BUVARD online: a webtool using the R language (Shiny) to help end-users sizing their vegetative filter strips

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Introduction

- Vegetative Filter Strips (VFS) are known as a relevant solution to limit pesticides transfers by runoff from fields to aquatic environment.
- Their efficiency strongly depends on soil, agronomic and climatic conditions and they need to be optimized by considering appropriate sizing.
- In this context, IRSTEA developed a complete toolkit, which allows designing site-specific VFS by simulating their efficiency to limit runoff transfers (Carluer *et al.*, 2014).
- Now, a supplementary step is carried out by implementing a web interface to help end-users to get simplified results.
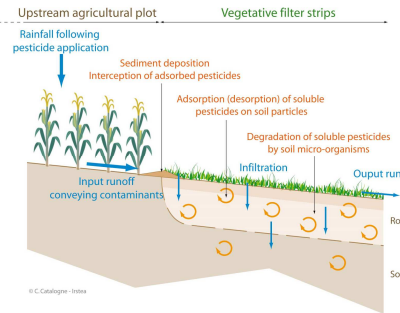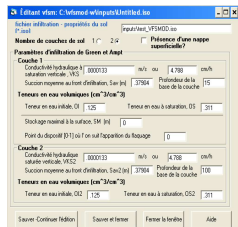
From a complex modeling toolkit…

Method developed by Carluer *et al.* (2011) :

1/ Describe contributive area geometry by using GIS features implemented in Hydrodem (Leblois and Creutin ,2013)
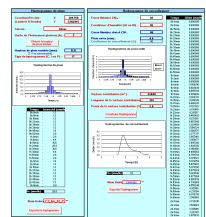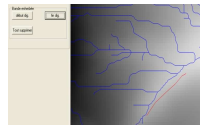
2/ Generate runoff hydrogram according to the « Curve Number » method (USDA-SCS, 1972)

3/ Assess the VFS efficiency by using the mechanistic model VFS-mod (Munoz-Carpena *et al.,* 2011)

But handling the different modelling tools appeared to be very complex for end-users because of :

- The need of numerous and complex parameters, which are not always easily available in practical applications
- The complex management of inputs/outputs between each step

### Can we propose a simplified approach instead ?

… to a user friendly interface presenting simplified results

1/ Simplifying the approach by :

- Generating a huge amount of scenarios for four french climatic areas.
- Summarizing the results through **graphical abacus** displaying efficiency for different sizes of VFS and different climatic conditions (summer or winter rains of different durations, initial moisture of soil).

2/ Implementation of an interactive web application to display abacus :
(using the R package « Shiny » features)

The user fills in the parameter fields considering his study site characteristics
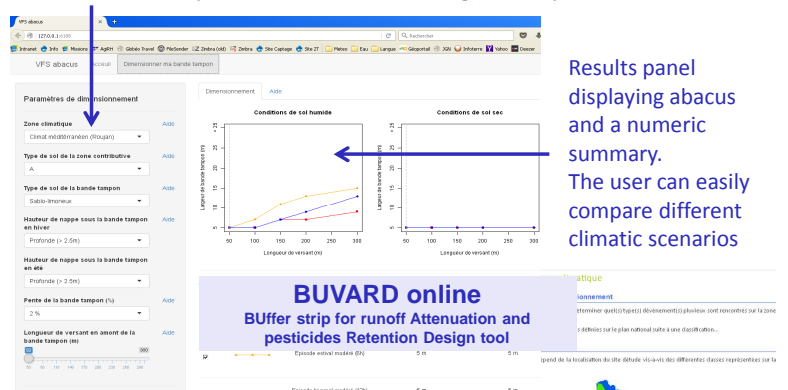
Results panel displaying abacus and a numeric summary.
The user can easily compare different climatic scenarios

BUVARD online
BUffer strip for runoff Attenuation and pesticides Retention Design tool

At each step, (parameters choice, results interpretation) support is provided by contextual « help pages »

- **No calculus is required**, relevant abacus can be obtained with a parcimonious set of parameters (the most influent ones).
- **Readily available on the user web browser**.

Online soon ! See http://www.irstea.fr/les-zones-tampons

Conclusion & perspectives

- Efforts to make research tools more accessible are very important to better disseminate them into the operational users community. This example illustrates a way to do so by using the scientific language R.
- Contextual help is also needed to explain each parameter purpose and support their choice in difficult cases, especially here for the « Curve number », which is one of the most influent parameter.
- Futur woks will improve the tool by implementation of a metamodel providing more accurate scenarios (see Lauvernet *et al.* oral presentation)

https://cran.rproject.org/web/packages/shiny/index.html

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