



WULCA  
A LIFE CYCLE  
INITIATIVE PROJECT



# WULCA EQ meeting

September 30<sup>th</sup>, 2015

# Agenda

- **Reminder: what we aim and what we already have**
- **Objective of today's meeting: relevant water compartments of the FF model**
- **Next steps**



# What we aim

Change to a **less ambitious, more suitable objective**

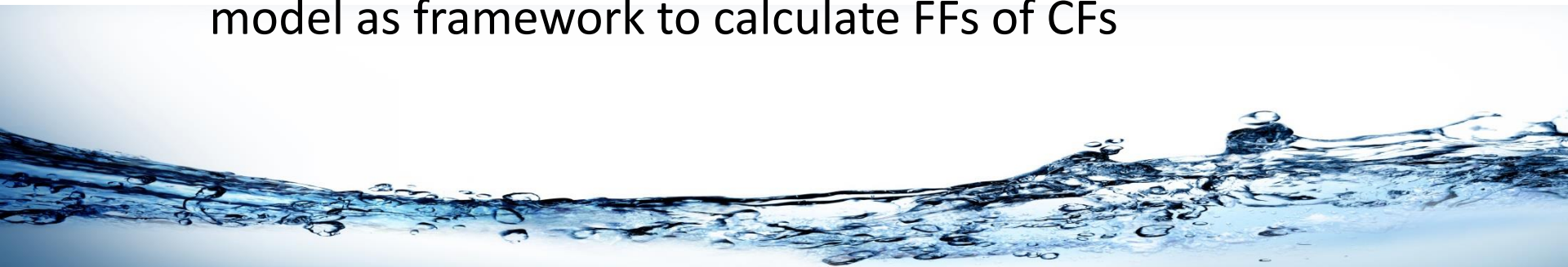
**From:**

To develop a framework to structure the EQ AoP within the water use impact category

**To:**

To identify prospects for improvement to structure the EQ AoP within the water use impact category

As a sub objective, we recommend the water compartment model as framework to calculate FFs of CFs

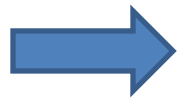


# What we already have

1. Introduction: limitation of current midpoint and endpoint methods justifies a change in the structure of current water use LCIA methods. This is the rationale behind this work
2. Materials and methods
  - Description of cause-effect pathways aimed to be covered in the new structure. From all the pathways (includes any emission to water and water consumption), the focus of this work is on water consumption
  - Structure of the CFs based on a sequence of sub-factors: this allows keeping track of exchanges between compartments and impacts allocated to every exchange

# Objective of today's meeting

Next steps from last meeting



Identify relevant water compartments of the water cycle, their boundaries, flows from/to other compartments.

- Define spatial resolution of the compartments and provide guidance on the temporal resolution of the flows

Water compartment	Relevant literature	Description	Flows in and out
Soil	(FAO/IIASA/ISRIC/ISS-CAS/JRC 2009) ...	. Soil-water content . Includes... . Omissions/simplifications (eg, amount of soil layers?) ...	→in: .precipitation from atmosphere ... →out: .evaporation from soil ...
Shallow aquifer	(Fan et al 2013) ...	...	→in: infiltration and flows from upstream ... →out: artesian and other wells, exfiltration to surface waterbodies direct evaporation through soil, evapotranspiration through plants
Deep aquifer	TO BE COMPLETED	TO BE COMPLETED	In: infiltration from above Out: exfiltration
Surface water bodies	TO BE COMPLETED	TO BE COMPLETED	In: precipitation, surface run-off/melt, exfiltration Out: infiltration into soil, evaporation, plant uptake, human abstractions
...TO BE COMPLETED	TO BE COMPLETED	TO BE COMPLETED	TO BE COMPLETED



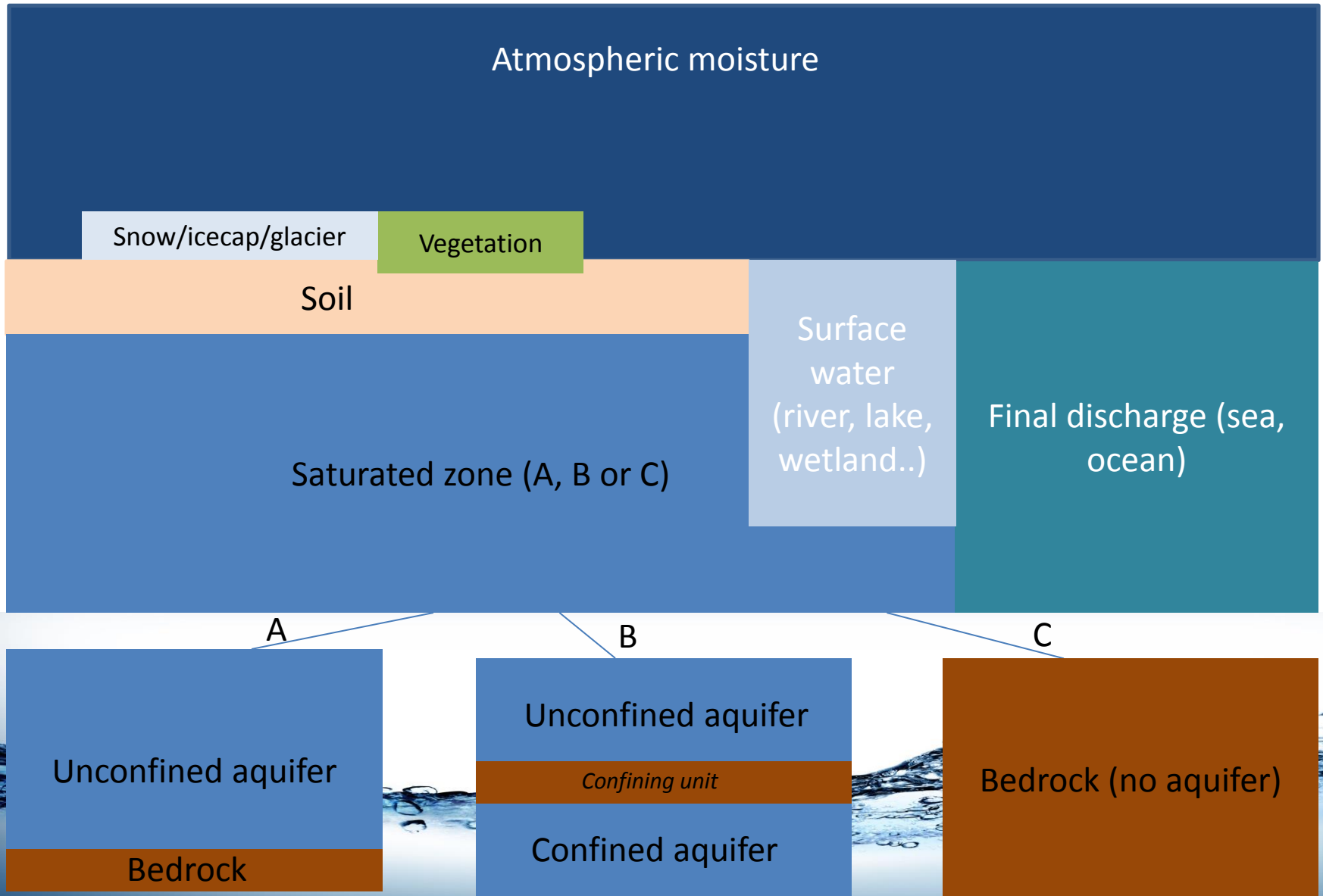
# FF: water compartment model setup

**Definition:** water mass balance that reproduces the propagation of the water flow between compartments of the hydrological cycle (in a given temporal scale → next meeting)

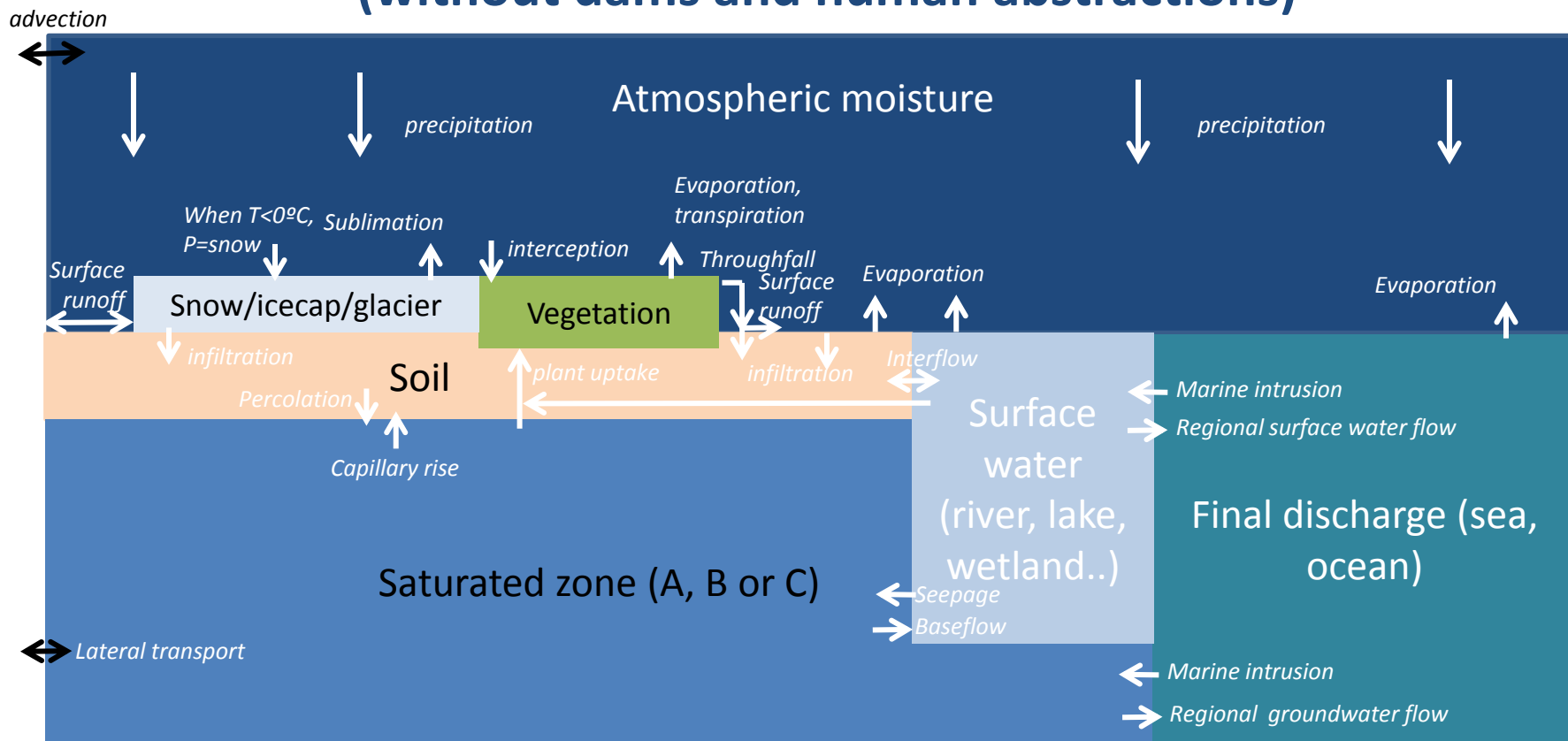
- Different levels of sophistication of the FF model, from simpler to more complex versions
- The simpler (yet relevant) version is based on the general architecture of Global Hydrological Models (eg: WaterGAP) and specialized literature on climate-land-surface-subsurface interactions



# Water compartments in the simplified FF model



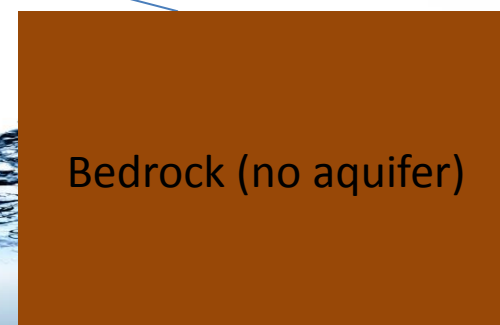
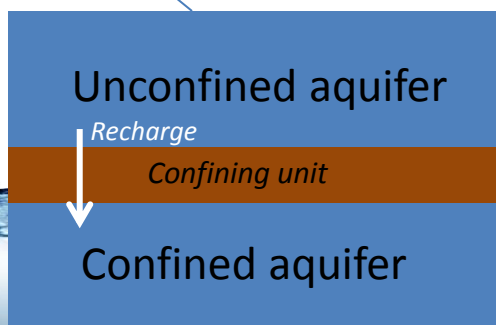
# Water flows between compartments in the simplified FF model (without dams and human abstractions)



A

B

C





# General questions around the FF model

## 1. Which world shall we represent?

A contemporary water balance (ie actual land use cover)...

- a) under natural water conditions (without dams and human extractions)
- b) under anthropogenic influence (with dams and human extractions)
- c) without human abstractions but with dams

Or propose the 3 options as possible, specifying the water compartments and fluxes in and out each FF model (a, b, c), and leave the selection for future developers

# General questions around the FF model

## 2. Shall we identify the most relevant flows between compartments in the simplified model?

For most of the flows, the relevance (in terms of water mass) relies on local conditions → **difficult prioritization worldwide**. Eg: river seepage is more important in arid areas and baseflow in humid areas

Other flows are less relevant for freshwater use related LCIA models, eg: seawater evaporation

Finally, other flows are quantitatively less important in a simplified model and may be left for further elaborated models. Eg: recharge of confined aquifers, plant harvesting -in the FF model with human extractions-

# Specific questions around the FF model

## 1. Shall we include a deep (confined) aquifer in the simplified FF model?

In the simplified model, I assumed that confined aquifers are disconnected from the rest of compartments (without human influence!) , so it should not make sense to include confined aquifers in a model that aims to show interconnections between compartments.

This is not true anymore with human extractions and the setup of more complex FF models with flows in (infiltration) and flows out (baseflow to rivers)

# Specific questions around the FF model

*→ Go through the FF model.docx for comments on every specific compartment*



# Next steps

- Identify relevant water compartments of the water cycle, their boundaries, flows from/to other compartments → finish
- Define spatial resolution of the compartments and provide guidance on the temporal resolution of the flows
  - How to consider consumption for a short time period? (withdrawal and release in the same compartment)
  - Temporal resolution : time horizon? Steady-state? Inter-annual as well?







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Thanks