# Modelling the effect of field management on crop water productivity and catchment hydrology


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## The effect of improved field management

By 2050 we need to double the food production to feed the growing world population.

However, in many regions of the world water scarcity is or will become the main bottleneck for increasing crop productivity.

**Improved field management can be the key solution to produce 'more crop per drop'.**


Soil management


Mulches


Soil bunds

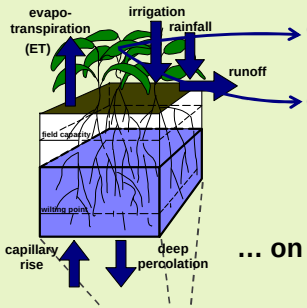

Fertility management


Runoff agriculture


Weed management

However, we need to assess the effect of field management…

**… on crop production at field scale**

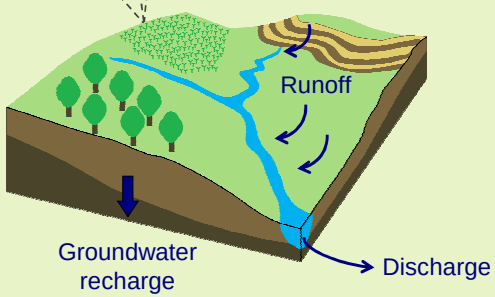



Crop biomass & yield

Crop water productivity

$$WP_{ET} = \frac{yield}{ET}$$

**… on catchment hydrology**




## Research objectives

**Development of an agro-hydrological model**

- Widely applicable
- Few parameters
- Intuitive input variables
- Applicable in regions with data limitations

**Simulation of the effect of field management**

- On hydrology and crop (water) productivity
- At catchment and field scale
- For current and future climatic conditions

## Linking crop and hydrological models

**AquaCrop crop water productivity model**

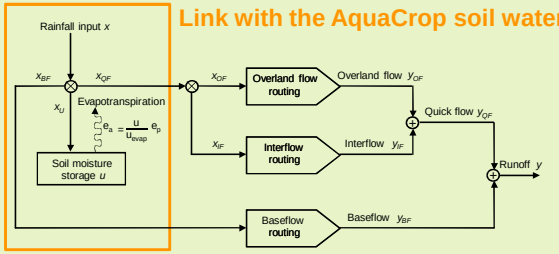
- Field scale - daily time step
- Climate, soil and crop input
- Field and/or irrigation management input
- Accurate yield and $WP_{ET}$ prediction
- Validated for different crops
- Valuable tool for water limiting conditions
- Climate change impact assessment

AQUACROP

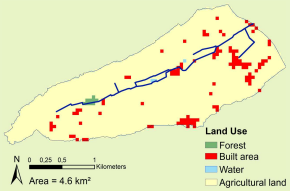
**VHM lumped conceptual hydrological model**

- Catchment scale - time step of day to minute
- Limited input requirements (climate data)
- Accurate discharge prediction
- Low computational time
- Climate change impact assessment

Link with the AquaCrop soil water balance




## Case study: Kruishoutem catchment, Belgium




Available data (2002-2009):

- Climate
- Discharge at outlet
- Land use (95% agriculture)
- Soil map
- Crop rotations at parcel level
- Average crop yield in region


**AquaCrop simulations for different field types**

Soil types x crop rotations = 23 field types

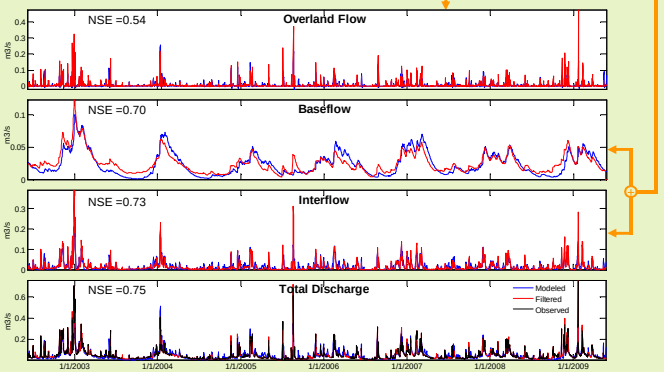
↳ 23 AquaCrop simulation runs for 2002-2009

↳ Weighted average of soil water balance

↳ Catchment soil water content, runoff, deep percolation

**VHM simulations for catchment**

Link models





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