



Ts. Dr. Nurul Nadrah Aqilah created software to predict river water levels to identify flood areas

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PEKAN, 1 January 2024 – Difficulty in analysing water level data which is important data for identifying flood areas sparked an idea to a researcher and lecturer of the Faculty of Civil Engineering Technology (FTKA), Ts. Dr. Nurul Nadrah Aqilah Tukimat, 38 to create WALES Simulator, a software that can predict river water levels based on meteorological variables such as rain and evaporation.

In identifying parameters and producing long-term water level equations, this research was conducted with Universiti Tun Hussein Onn Malaysia (UTHM) lecturer, Associate Professor Dr. Siti Nazahiyah Rahmat and two master students, Wan Zunairah Othman and Wan Amirul Syahmi Wan Mazlan.

In addition, several FTKA lecturers, Associate Professor Dr. Abdul Syukor Abd. Razak, Dr. Nur Farhayu Ariffin and Dr. Muhammad Khusyren Sulaiman also contributed ideas regarding this software.

According to Ts. Dr. Nurul Nadrah Aqilah, in current practice, water level stations are located in certain locations to detect changes in river water levels (WL).


“Information from WL is the best indicator for flood warning systems and forecasts of potential floods, flash floods and droughts.




ITEX'23
International Technology Exhibition

WALES SIMULATOR

Water Level for the Future



WALLES



INVENTOR
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CO-INVENTORS
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AND DR MUHAMMAD @S A KHUSAIRIN SULAMAN

Patent
• IP number: LY2023C01900

TRL 7
GRANT NO: RDU220338 (RM27,000)

Product Background

More than 30 of consecutive missing days on existing water level stations

+

Lack of water level station installed on site

+

Uncertainty of the climate changes causes large changes to the streamflow pattern

+

Requires complex hydraulics and hydrological data for flood forecasting

Product Features

- WALES SIMULATOR is a valuable software to estimate river water level (WL) depends on meteorological variables such as rainfall and evaporation,
- The portable software that can be used to track current WL using real-time data.


Industrial Benefit

- River WL forecasting as indicator for the flood monitoring
- Potential to estimate the WL at un-gauged area

Marketability

Price: RM15,000 (Software + Training + WL Projection)
(The package only for particular state)

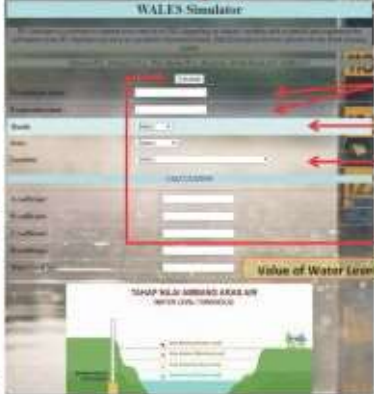
Collaborators



Achievement

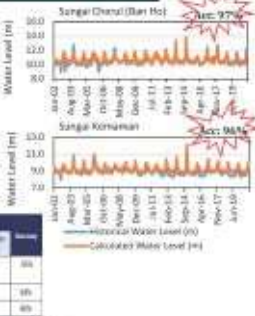
Gold Medal in CITREX2023

Solution



Enter rainfall & evaporation
Choose month
Choose state and location
Click Calculate button

Results



Higher Accuracy
The Fastest in WL Filing Treatment
Reliable WL Projection Software

City/State	RM	Months	Users	Rating
IPAH	10000	1	1	85%
IPAH	10000	1	1	85%
IPAH	10000	1	1	85%

Novelty

- The WL is calculated based on multilinear regression equation
- The variables considered are rainfall, evaporation, and 4 coefficients (A, B, C, and D)
- The performances of simulated WL show a good result with >90% accuracy

Benefit of Product

- WALES SIMULATOR is a future water level estimator using hydrological data only.
- It is the best indicator to monitor the increment/decrement of WL based on real time data.
- It is also very useful software to determine the WL at un-gauged area and for the long-term forecasting.

Status of Innovation

TRL Level 7 – The product has been demonstrated in relevant industries. The LOI has been signed between NAHRIM and UMP

Publications

- 1) Nadrah, N.N., Zulkarnain, S.H., and Khairi, H. (2021) Estimation of the Future Trend Changes on the Streamflow with Climate Resilience Consideration, IOP Conference Series: Earth and Environmental Science, 1061(1):012014
- 2) Zulkarnain, S.H., Nadrah, N.N., and Khairi, H. (2022) The Impact of Climate Change on the Streamflow in the Context of Climate Change Case Study in Terengganu, IOP Conference Series: Earth and Environmental Science, 1100(1):012014
- 3) Khairi, H., and Nadrah, N.N. (2023) Spatial Distribution of Water Level in Terengganu River Basin, published by IOP Publishing, pp. 012014

“However, the lack of WL stations installed on site, particularly in locations prone to flooding, creates challenges and problems in hydrological modelling, particularly for long-term monitoring and estimating the effects of climate change.

“Furthermore, the problem of missing data on existing WL stations due to network miscommunication also leads to biased results in hydrological modelling work,” she said.

Therefore, she said WALES Simulator is the best software to solve the problem of filling in the missing WL, estimating the WL especially in uncontrolled areas and predicting the long-term changes of the WL.

The research, which began in 2021, was also collaborated by the National Water Research Institute of Malaysia (NAHRIM), which is one of the agencies that will adopt the software.

She explained that users can use this software by entering the amount of rainfall and evaporation per month including entering the information month and location and then the calculation section will perform calculations to estimate water levels.

For now, the price of the software is for one state only with a minimum cost of at least RM15,000 which includes the software, training and user guide.

However, the price changes depending on the location and number of stations required.

She also intends to expand the use of WALES Simulator to the relevant government agencies such as the Department of Irrigation and Drainage (DID), Tenaga Nasional Berhad (TNB) and others.

Previously, she created IIUVIA Converter – The Rainfall Solution software.

This product bagged a gold medal in the 2022 Creation, Innovation, Technology & Research Exposition (CITREx).

The research also won a gold medal at the International Invention, Innovation and Technology Exhibition (ITEX) 2023 which took place at the Kuala Lumpur Convention Centre (KLCC) on 11 and 12 May 2023.

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