ADB e-Marketplace for a Water-Secure and Resilient Asia and the Pacific

Spotlighting innovative solutions, latest technologies and best practices

Session 23:
From Data to Decisions: Harnessing UK Digital Solutions for More Resilient Water Management

Fathom Q&A

1. Can you please provide further details on the comparability between Fathom and other dynamic modelling software? You mentioned yourself HEC-RAS. In my experience, they're two different purposes, so not directly comparable. But curious to hear your thoughts on it.

Tools like HEC-RAS and Fathom serve different purposes, so they're not directly comparable one-to-one. HEC-RAS is typically used for very detailed, site-specific hydraulic studies, while Fathom is designed for large-scale, consistent coverage, enabling decisions at portfolio or national levels.

That said, we've benchmarked our models against high-resolution, event-based studies to test comparability. Our paper "Comparison of event-based flood inundation maps" explains this in detail and shows how Fathom performs relative to traditional approaches:

https://www.fathom.global/academic-papers/comparison-of-event-based-flood-inundation-maps/.

2. The date can review the past time, so can we check the flood map in one place in any past time?

Fathom's maps aren't a satellite archive of every past flood. What we provide are scientifically modelled views of flood hazards. These are built using hydrology, hydraulics, and historical climate datasets to simulate maximum flood depths and extents for different return periods both now and into the future up to 2100.

3. A flood model supports decisions on investments to reduce flood risks. How do you decide which of the minor streams of the catchment area needs to be calibrated to validate the model?

We do not specifically calibrate our rivers within the models. We define which minor streams to include in the model based on an upstream catchment threshold. Once a river is included within the model, it is subject to the same set of methodologies as larger rivers. We validate our model across a range of national government flood maps and historical flood extents and water depths. More information on the model validation can be found in Wing et al. (2024). https://doi.org/10.1029/2023WR036460

HR Wallingford Q&A

1. I'm curious about two aspects: first, how your model handles incomplete or drifting sensor data in older DMA networks; and second, how you ensure transparency, so field crews trust the AI-flagged hotspots before excavation. Could you share any lessons or safeguards you've built in?
Thanks for the question.

All the calculations are based on statistical analysis and hydraulic modelling, so the scientific based is sound. The tool is designed to be a decision support tool, so that leakage managers can have a prompt, comprehensive and clear picture of the status of the measurements and water balances. Missing data (for single timesteps or short period of time) are infilled based on past history, but if a meter is permanently out of order or providing wrong data, Sim-On only provides evidence of errors, without trying to invent any data. This is because it is useful for the leakage team to know how the flow meters are working and that the calculations are based on real data.

If there is a known offset it is possible to include multipliers and offset factors to manipulate the measure from the fiels and use corrected values; also, it is possible to set thresholds to exclude outliers before they are acquired and substitute them with historical values.

For any further detail please get in touch.

2. What's the cost of this software tool? Is it on an annual subscription basis of full licence fees basis. How different this modelling tool compared to waterGEMS.

The cost depends on the modules that are used and the size of the project. The base is water balance and leakage statistical analysis; the cost depends on the number of flow meters connected to the

system. Then there are the pre-location module and the smart meter modules that can be added. We offer both annual subscription and licence purchase (with optional annual support and update).
The water modelling part is currently functional for leakage detection with iterative simulations in the background.

The typical planning operations that you can make with modelling tools like InfoWorks WS, ProBe Water or EpaNet or similar is a different application with different objectives. We make use of calibrated water models coming from these tools in order to locate leakage.

Feel free to keep in touch for any further information, thanks for the question.

3. In the example presented, which IoT devices were used and how many per DMA? Was the cost of €100,000 for software development or for equipment/hardware?

The cost of the equipment is not included; we tend to use what is already installed and suggest how many further flow or pressure sensors can be added to refine the analysis.

For each DMA, to perform the leakage identification part (hydraulic balance and leakage level calculation) all the incoming and outgoing flows are to be known. To perform the pre-location there is the need for continuous pressure sensors at all the boundaries (where flow meters are) and at least 3 more points within the network, 5 to 10 would be optimal to refine the performance. This depends on the size and structure of the DMA. We use hydraulic modelling to minimize the number of pressure sensors needed.

Feel free to keep in touch for any further information, thanks for the question.

4. When we don't have primary data for non-revenue water (like actual leak detection surveys), then we rely on secondary data and assume a certain percentage for NRW. I wanted to ask if there is a specific tool which can determine the NRW by putting the already available data like income level, water consumption, pipelines life etc?

Sim-On calculates the level of leakage based on the water balance. The night use is calculated by population information or smart meter data if available. Thanks for your question, feel free to keep in touch for any further information.

5. What brand can you recommend for a leak detection device please.

Sim-On can connect to any SCADA platform and also gather data from different platform to let the user be free to choose without the necessity to stick to only one provider.

6. How can SIM-ON detect leakage if the pipe system is under a building?

Typically, all pipes are not emerging from the ground and what SimOn tries to do is to reduce the area of search with traditional methods (e.g. acoustic) in 2 steps: promptly identifying the DMAs where new leaks are occurring and pre-locating it is using the hydraulic model. This second step highlights the area where it is most likely for the new leak to be, because the variations in the pressure measurements show a different pattern from the calculated pressures. So, the model does not need to know where the pipe exactly is.

Thank you for your question, feel free to keep in touch for any further information.

7. Can Sim-On water technology help with pinpointing leak location?

Yes, the pre-location module of Sim-On is specifically built with this objective. It uses hydraulic simulations and iterative statistical processes to reduce the area of search with traditional methods (e.g. acoustic). We aim to highlight an area that can be inspected in 1 day or less.

In order to do so, it needs a calibrated hydraulic model of the DMA (which is simpler than the hydraulic model of the whole system) and some pressure sensors: one where all flow meters are and at least 3 within the DMA network; 5 to 10 would be optimal to refine the performance. This depends on the size and structure of the DMA. We use hydraulic modelling to minimize the number of pressure sensors needed.

Feel free to keep in touch for any further information, thanks for the question.

8. This seems to be a system which might be too complex for water utilities in developing countries. Has it been applied in developing countries? How much were NRW figures reduced? Are there evaluations made and are there reports?

This is a tool that needs a set of data to run, specifically a shapefile of polygons for DMAs and the flows, so of course there must be availability or potential availability to start implementing it. Typically, where the water utilities are aiming at reducing leaks, they must be thinking of installing or making a better use of flow meters, so Sim-On Water is applicable.
We have started working in areas where this information was not completely available, but it is possible to install in the near future, so we worked together to define DMAs extension and where to install the equipment.

This is an application that is meant to be modular and scalable, to allow anyone to maximize the data they have and plan how to include other areas and other analysis while the availability of data increases.

Boundary flows for leakage level calculation and potential new leaks identification.

Hydraulic models and pressure sensors for leak pre-location.

Smart meters for a better calculation of night use.

Feel free to keep in touch for any further information, thanks for the question.

Detectronic Q&A

1. In developing countries, the budget is a major consideration. Is your company open to small-scale deployment? Regarding theft, does your device include a theft alarm and GPS location features? Another problem is the lack of LPWAN availability; is your device customizable?

We can deploy from single sensor to multiple thousands, although we would need to find suitable partner in region required for installation. The units operate on 2G,3G,4G,5G, CAT1-BIS, NB-IOT, LTE, CAT-M1 / M2, so we are usually we covered for most requirements. LoRaWAN is being developed for future applications.

2. If the sewers could not accommodate the stormwater, can the extent of inundation be identified by the system?

If you are asking can we detect Infiltration, yes by using the MSFM4 flow meter, this is commonly used for this type of application

3. I was curious about the pricing of the tech solutions. Is this technology affordable for governments of developing countries and has it been deployed in a developing country?

The sensors range in price depending on specific model, ranging from £299 thru £5000 depending on model.

4. Can this technology be applied for flow monitoring of reservoirs during floods to take decisions for efficient diversion of the overflowing flows to reduce flood impacts on downstream assets?

Certainly, we have products designed for exactly this purpose, please reach out following this call