of page



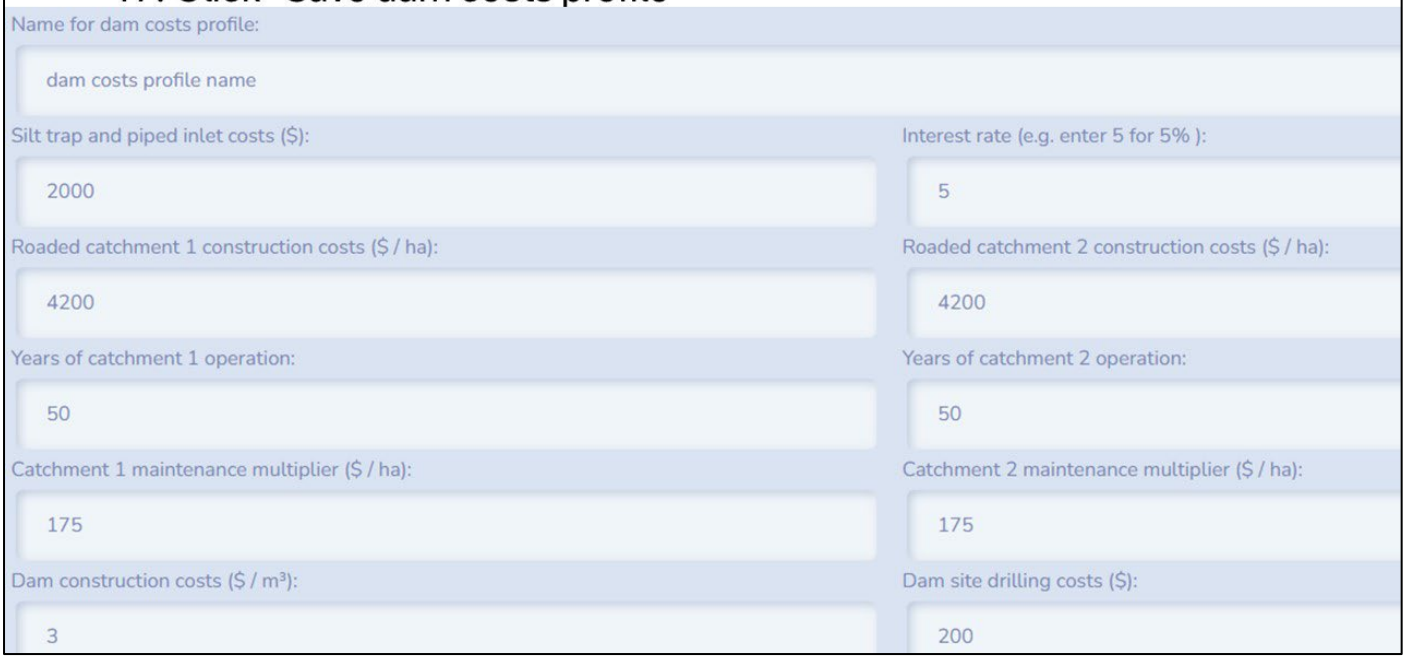
Note: You can also specify if water is added to the dam such as via other dams or drains.

Practice: Assume 800 sheep drink from your dam in January, February and March each year.

15. Define a Cost Profile

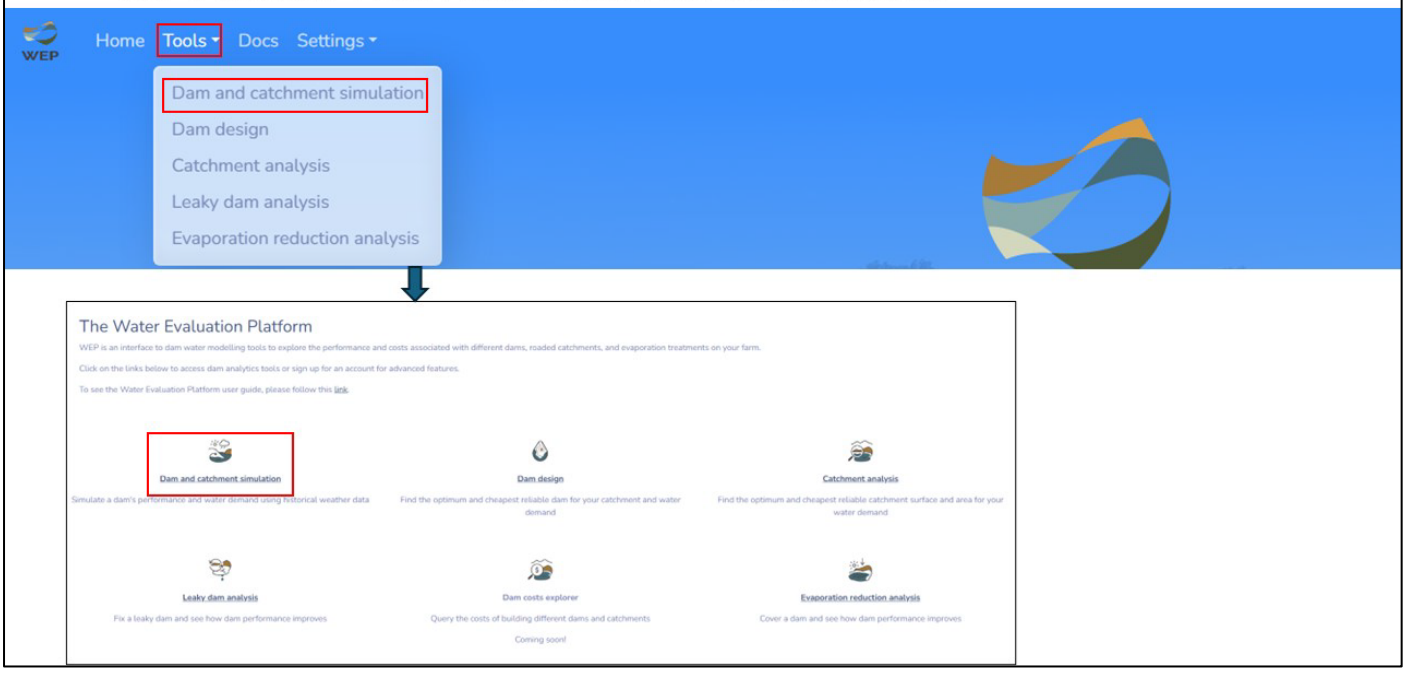


Note: Default values are provided.
16. Customise default values based on local knowledge
17. Click “Save dam costs profile”



Practice: Assume plastic PVC – construction cost $29,400/ha; years of operation = 7; maintenance multiplier $769/ha; Silt trap and piped inlet costs $2,000; Dam construction costs $3/m^3; dam site drilling cost $200; cost to line dam $12/m^2; evaporation cover treatment costs $12.50/m^2; interest rate 0.05%.

Analysis tools – Find under “Tools”, or scroll down home page.
18. Click on “Dam and catchment simulation”



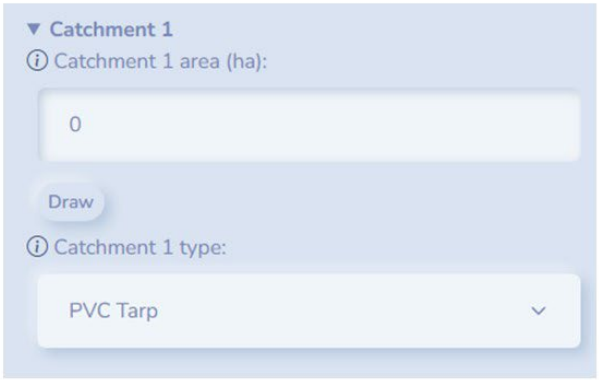
19. Dam and catchment simulation - Simulates costs, reliability, performance and water demand using historical weather data

- Reload a previous configuration, or use "New config".
- Name the simulation.
- Select a dam profile (water demand, see step 9).
- Select a dam cost profile (see step 15).
- Select duration of simulation (make it long).
- Select location of dam (or proposed) (click map).
- Select dam morphology (shape and dimensions).
- Select starting water level (% full) and if it leaks.
- Draw catchment area (or input hectares) and select catchment type (e.g. tarp). [Note step 20]
- Repeat for Catchment 2, or set area to zero if n/a
- Run simulation.

Practice: Click on map to locate the dam. Make sure blue marker is in the centre of the dam. Measure dimensions based on maximum water level (i.e. spillway). Start duration from 2000. Assume a morphology of 55 x 55 m, 5 m deep with 33% side slope; starting level of 60% (January commencement). Assume Catchment 1 is a 0.45 ha plastic tarp, and Catchment 2 is a natural catchment of 30 ha. Assume no leaks.

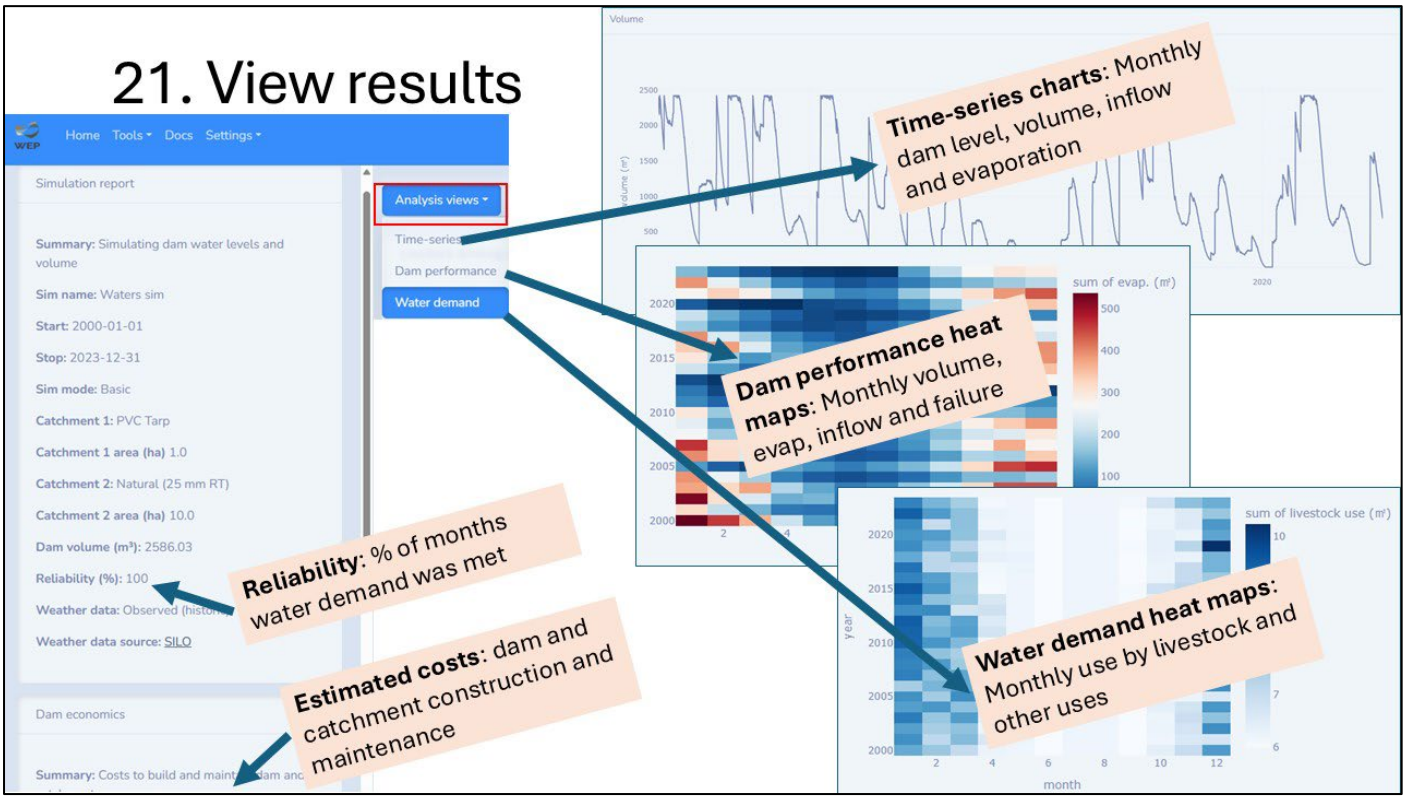
20. Drawing a catchment

- To draw a catchment area, find location and click "Draw"

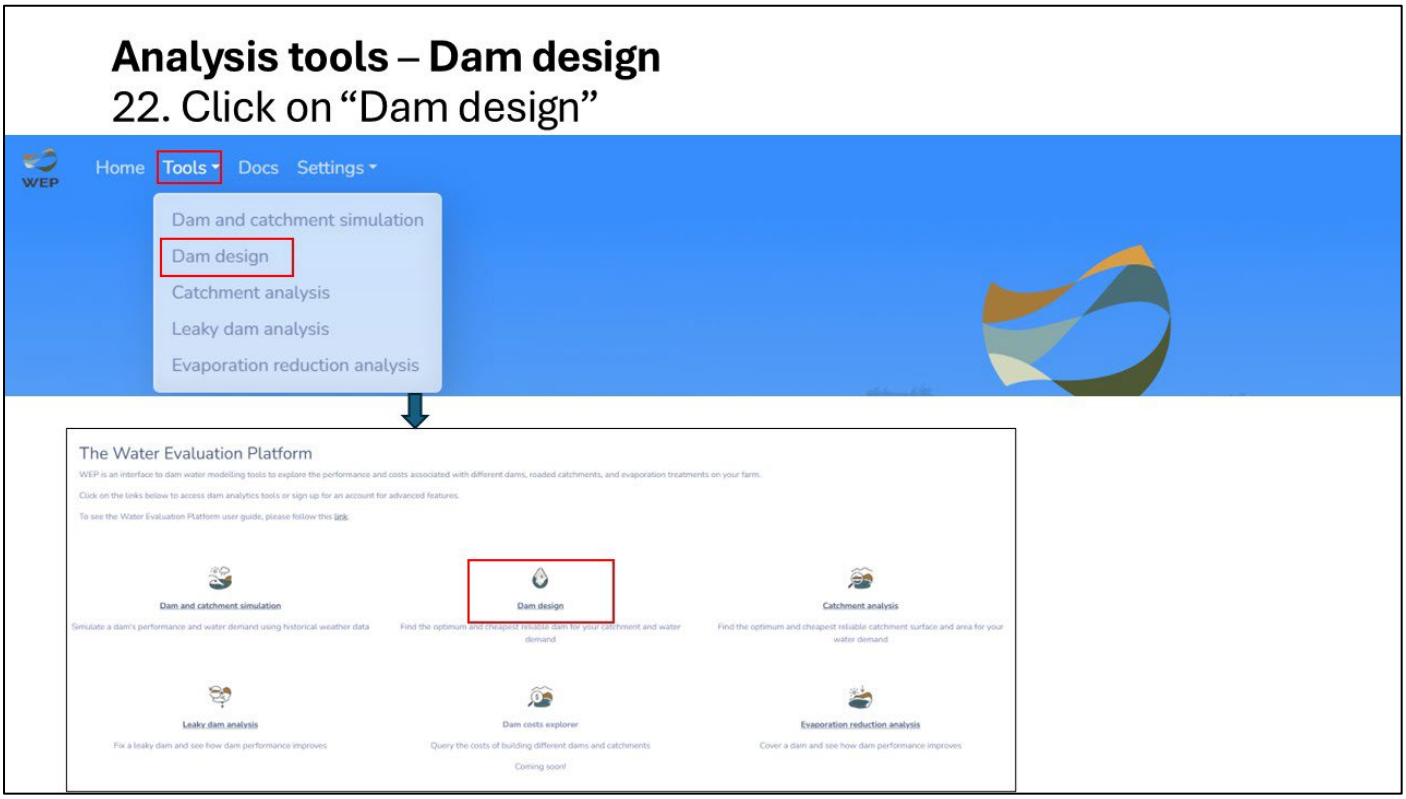


- Click on the polygon and start drawing, then click "Finish"

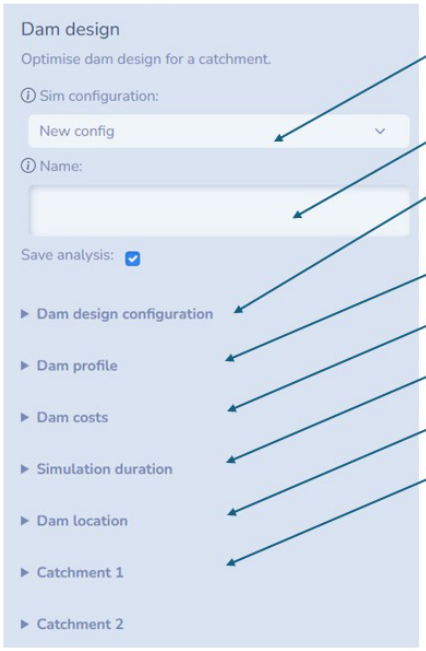
Note: Natural catchment areas can also be drawn or area estimated.
If there is no second catchment, set "Catchment 2 area" to 0



Note: Aim for at least 95% reliability, ideally > 98%. Heat maps that show maximum water inflow may suggest risk of erosion and infrastructure damage.



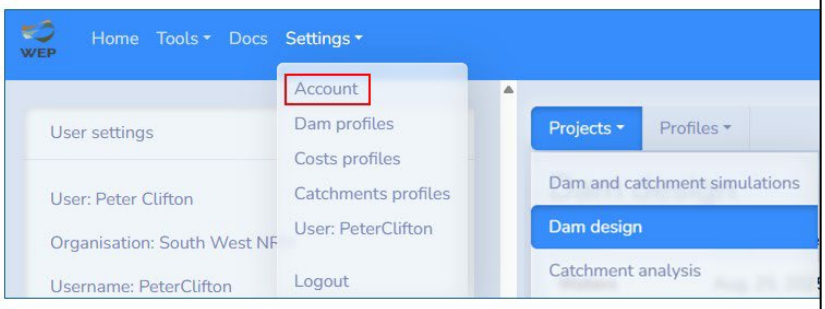
23. Dam design simulation - Uses an existing catchment and dam (water demand) profile to design cheapest, reliable dam.



- Reload a previous configuration, or use “New config”.
- Name the simulation.
- Configure dam design: desired reliability; search steps (4 is ideal and maximum); shape; depth.
- Select a dam profile i.e. water needs (see step 9).
- Select a dam cost profile (see step 15).
- Select duration of simulation (make it long).
- Select location of dam (or proposed) (click map).
- Draw catchment area (or just input hectares) and select catchment type (e.g. tarp, road, natural).
- Repeat for Catchment 2, or set area to zero if n/a
- Run simulation.

24. Dam Design results

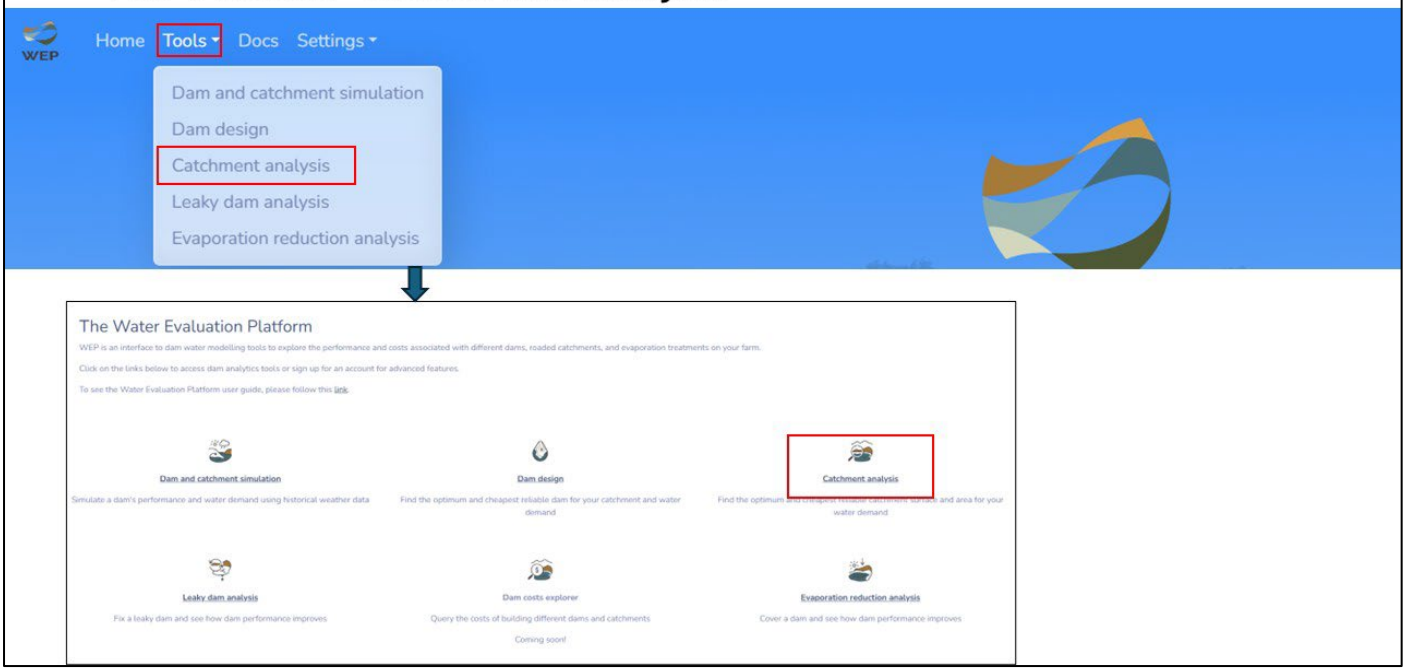
- Results will be sent by email.
- Once saved, results can be accessed in settings.



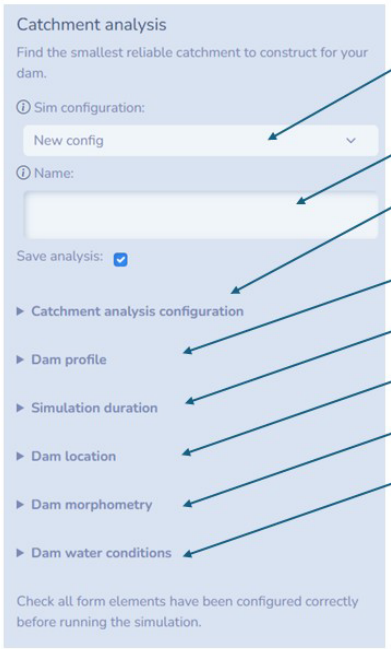
- Results include:
  - Storage capacity.
  - Costs.
  - Affect of design change on reliability.

Analysis tools – Catchment design

25. Click on “Catchment analysis”



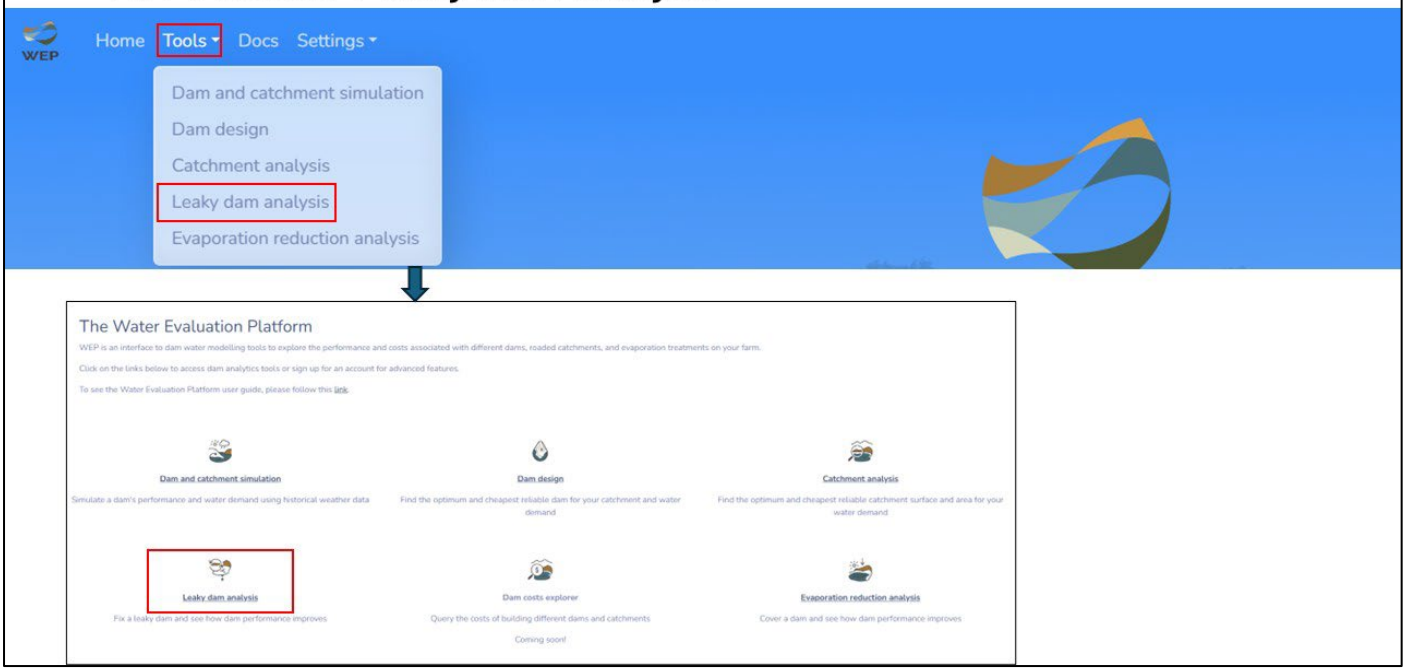
26. Catchment design analysis - Uses an existing dam and (water demand) to design cheapest, reliable catchment.



- Reload a previous configuration, or use “New config”.
- Name the simulation.
- Configure catchment: desired reliability; search steps (4 is ideal and maximum); and type.
- Select a dam profile i.e. water needs (see step 9).
- Select duration of simulation (make it long).
- Select location of dam (or proposed) (click map).
- Add dam shape and dimensions.
- Set the starting depth of the dam (%).
- Run simulation.
  - You will be notified when results are ready
  - See settings > account > project > catchment analysis

Analysis tools – Leaky dam

27. Click on “Leaky dam analysis”



28. Leaky dam analysis - Cost:benefit tool to see how a dam’s performance improves by fixing leaks.

- Reload a previous configuration, or use “New config”.
- Name the simulation.
- Select a dam profile i.e. water needs (see step 9).
- Select a dam cost profile to estimate repair cost.
- Select duration of simulation (make it long).
- Select location of dam (or proposed) (click map).
- Add dam shape and dimensions.
- Set the starting depth of the dam (%).
- Draw catchment area (or just input hectares) and select catchment type (e.g. tarp, road, natural).
- Run simulation.

Note: leaks are incorporated into dam analyses based on size of wall/water interface. They are completely removed in this scenario

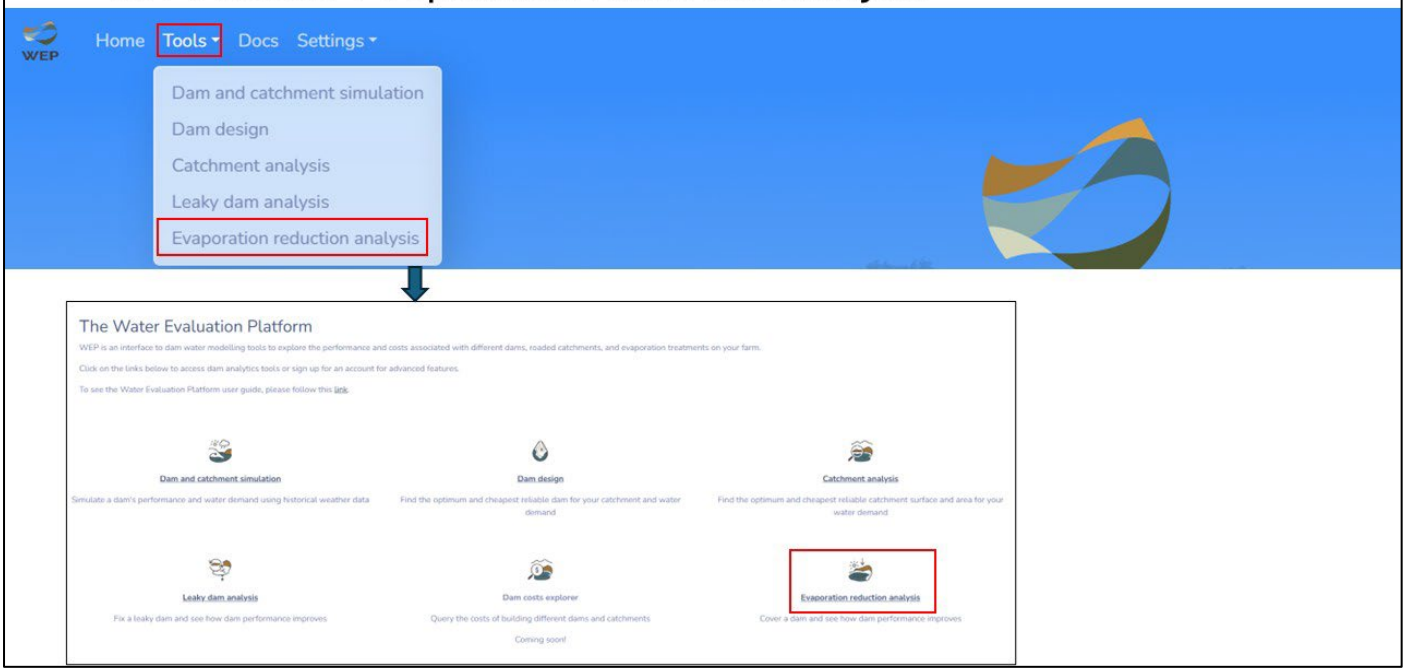
29. View results

Reliability: % of months water demand was met before and after fix.

Costs: Cost of lining v cost of water saved

Analysis tools – Evaporation reduction

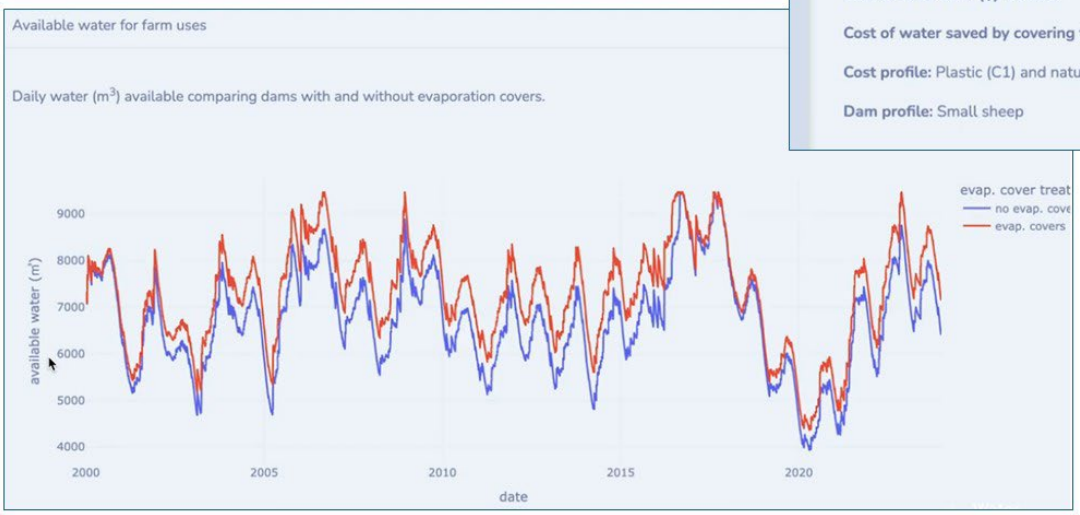
30. Click on "Evaporation reduction analysis"



31. Evaporation reduction analysis – Simulates the effect of putting evaporation covers on part of a dam.

- Reload a previous configuration, or use "New config".
- Name the simulation.
- Describe evaporation cover: effectiveness and area of cover.
- Select a dam profile i.e. water needs (see step 9).
- Select a dam cost profile to estimate repair cost.
- Select duration of simulation (make it long).
- Select location of dam (click map).
- Add dam shape and dimensions.
- Set the starting depth of the dam (%).
- Draw catchment area (or just input hectares) and select catchment type (e.g. tarp, road, natural).
- Run simulation.

32. View results



See more at https://docs.waterevaluationplatform.app/getting-started.html