WBI-Vietnam ULiège projects

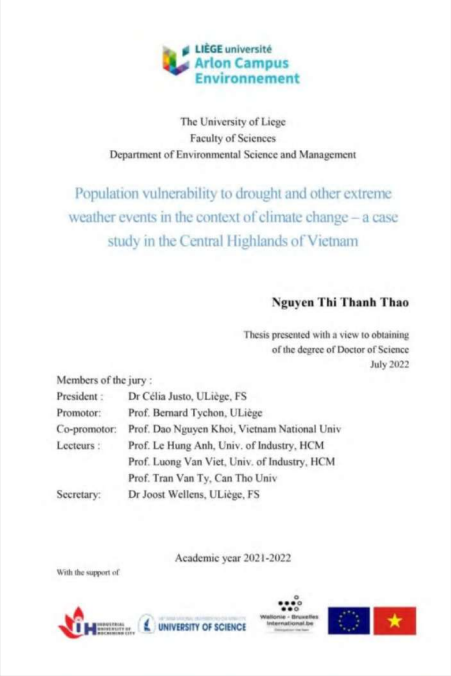
Joost Wellens, Nguyen Thu Phuong, Bui Hai Nam

20 November 2025 | Gembloux





- agricultural small holders -



LIÈGE université
Arlon Campus
Environnement

The University of Liege
Faculty of Sciences
Department of Environmental Science and Management

Population vulnerability to drought and other extreme weather events in the context of climate change – a case study in the Central Highlands of Vietnam

Nguyen Thi Thanh Thao

Thesis presented with a view to obtaining
of the degree of Doctor of Science
July 2022

Members of the jury :
President : Dr Célia Justo, ULiège, FS
Promotor: Prof. Bernard Tychon, ULiège
Co-promotor: Prof. Dao Nguyen Khoi, Vietnam National Univ
Lecteurs : Prof. Le Hung Anh, Univ. of Industry, HCM
Prof. Luong Van Viet, Univ. of Industry, HCM
Prof. Tran Van Ty, Can Tho Univ
Secretary: Dr Joost Wellens, ULiège, FS

Academic year 2021-2022

With the support of

UNIVERSITY OF SCIENCE

… 3 projet cycles

- 2019-2021, 2022-2024 & 2025-2027 -

- Support for the establishment of a Drought Observatory:
  - ULiège, SPW-DGARNE, Industrial University of Ho Chi Minh City (IUH) & Vietnam National University Ho Chi Minh City (VNU-HCM)
  - Dr Nguyen Thi Thanh Thao
- Analysis of Capacity Demand for Sustainable Water Supply for Coffee Plantations in the Central Highlands of Vietnam
  - ULiège, SPW-DGARNE, Vietnam National Institute of Agricultural Planning and Projection (NIAPP) of Ministry of Agriculture and Rural Développement (MARD)
  - M. Bui Hai Nam
  - Mme. Nguyen Thu Phuong
- A Water-Energy-Food Nexus approach for a sustainable intensification and development of the (irrigated) coffee sector:
  - ULiège, SPW-DGARNE, Vietnam National Institute of Agricultural Planning and Projection (NIAPP) of Ministry of Agriculture and Rural Développement (MARD)
  - M. Bui Hai Nam
  - Mme. Nguyen Thu Phuong

TRUONG DAI HOC KHOA HOC TU NHIEN
KHTN
TP. HO CHI MINH

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1 Common context

- sustainable water management for agriculture -

- Major challenges:
  - Climate change: droughts ↗ & water stress ↗
  - Agricultural yields ↘ & food security ↗
  - Competing water use(r)s: agriculture, energy, drinking water
  - Uneven water distribution
- Response = 2 complementary projects:
  - Drought Observatory
  - Water-Energy-Food Nexus approach

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… Water-Energy-Food nexus

- key activities -

1) Modelling water resources allocations
   - Collection of multisectoral data
   - Farmers' surveys
   - Climate & hydrological data
   - Economic trade off among water allocations scenarios
   - Development of Water-Energy-Food Nexus index
2) Strengthening the (irrigated) coffee sector
   - Implementation of a decision-support tool: AquaCrop
   - Testing different irrigation scenarios (water savings)
   - Establishment of an irrigation advisory service
3) Remote sensing monitoring
   - Mapping the evolution of coffee plantations
   - Detecting areas under water stress
4) Capacity building

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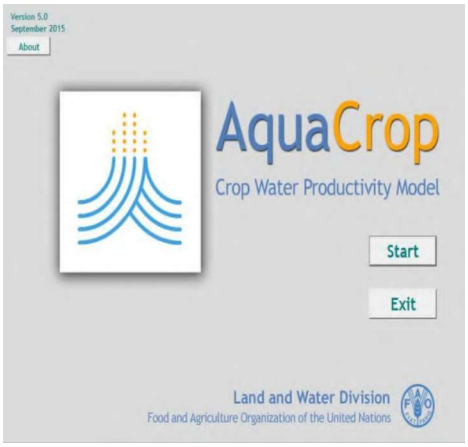
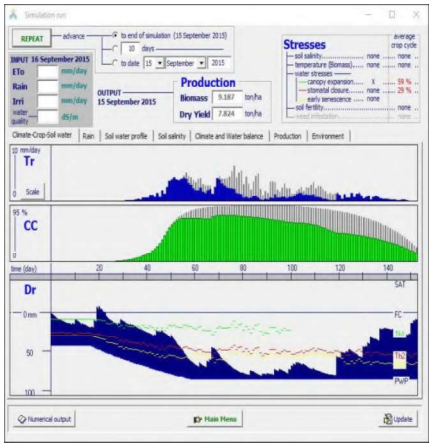
- intensification of (small holders) agriculture -

2.i AquaCrop

- bridging the gap between farmer and modeler (?) -





- Parcel level
- Root vegetables
  Fruits & grains
  Leafy vegetables

→

Impact: soil / plant / climate / management

⇕

water demand & consumption

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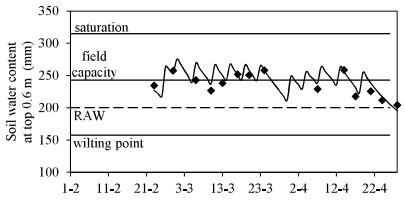
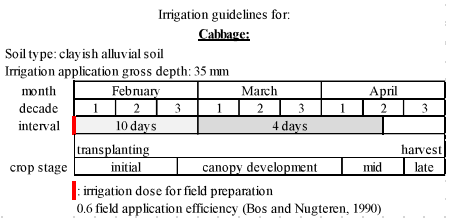
2.ii AquaCrop

- 'blanket' irrigation advice -

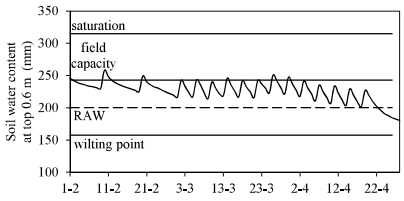


① Inefficient irrigation, Percolation losses.

Irrigation: 555 mm
Drained: 76 mm
Yield: 52 ton/ha



② Irrigation chart for cabbage, cultivated on a clayish soil, in the Bobo-Dioulasso region, Burkina Faso.



③ Efficient irrigation, No losses, Maximum yield.

Irrigation: 455 mm (-18%)
Drained: 1 mm
Yield: 53 ton/ha
(same period)

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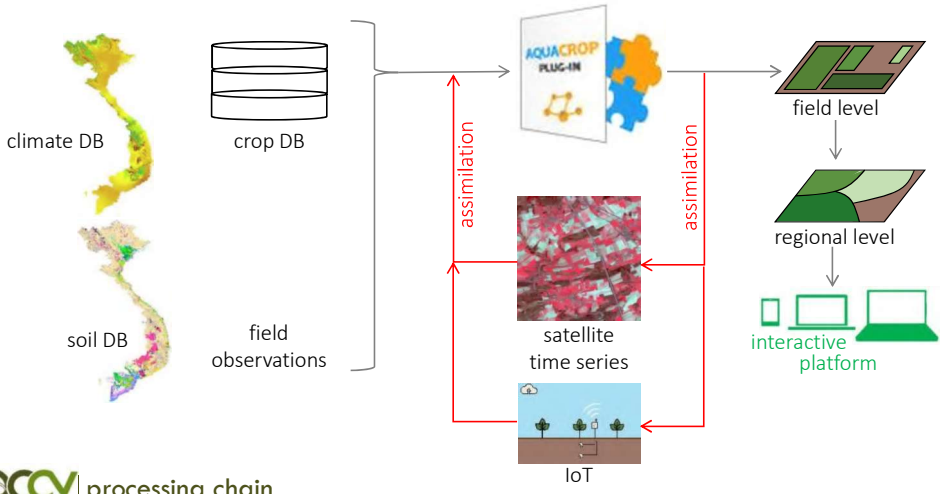
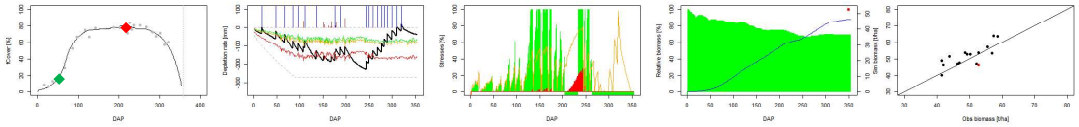
2.iii AquaCrop → PROCCY

- towards a regional approach -



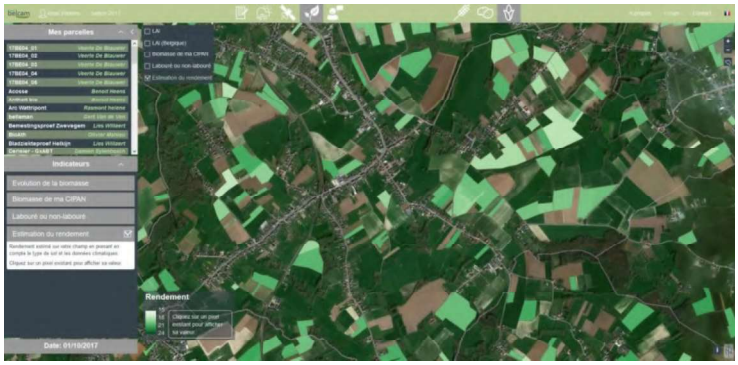
With a support of:

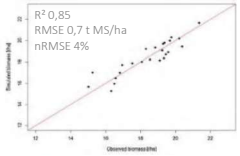
proccy processing chain for parcel & regional crop yield modelling | processing chain dashboard

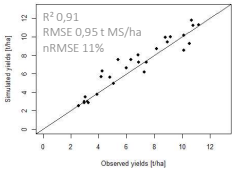


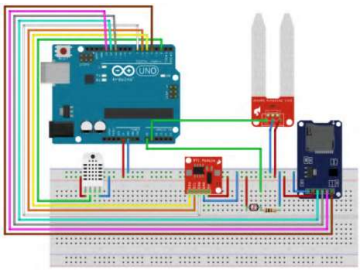
2.iv AquaCrop → PROCCY

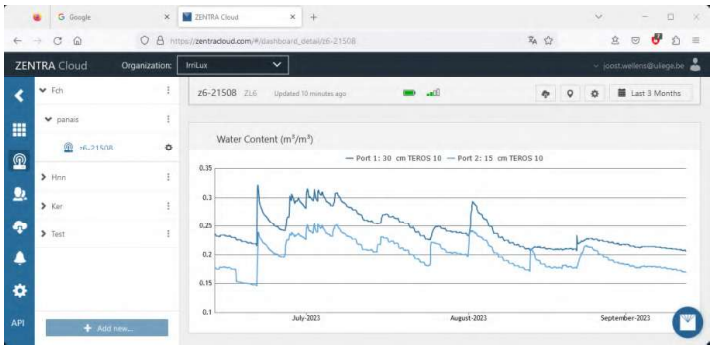
- towards a regional approach -











3.i Data for & by all

- making the invisible visible* -

* Srinivasan et al., 2022. AWM

- Commercial to amateur soil sensors
  (1 000 €/field to 200 €/field)
- Improved water use through improved information use !
- Co-learning = cognitive & operational evolution

3.ii Irrigation management

- monitoring & co-learning -

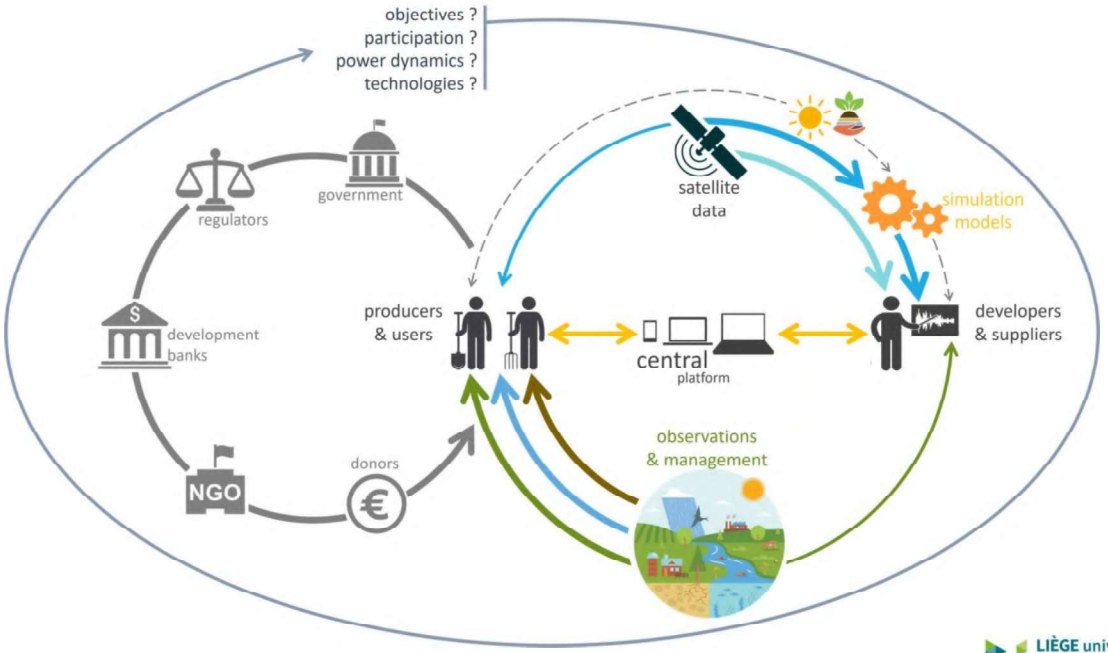




- water resources allocations between ≠ use(r)s -

4.i IWRM conceptual model

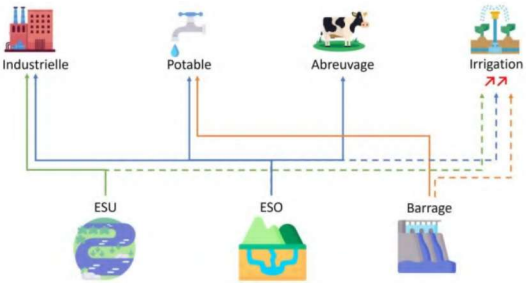
- 3 converging loops -

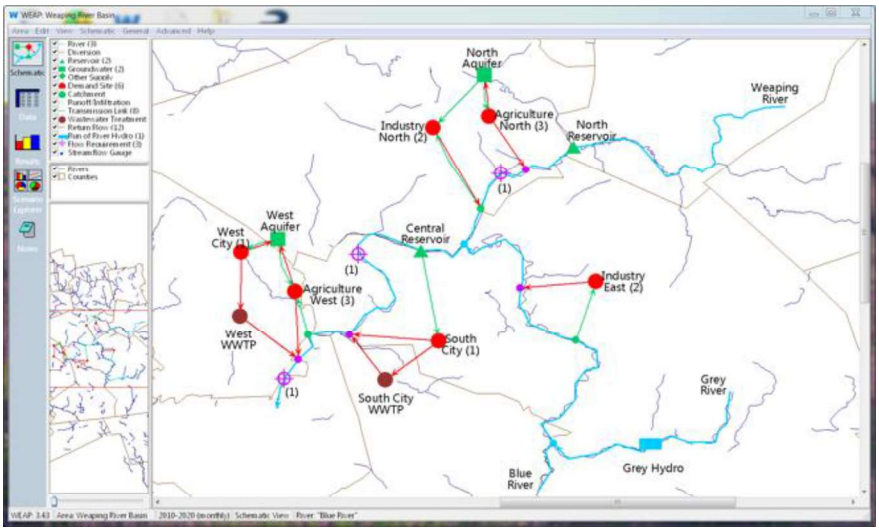


4.ii Modelling water resources allocations

- WEAP* -

* Water Evaluation & Planning System





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- co-learning -

5.i Capacity building

- AquaCrop training -

LE COURRIER DU VIETNAM

Société / Environnement

Des actions autour de la sécheresse et l'accès à l'eau dans l'agriculture

La sécheresse et l'approvisionnement en eau pour les plantations de café dans les hauts plateaux du Centre du Vietnam étaient les thèmes d'un séminaire qui s'est tenu mardi 21 février à Hanoi en présence des experts de Wallonie-Bruxelles et du Vietnam.

>> Renforcer la coopération entre le Vietnam et la Fédération Wallonie-Bruxelles

>> Vietnam - Wallonie-Bruxelles : 25 ans main dans la main

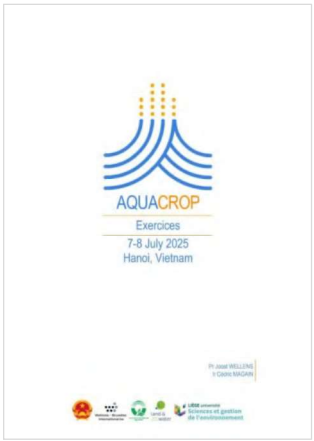
>> Le Vietnam, partenaire prioritaire de la Communauté française de Belgique

Le séminaire scientifique a vu la participation des experts de Wallonie-Bruxelles et vietnamiens.

Photo : Vân Anh/CVN

La Délégation générale Wallonie-Bruxelles au Vietnam, en collaboration avec l'Université de Liège (ULG), l'Université d'industrie de Hô Chi Minh-Ville (UIH) et l'Institut national de planification et projection agricoles (NIAPP), a organisé le séminaire intitulé "Sécheresse : demande, capacité et approvisionnement en eau pour les plantations de café dans les hauts plateaux du Centre du Vietnam". Ce séminaire a pour but de faire le bilan du projet 2.21 : "Appui à la mise en place d'un observatoire de sécheresse", approuvé par la dixième session de la Commission mixte permanente (CMP 10) entre le Vietnam et Wallonie-Bruxelles. "Le séminaire permettra aux experts d'échanger sur les problématiques d'importance universelle.

Wallonie - Bruxelles International.be



AQUACROP

Exercices

7-8 July 2025

Hanoi, Vietnam

Introduction to AquaCrop

7 to 8 July 2025

Hanoi, Vietnam

Certificate of participation

The undersigned certify that: Thao N'Guyen

participated from July 7 to 8, 2025, in Hanoi, in a training course on

" Introduction to AquaCrop "

The training was funded by Wallonie-Bruxelles International (WBI) and organized by the National Institute of Agricultural Planning and Projection (NIAPP).

Training modules were elaborated by the University of Liège (Land & Water lab).

In witness whereof, this certificate is issued to serve as proof of participations.

July 8, 2025, Hanoi

Pr Joost Wellens	Ir Cédric Magain	Bui Hai Nam
University of Liège	University o Liège	Deputy Director General NIAPP

5.ii Capacity building

- AquaCrop training -

Thank you!

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