

A novel toolkit to streamline Land Use Land Cover change assessment in the SWAT+ model to enhance flood management and infrastructure decisions

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Flood management in Wales:

Since the Flood & Water Management Act (2010), flood alleviation in England and Wales falls to regional flood risk management authorities.

An improved understanding of the impacts of Land Use Land Cover (LULC) change on local hydrology is key to strengthening the flood alleviation schemes and maximising the effectiveness of spending at a local government level.

In this project, we have partnered with Gwynedd County Council, a local authority in North Wales, UK, who are looking to improve on their current approach to the development of flood alleviation schemes.

We propose a SWAT+ based web toolkit as a decision support system.

Aim of the study:

Improve the capability of Gwynedd County Council (and other local authorities in Wales) to make more informed flood alleviation schemes, maximising scheme efficiency as well as spending and resource allocation.

Objectives:

1. Develop a user-friendly toolkit that allows the end user to specify, through a Graphical User Interface (GUI), various types of LULC changes at multiple locations within their study catchment.
2. Through the toolkit, run the SWAT+ model with the newly defined land use scenarios and enable interactive visualization of the results to aid in assessing the hydrological impacts.
3. Work with GCC(Gwynedd County Council) to evaluate the effectiveness of the toolkit as a support tool.

SWAT+ LULC Change Toolkit:

1. GUI map – HRU selection
2. Land use edit table – populated with HRU selection
3. New land use and plant type – pop-up forms
4. Output visualization – interchangeable scenario hydrographs

Desired Functions Achieved?

Desired Functions	Achieved?
Make visual selection of catchment HRUs	✓
Make land use changes to selected HRUs	✓
Make new plant type	✓
Make new land use type	✓
Visualize and compare model outputs	✗
Run the SWAT+ model in the application	✗

HRUs	Current Landuse	New Landuse
2	PAST <input type="button" value="Edit"/>	<input type="text"/>
	PAST <input type="button" value="Edit"/>	<input type="text"/>
523	PAST <input type="button" value="Edit"/>	<input type="text"/>
524	PAST <input type="button" value="Edit"/>	<input type="text"/>
525	PAST <input type="button" value="Edit"/>	<input type="text"/>
526	PAST <input type="button" value="Edit"/>	<input type="text"/>
527	PAST <input type="button" value="Edit"/>	<input type="text"/>
528	PAST <input type="button" value="Edit"/>	<input type="text"/>
357	PAST <input type="button" value="Edit"/>	<input type="text"/>
358	PAST <input type="button" value="Edit"/>	<input type="text"/>
366	PAST <input type="button" value="Edit"/>	<input type="text"/>
367	PAST <input type="button" value="Edit"/>	<input type="text"/>
368	PAST <input type="button" value="Edit"/>	<input type="text"/>
369	PAST <input type="button" value="Edit"/>	<input type="text"/>
<input type="button" value="EDIT ALL"/>		<input type="button" value="CLEAR"/>