

## Webinar: Integrated Catchment and Receiving Water Modelling

#	Question	Answer
1	I had a chance to see one of my colleagues uses Tuflow to model a flood a couple months ago but he typed the code in only. Is there any Tulfow version that doesnt require one to have a certain understanding about coding? thanks	Although the TUFLOW commands look like coding, it is far simpler and easier. You can try this for free via guided eLearning: <a href="https://www.tuflow.com/training/training-catalogue/tt102e-introduction-to-2d-modelling-elearning/">https://www.tuflow.com/training/training-catalogue/tt102e-introduction-to-2d-modelling-elearning/</a>  Alternatively, there are several GUI alternatives which have been developed by other parties. See <a href="https://www.tuflow.com/products/gui-options/">https://www.tuflow.com/products/gui-options/</a>
2	What was the Lumped Daily Model used in this comparison?	Thanks for your question. The model used in this comparison was the eWater SOURCE model which exported daily flows, TSS, TN and TP concentrations. To reiterate what Michael and Phil said however, the eWater SOURCE model was built with the intent to be used as a catchment within a larger domain, not specifically to provide boundaries to Oxley Creek. We used that model because it was available for the Oxley Creek catchment 'as is' and with additional effort it may offer different predictions.
3	The measured WQ data is limited in most locations, do you have recommendations for agencies to collect better data?	Data is often limited particularly further up in the catchment. More data will always provide a better chance to validate a model. This tool can also be used to help guide the locations where data may be limited or most valuable to collect.
4	Is that open source? Is that interface base or coding base?	TUFLOW is propriety software, not open source. It is a hybrid interface/code-esq base modelling environment. GIS software such as QGIS is used as the user interface. Syntax linking the QGIS spatial datasets, boundary conditions and simulation controls is specified in a number of text files.
5	how is a storm network (XP-storm output) integrated into a TUFLOW Catch model setup?	XP-Storm does not include the features necessary to provide inputs to the receiving water modelling, so unfortunately that is not an option. Native TUFLOW HPC is required as the catchment model. Numerous code updates were added to HPC during the pilot study to enable this modelling
6	How does this equate to rainfall-runoff models such as SIMHYD and Sacramento? Is there similar sort of parameters and conceptual complexity in generating runoff?	TUFLOW uses physical based properties for modelling the rainfall runoff. In this case soil infiltration (using a Green-Ampt equation) is being used to determine the amount of water/rain which is infiltrating from the surface into the soil. Over time the soil layers can be drying out through vertical movement of water into deeper soil layers (up to 9 vertical layers are allowed) or through horizontal movement of groundwater. The following webinar gives an introduction to direct rainfall: <a href="https://awschool.com.au/training/is-rain-on-grid-modelling-accurate/">https://awschool.com.au/training/is-rain-on-grid-modelling-accurate/</a> and may be of interest.
7	How can we use drains hydrograph on TUFLOW? Thanks	Drains can output hydrology flows directly to a TUFLOW ts1 format. Those flows can be entered as boundary condition inflows to the TUFLOW hydraulic model. Can you please email TUFLOW support ( <a href="mailto:support@tuflow.com">support@tuflow.com</a> ) and Drains software support with your model details? Collectively both of our software support teams will be able to help you with your modelling.
8	Can TUFLOW can be used for Groundwater recharge modelling?	Yes, groundwater functionality beyond simple infiltration methods was added to the 2023 release version of TUFLOW Classic/HPC.  Please refer to Section 2.3 of the most recent release notes: <a href="https://docs.tuflow.com/classic-hpc/release/2023-03-AC/">https://docs.tuflow.com/classic-hpc/release/2023-03-AC/</a>
9	Can I have your email contact so that I can communicate time to time for my PhD research?	The best email address to use is <a href="mailto:support@tuflow.com">support@tuflow.com</a>

## Webinar: Integrated Catchment and Receiving Water Modelling

10	How many soil layers integrated in TUFLOW catch? if >1, infiltration from shallow layer to deepers are simulated?	A vertical hydraulic conductivity is used. The value is part of the soil properties, which can be spatially distributed on a layer by layer basis. Up to 9 vertical layers for soil are allowed for. For the infiltration from the surface into the soil for this modelling a Green-Ampt infiltration has been used. Initial/Continuing loss and Horton loss are also available for the calculation of infiltration into the upper soil layer.
11	Another challenge we have had is with representing small storages in the catchment such as farm dams. Which have show substantial attenuation of flows and act as sinks which hold and lose water through evaporation/irrigation use. Keen to understand how once could model such storages.	These could be represented by modelling in the 2D cells of the model. Depending on the resolution of the model it may be necessary to use a topography modifier to model the dam wall to ensure that the dam does not overflow or spill until the right water level. This will allow water to be stored in the dam and the evaporation would be applied to the wet cells. In terms of irrigation this would need to be applied as a time-series or 1D element (pumps can be used).
12	Thanks... a follow-up question: soil characteristic such as bulk density, %clay, %sand, organic content are part of input? Sandy soil in WA are quite different from eastern states..	Yes, the soil characteristics form an important input in the modelling. The soil data in this modelling was sourced from the Australian Soil Atlas (CSIRO, 2013). The predominant soil types in the catchment are hard acidic yellow (Dy3.41) and red (Dr3.41) mottled soils. The texture of the Horizon A soil is categorised as Sand, Sandy Loam or Loam. For the pilot study, although the soil type would vary spatially, for proof of concept we used a median texture of Sandy Loam globally. Pervious/impervious areas were also specified.
13	Hi All, is it sediment of TSS?	It is a single fraction of suspended sediment both in the catchment and receiving model
14	Thanks for the wonderful Webinar. Can this Salinity recession happen in Brisbane river? If we increase the fresh water in Brisbane river, will it push the salt out of Brisbane river in to Moreton Bay? If yes, how much fresh water would be required and for how long to push salinity out of Brisbane River? And how tide will behave during that time?	This type of modelling tool is perfect for answering that type of question.  We can't however answer your specific question asking how much fresh water is needed to flush the Brisbane River and how that impacts the tide. We would need to complete an assessment of that specific system to provide you with an informed answer. This would likely involve use of the TUFLOW model suite to do so!
15	May I ask if the results for TSS in Oxley Creek just displayed are simulated results? Has it been compared with the measured TSS time series? How can we get the sediment concentration data?	Comparison against recorded TSS will be provided by Michael in two slides time :) Model predictions were compared with available measurements from Southeast Queensland stakeholders. The measurements taken are a snapshot in time, with continual data not available.
16	Is that auto calibrated software? if not then what's the calibration parameters?	It is not autocalibration software. Calibration was undertaken by varying parameters within industry standard ranges to achieve satisfactory performance against criteria such as those presented by Moriasi et al 2015.
17	Is there a filter size adopted for the sediment particle size?	No. It is total suspended solids.
18	Is there particle tracking or intent to include PT? I ask in relation to the recent study that demonstrated groundwater contributing greater nutrient loads to the GBR than previously thought (Tait et al 2019).	Particle tracking can be included in the receiving model using the Particle Tracking Module (PTM) available as part of the TUFLOW FV suite. You can also represent the groundwater flows as tracers to understand the dispersion within the system.
19	Hi Can we have this presentation slides. Thanks Ravee	The slides will be available as a PDF on the AWS website after the session. Thanks!

## Webinar: Integrated Catchment and Receiving Water Modelling

20	<p>What differences would we expect to see if the model accounts for sediment sourced from creek bed erosion? How do the updates to TUFLOW HPC simulate this scenario?</p>	<p>Very good question, thank you. The best way to account for detailed in-stream sediment resuspension and deposition dynamics is to extend the TUFLOW FV model domain up into such streams of interest, and use the TUFLOW FV Sediment Transport Module. Even though Oxley Creek had TUFLOW FV applied to cover only the tidal reaches, there is no reason it's computational domain (mesh) cannot be extended upstream into freshwater reaches.</p>
21	<p>I assume that there was a erosion/deposition process happened in that sediment model. I wonder why there was no change to the creek bed during the process?</p>	<p>The sediment resuspension and deposition was occurring in the TUFLOW FV model, and this was discussed as having its signal in the fortnightly (neap-spring) frequency of TSS concentration fluctuations. The bed stores (not morphology) was also being adjusted accordingly, but was not shown.</p>
22	<p>Is the routing in the rainfall-runoff model taken care by the TUFLOW hydrodynamic model?</p>	<p>TUFLOW HPC does all the routing required by solving the equations of motions for surface and subsurface flows. The same applies for pollutant export and transport. The following webinar on direct rainfall may help to understand how this is occurring: <a href="https://awschool.com.au/training/is-rain-on-grid-modelling-accurate/">https://awschool.com.au/training/is-rain-on-grid-modelling-accurate/</a></p>
23	<p>The TUFLOW CATCH calibration looks pretty good, so I was wondering if it's possible to use the same set of parameters for ungauged catchments with similar characteristics to predict catchment flows from ungauged catchments. This would be useful when we don't have gauged data; however, it has to be done very carefully.</p>	<p>Yes. The approach you describe is regularly used. Parameterisation from similar gauged catchments can be used to inform the modelling in nearby ungauged catchments if no other data exists. This is a more informed approach than selecting parameters blindly.</p>
24	<p>Are there plans to compare a integrated catchment and receiving model against a lumped node/link model made specifically for comparison sake?</p>	<p>This was presented in the webinar towards the end. A similar comparison will also be presented at the Engineers Australia Hydrology and Water Resources Symposium in Sydney in November this year. We have a paper presentation for TUFLOW Catch accepted.</p>
25	<p>“Traditional” catchment surface water modelling has issues with the following:</p> <ul style="list-style-type: none"> <li>• Modelling vegetated catchments</li> <li>• Modelling catchments without flow measurements and unique catchment properties</li> <li>• The non stationarity of flows (i.e. less flow than observed in the past with similar rainfall)</li> </ul> <p>Do you know how the model copes with these and if there are plans to test the model against these issues?</p>	<p>TUFLOW HPC solves the shallow water equations to predict surface water runoff and propagation. These equations take input that reflect reality on ground - e.g. surface roughness parameters. As such, modelling vegetated catchments is reliant on user parameterisation, rather than limitations associated with lumped hydrology approximations. Model testing is continuing. The soils layer is drying in response to the rainfall, evaporation and groundwater movement. Similar rainfall events may provide quite different responses depending on the antecedent conditions.</p>
26	<p>How relevant is any particular year analysed to long term predictions or assessing a specified AEP?</p>	<p>The year simulated was drier than normal. This was a deliberate choice because reproducing the details of fine-scale hydrology was seen as important - these details can be overwhelmed when simulating very wet years. The TUFLOW Catch model is not really focussed on simulating an AEP because the questions it is being asked are about long term environmental issues, rather than short term flood impacts. TUFLOW HPC (and FV) can be used for both short and long term simulations.</p>
27	<p>Can be a good idea to couple with Modflow for groundwater part</p>	<p>Thank you for your suggestion</p>
28	<p>I'm interested in seeing some TUFLOW CATCH model studies in Western Australia (WA), specifically focusing on the South West catchments with high infiltration rates and elevated P levels.</p>	<p>Thank you. Please send an email to <a href="mailto:support@tuflow.com">support@tuflow.com</a> if you would like to work with us to set up a TUFLOW Catch model in SW WA. We would be happy to do so in collaboration.</p>
29	<p>Is sediment erosion and transport modelled based on size classes</p>	<p>No - only one sediment fraction was simulated in this example, but as many fractions as needed can be added, each with their individual erosion/deposition properties</p>

## Webinar: Integrated Catchment and Receiving Water Modelling

30	Thank you everyone.	Pleasure! Thank you for attending
----	---------------------	-----------------------------------