Assessing the effectiveness of BMPs with the SWAT-GENLU modeling framework

Environmental performance of production activities,
Spatial and dynamic territorial organization, Public policy analysis, Territories

The GENerator of LandUse (GenLU1 and GenLU2) applications make it possible to feed complex actions at HRU level into SWAT agronomical management files

Motivations - Concerns - Objectives

✓ **Simulate long-term BMP scenarios with complex cropping systems** (long crop rotations, heterogeneous practices) (GenLU1 & GenLU2)
✓ Include **sensible temporal variability in management operation schedules** (GenLU1 & GenLU2)
✓ Need for **automatic implementation into SWAT mitigation measure scenarios**
✓ Need to **adapt to different spatial scales at a daily time step** (GenLU1 & GenLU2)
✓ Need to **spatialize Agricultural Census and generate land use cover** (GenLU1)
✓ Need to **spatialize a typology of practices linked to soils and generate land use cover** (GenLU2)
✓ Need to **adapt to different methodologies** (integrated assessment, standalone environmental modeling, or environmental modeling coupled with bio-economic modeling)
✓ Need to account for the **impact of climate on management application dates** (GenLU1 & GenLU2)
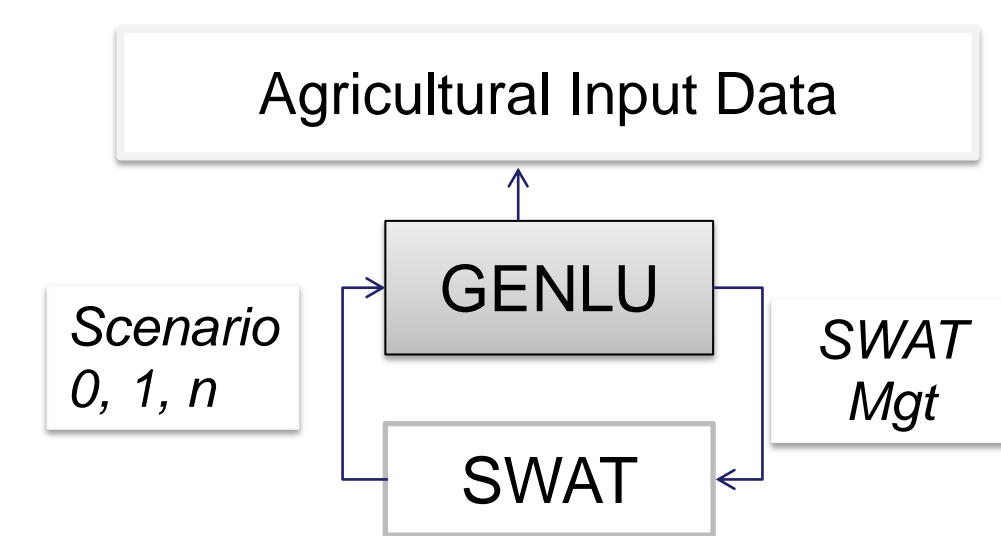
Modeling framework

- The GenLU applications are an interface between land use data and the SWAT project input files
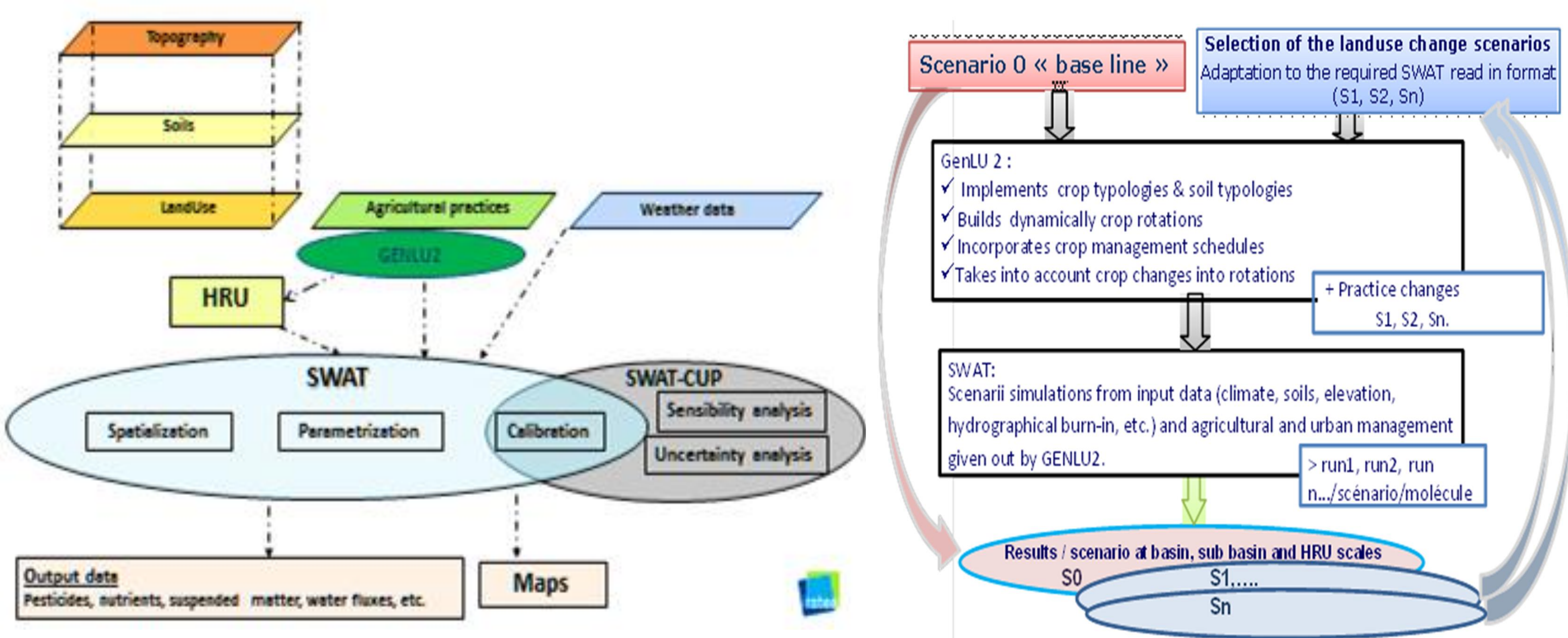
Source : Odile Leccia – Paul Bordenave (2008)

GenLU global methodology

- The GenLU applications are adapted for each BMP scenario
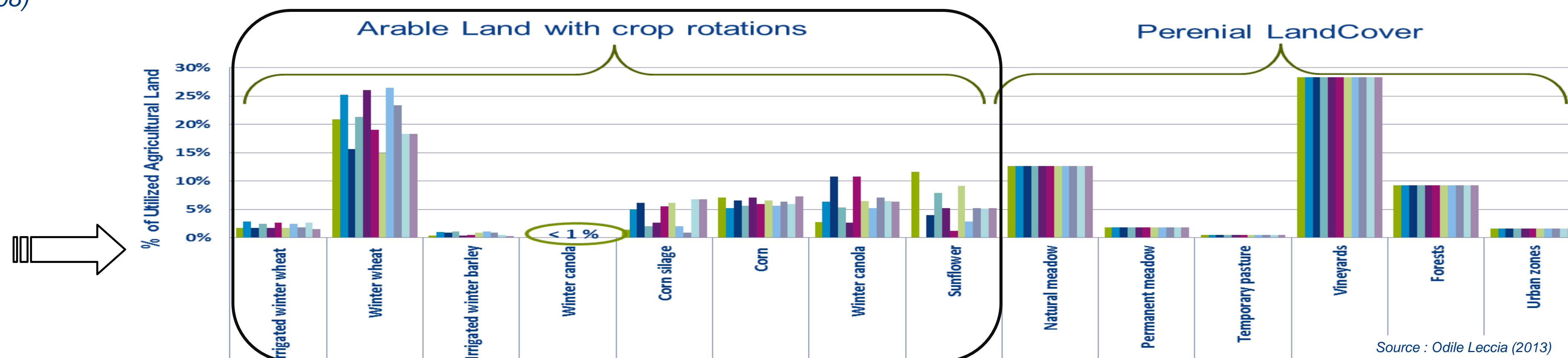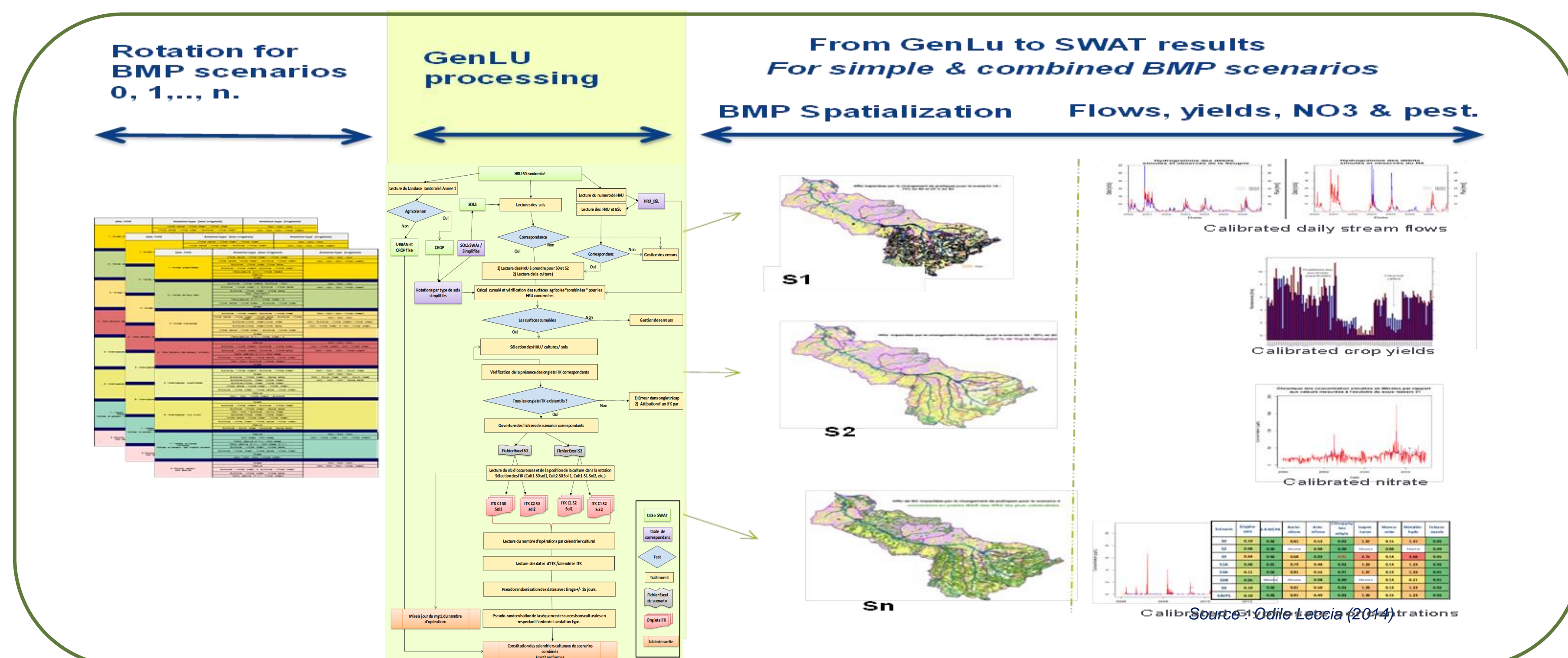- They sequentially process BMP scenarios at HRU scale

Results

- Statistical post-process GenLU cropping system to compare modeled and real surfaces

Source : Odile Leccia (2013)

- The GenLU applications make it possible to feed complex practices into SWAT-compatible input files

Source : Odile Leccia (2014)

Thanks to its ability to build SWAT-compatible alternative scenarios, GenLU is a highly useful tool to automatically implement complex land use and agricultural systems into the SWAT model

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