

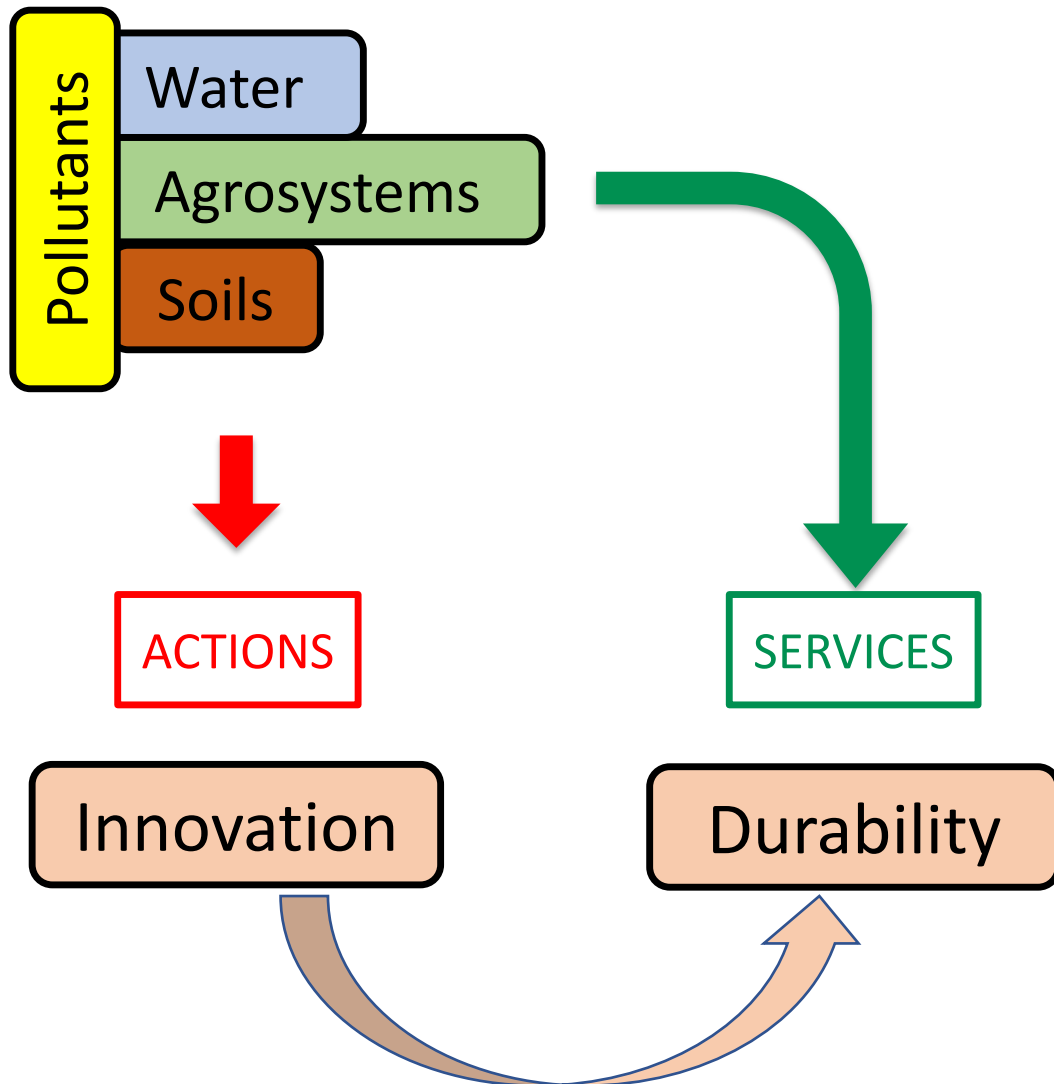
# ALTOS Monitoring Board - Meeting #1: project overview

- Societal challenges, overall and specific objectives
- Methodological challenges
- Experimental and methodological strategies, available assets
- Results dissemination and exploitation
- Activity structuration (WPs overview)
- Deliverables & Milestones (to be revisited due to credit diminution)
- Governance structure

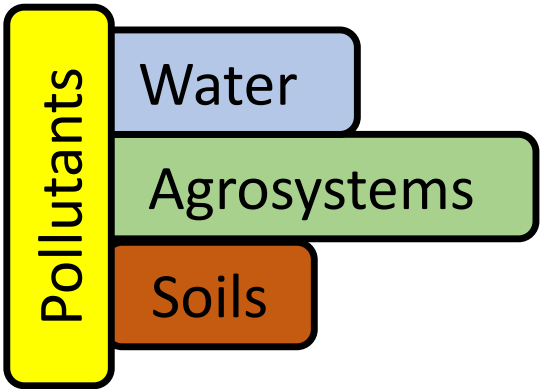
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# ALTOS: innovative actions & durability



# ALTOS: innovative actions



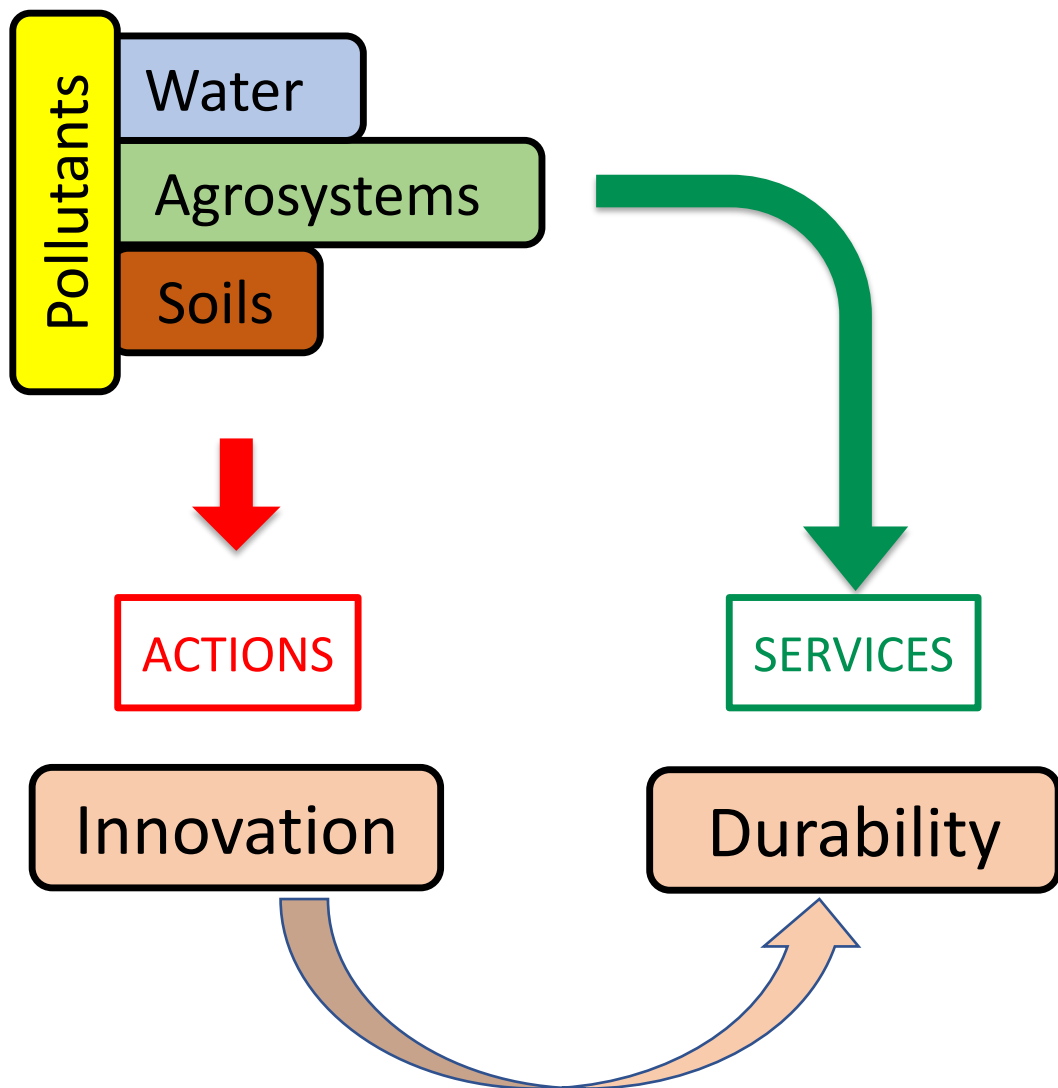
**ACTIONS**

**Innovation**  
Gaining from  
spatial structures  
and connectivities

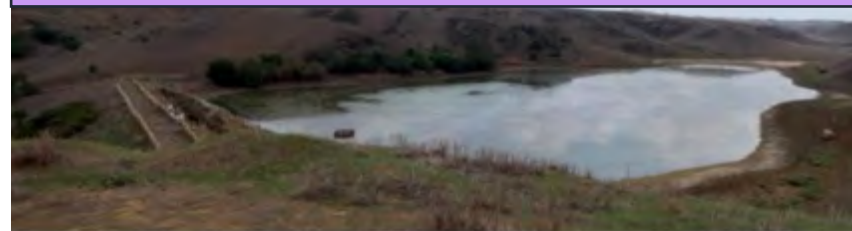
This block contains four diagrams illustrating innovative actions:

- Land use & downstream refill:** A 3D cross-section of a watershed showing a central river channel and tributaries. The land is divided into various colored zones (green, yellow, purple, brown) representing different land uses. A blue line indicates the water flow path.
- Vegetation & hydraulic lift:** A diagram showing a central tree with roots extending down to a "WET" zone. Blue arrows show water being pulled up from the wet zone and then distributed to other trees in "DRY" zones.
- Reservoirs & aquifer refill:** A cross-section of a landscape with a central reservoir. Rain (inflow) is shown falling on the surrounding green hills. Arrows indicate water infiltrating into the ground (infiltration) and then moving towards the reservoir.
- Vegetation & water consumption:** A photograph of an olive grove with black plastic mulch covering the ground between the trees.

# ALTOS: durability



Harvesting potable & irrigation water



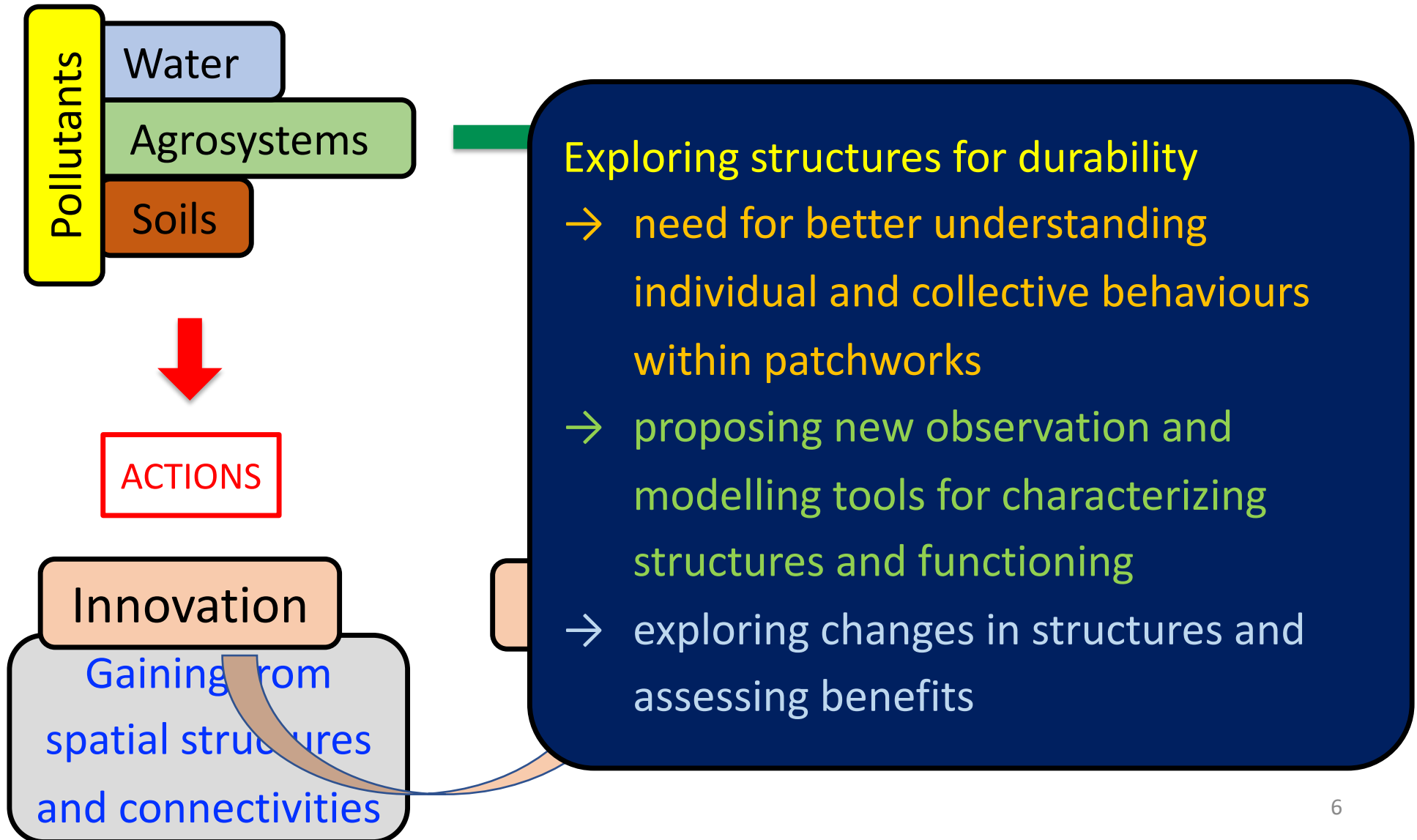
Enhancing crop production



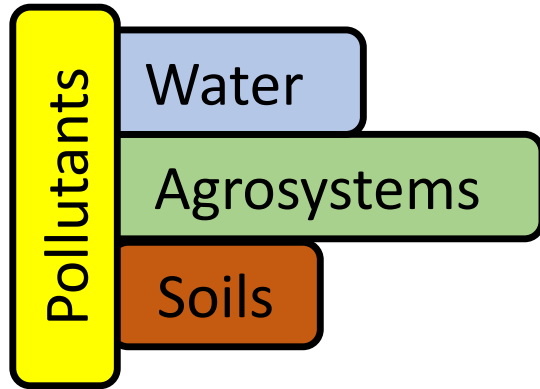
Minimising contaminations



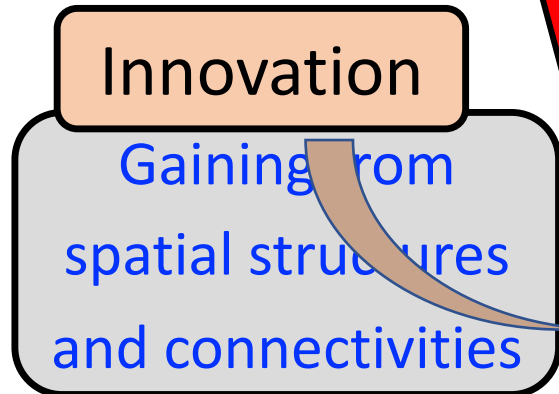
# ALTOS: spatial structures & connectivities



# ALTOS: spatial structures & connectivities



ACTIONS



A large dark blue rounded rectangle contains text. A red banner with white text is overlaid diagonally across it.

Exploring structures for durability  
→ need for better understanding of individual components and their interactions and  
developing tools for characterizing structures and functioning  
→ exploring changes in structures and assessing benefits

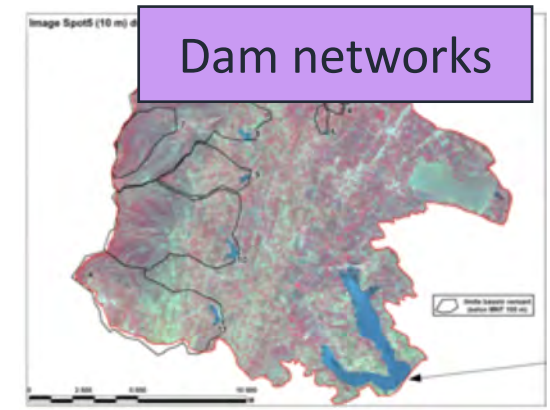
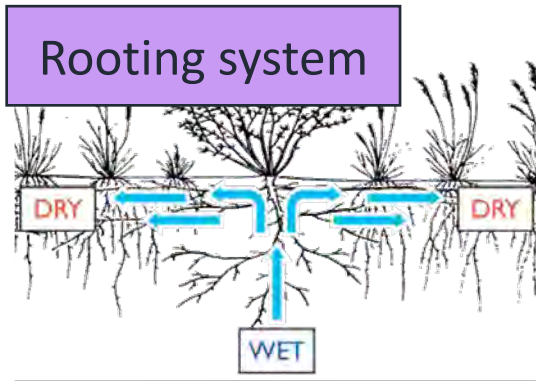
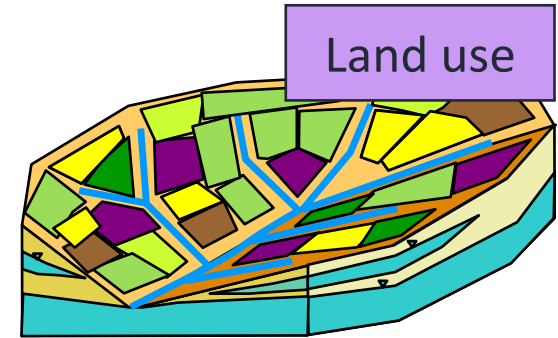
**• Sustain efforts on recent progresses**  
**• Capitalizing on recent progresses**

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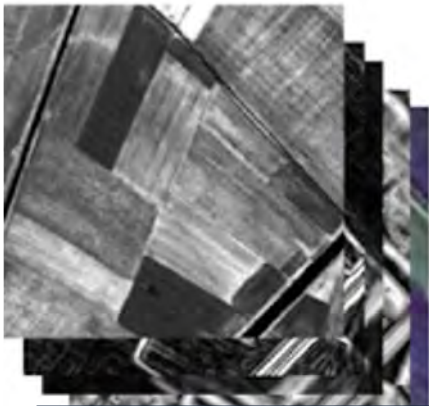
# ALTOS: structures and scales



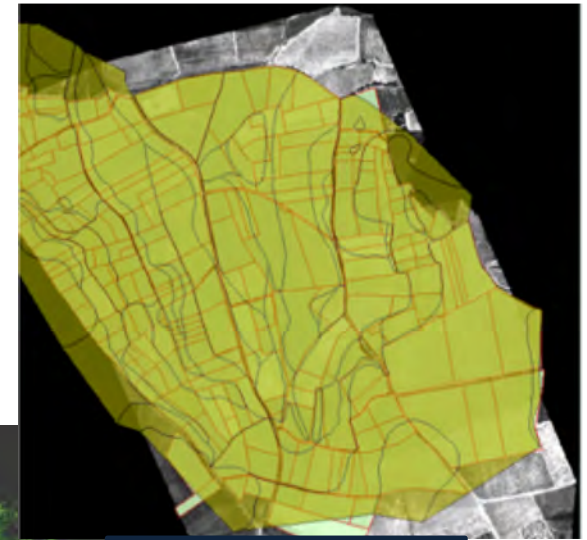
SPATIAL SCALE

# ALTOS: methodological challenges in monitoring

Photogrammetry



Multi-temporal high resolution imagery



Digital representation



# ALTOS: methodological challenges in monitoring

3D water fluxes for vegetation



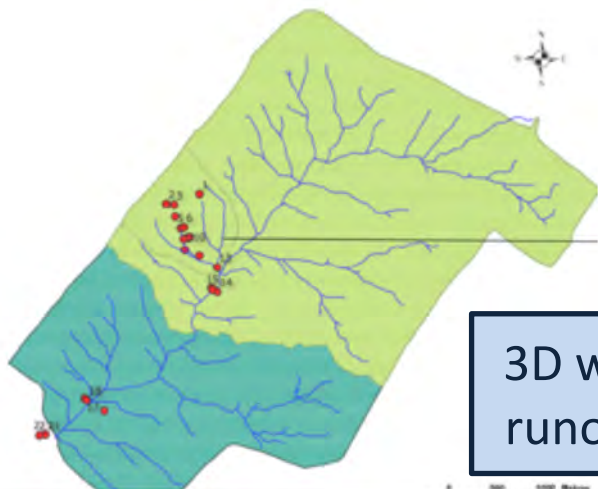
(a)

(b)

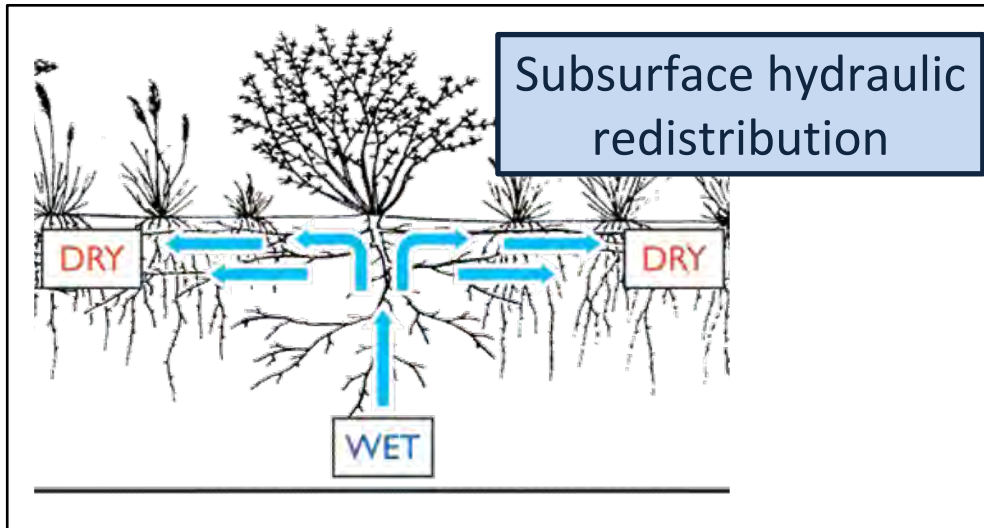
Nested hydrological measurements



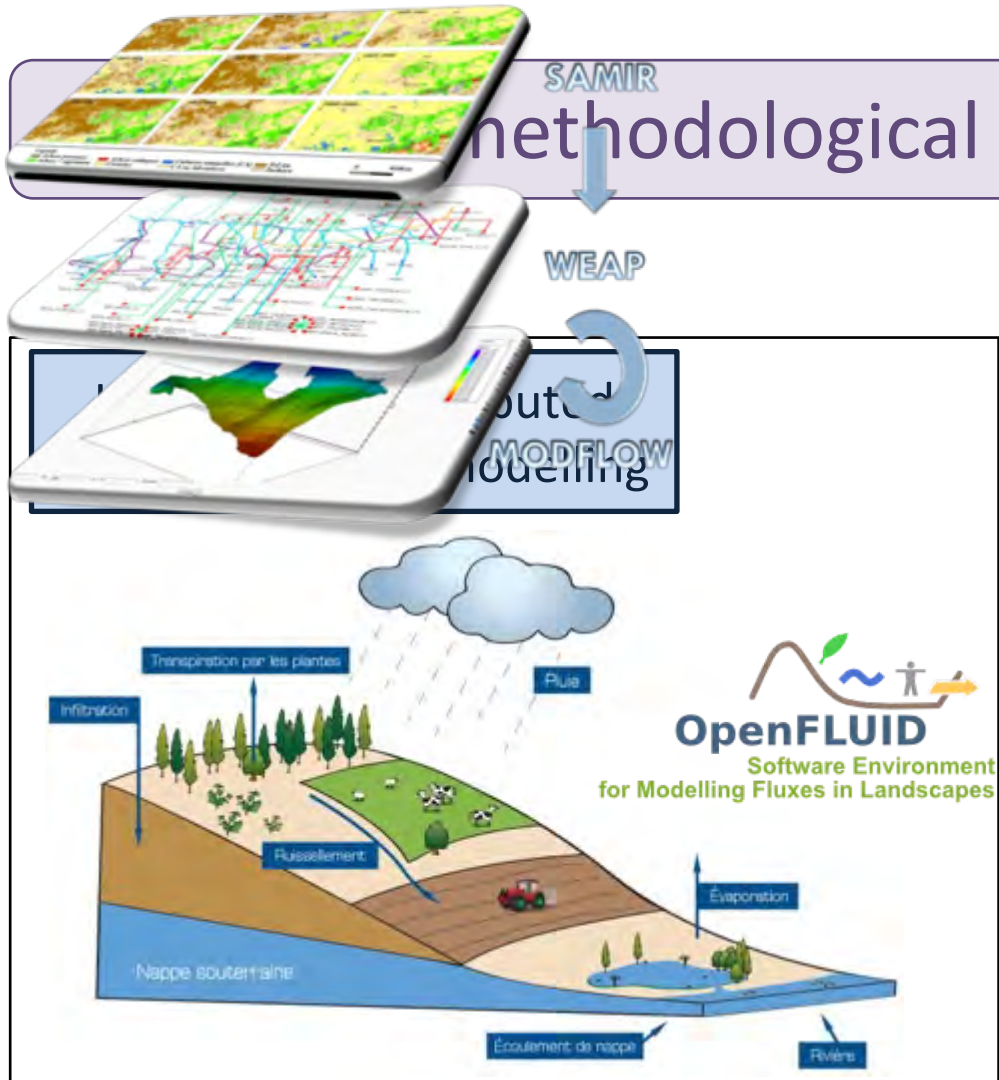
3D water fluxes for runoff / infiltration



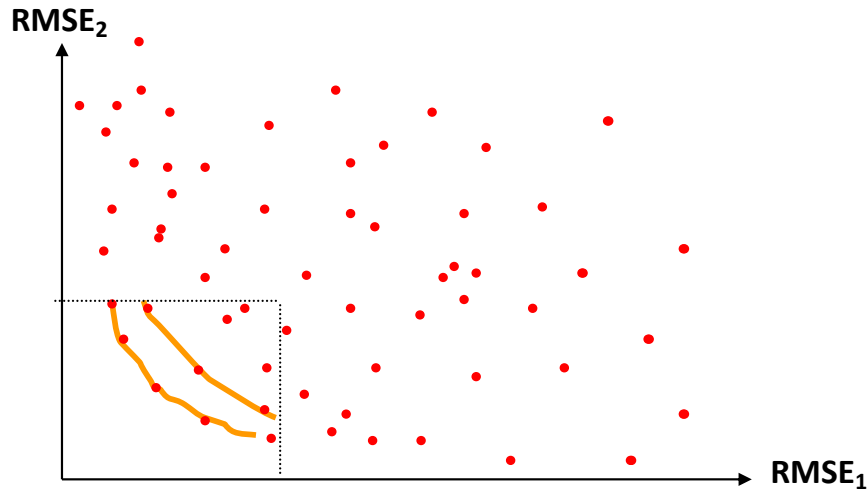
# ALTOS: methodological challenges in modelling



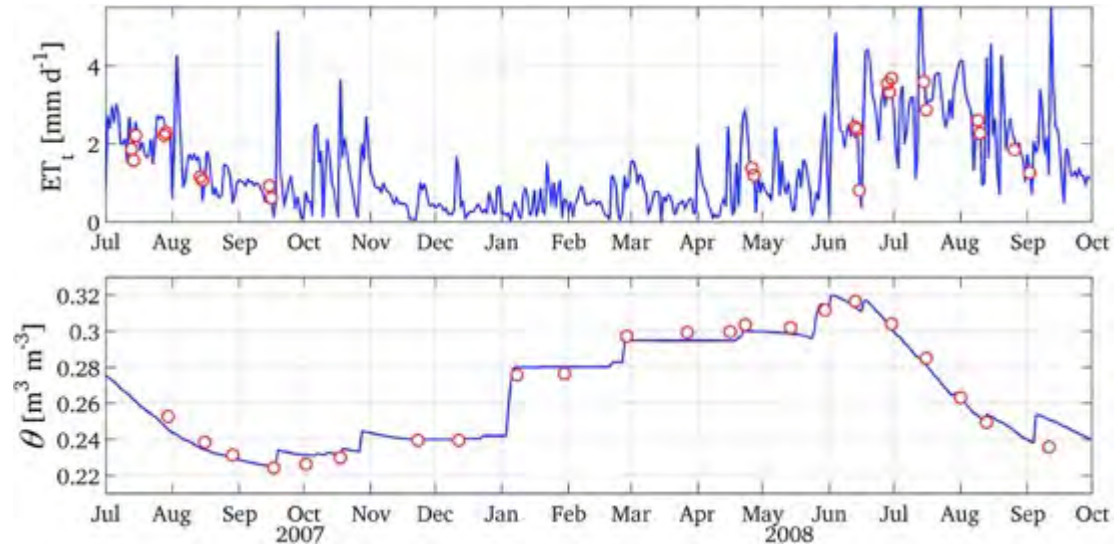
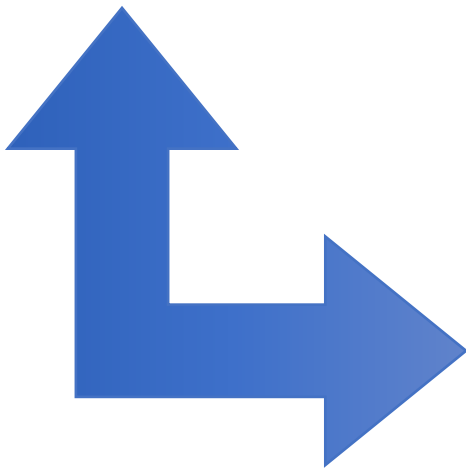
# Methodological challenges in modelling



# ALTOS: methodological challenges in modelling



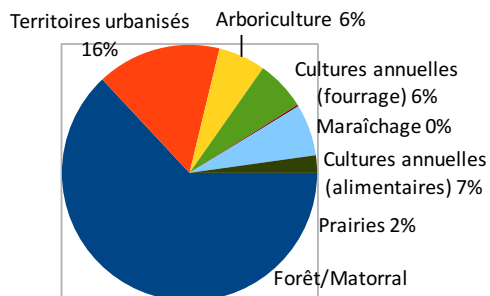
Multicriteria and multi-objective calibration



# ALTOS: methodological challenges in scenarios

Régional trends  
[qualitative / narrative]

Sub-regional trends  
[qualitative estimates]

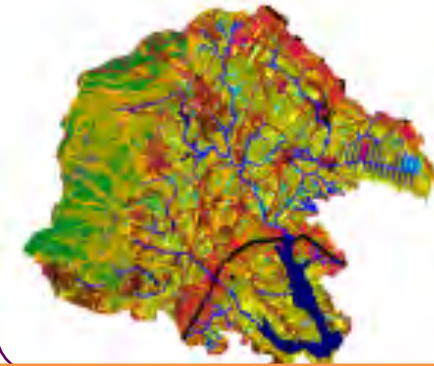


Spatial  
distribution



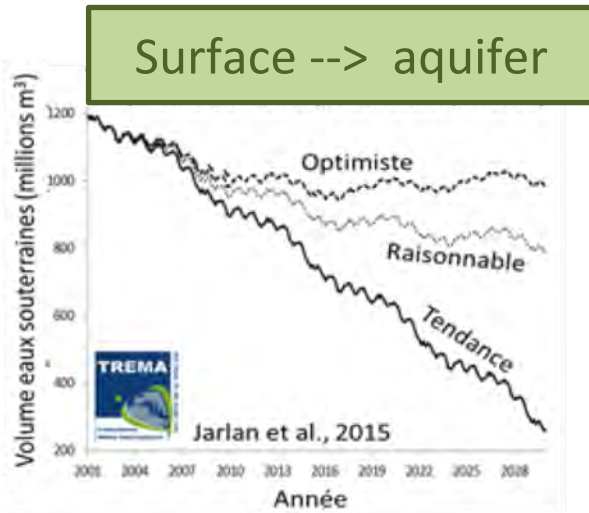
Constraints fields  
(topography, soils)

Local trends  
[field scale]



Debating via  
participative protocols

# ALTOS: methodological challenges in **assessment**



Impact  
assessment



Participative  
protocols



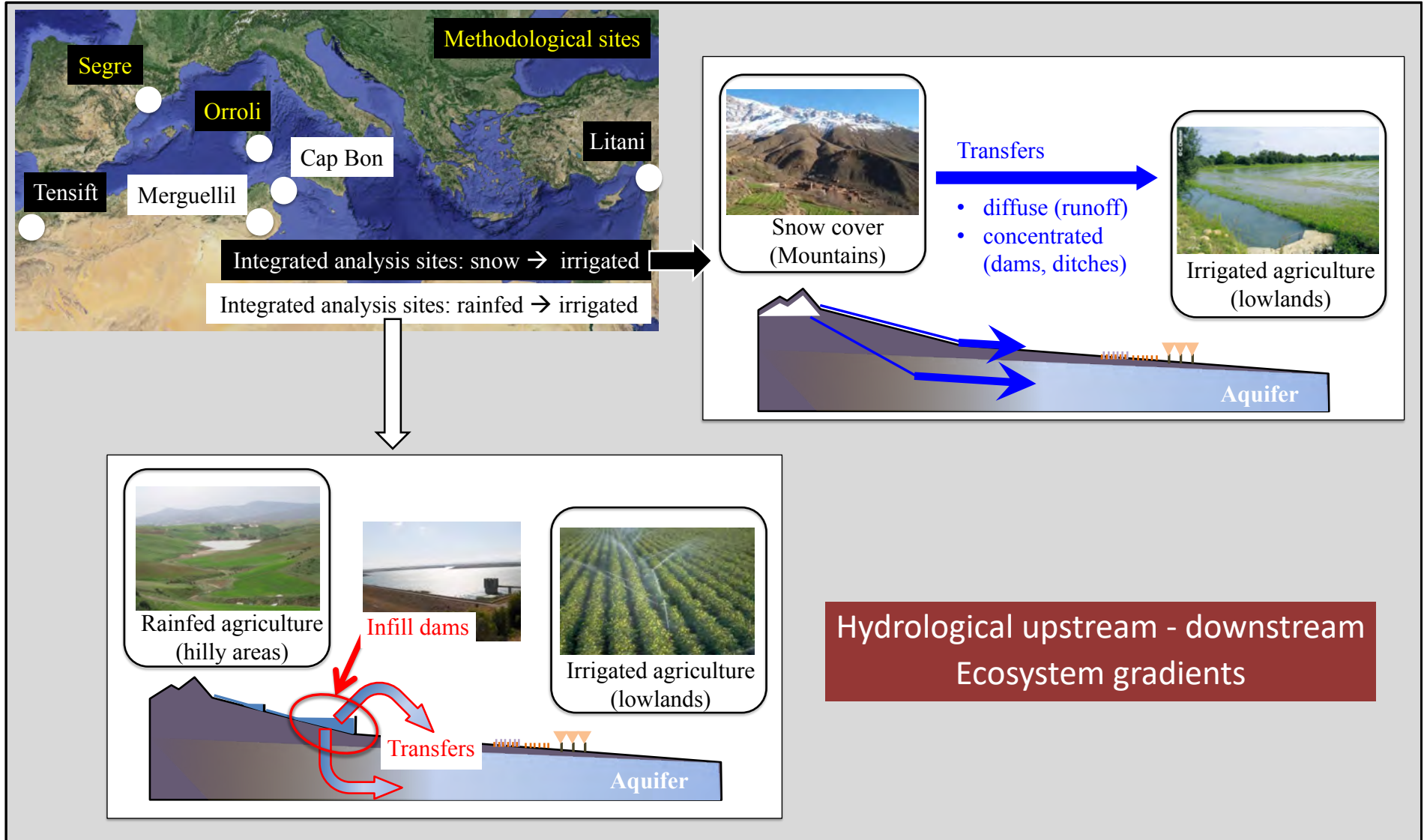
Upstream --> downstream



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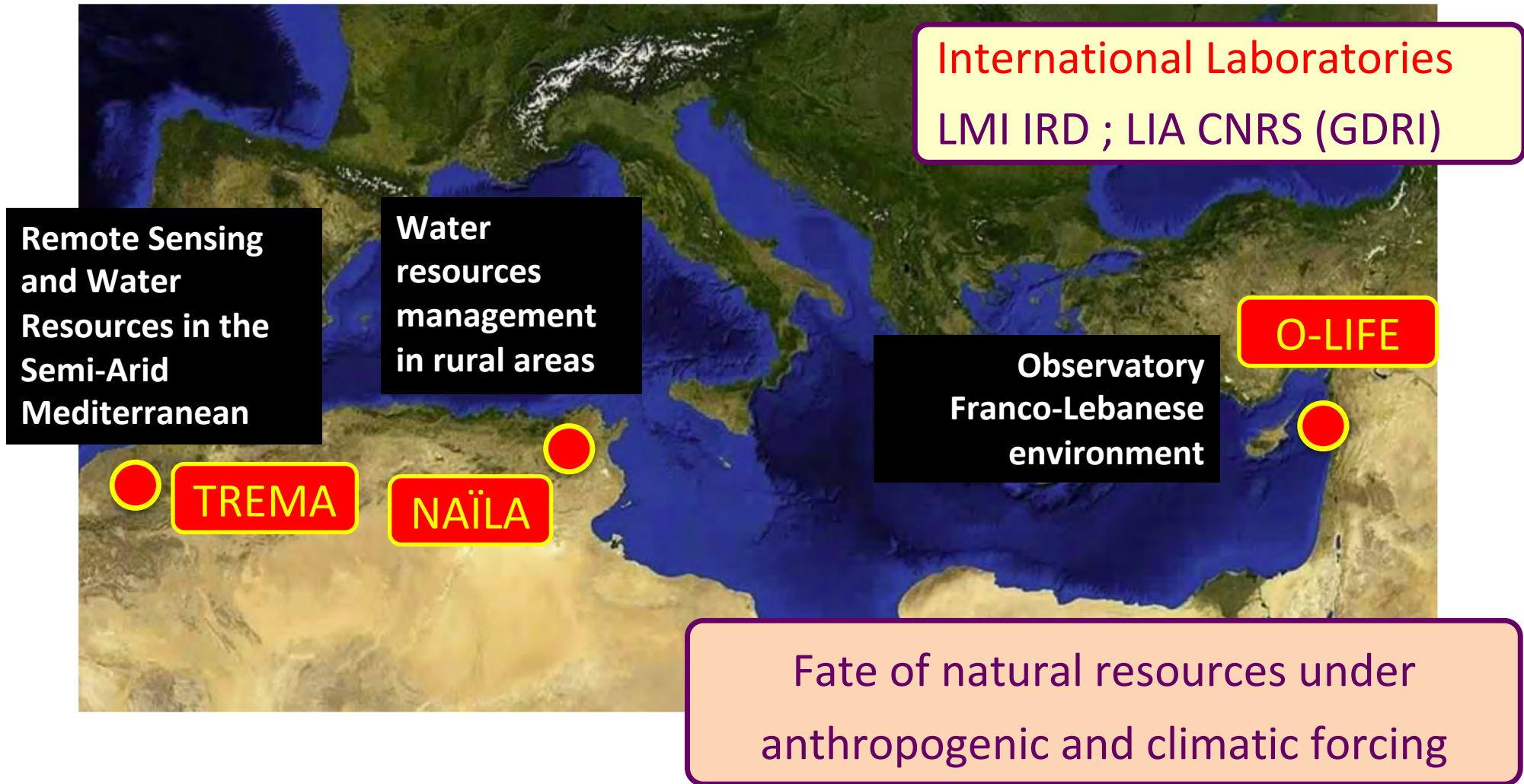
# ALTOS: study sites



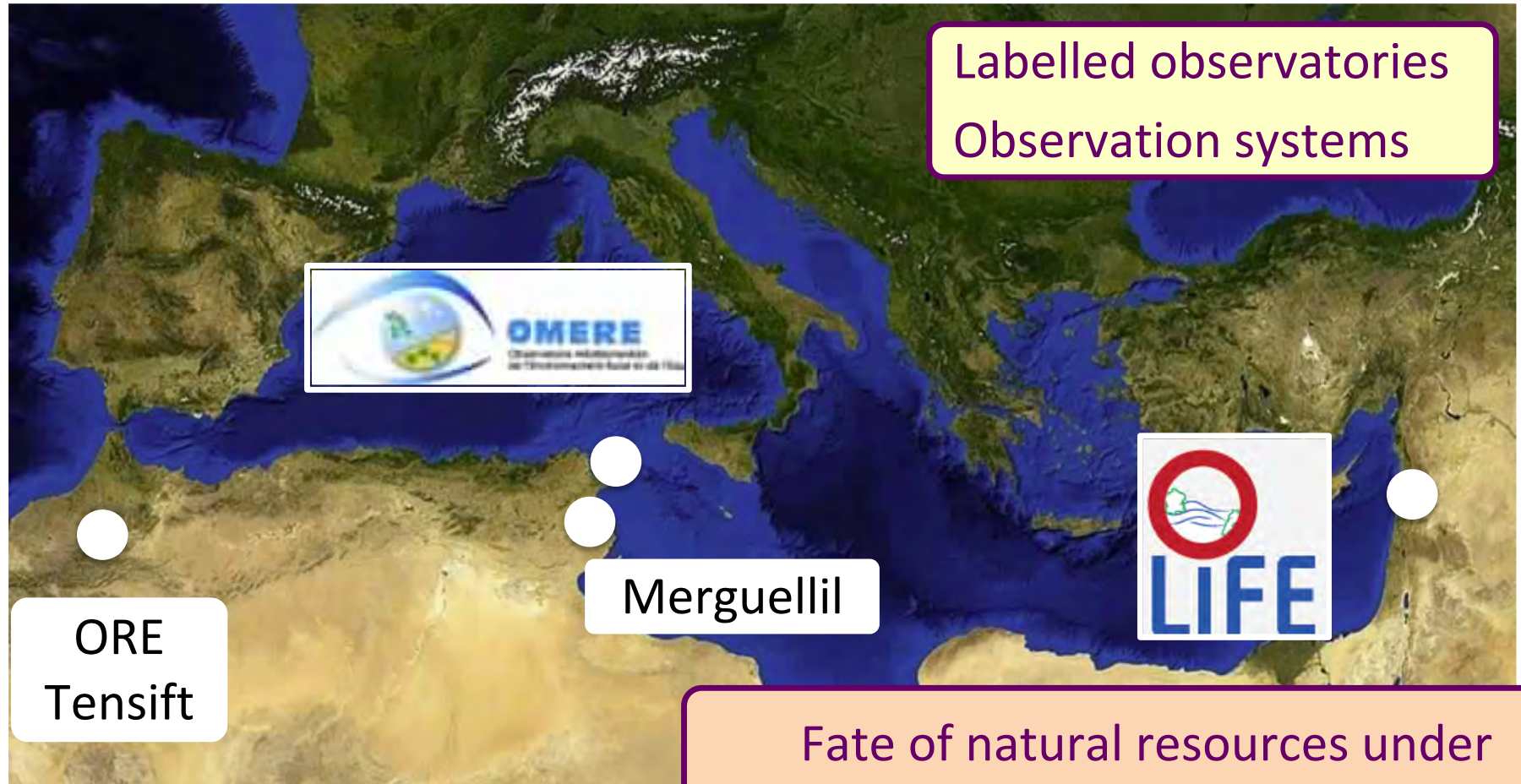
# ALTOS: study sites

	Catchments of interest (UP stands for upstream part, DW stands for downstream part)			
Features	Merguellil Centre-Eastern Tunisia	Cap Bon North-Eastern Tunisia	Tensift Central Morocco	Bekaa Eastern Lebanon
Climate	Semi-arid.	Sub-humid / Semi-arid.	Sub-humid / Semi-arid.	Sub-humid / Semi-arid.
Soils	UP: immature, calcimagnesian and isohumic soils. DW: sandy / silty-clay soils.	UP: regosols / vertisols with sandstone / marl outcrops. DW: calcisols on Tyrrhenian deposits	UP: shallow mineral soils. DW: loamy soils on alluvial deposits.	Thick / heavy soil sequence.
Crops	UP: mixed crops, olive trees, rangelands. DW: annual crops, orchards, cereals, gardening.		UP & DW: cereals, orchards. DW: olive trees.	Irrigated summer crops, fruit trees.
Water supply & infrastructures	Overall trends are rainfed on upstream and irrigated on downstream.			Rainfed and irrigated.
	Infill dam, upstream network of hilly lakes, downstream groundwater boreholes.		UP: terraces, river based irrigation, dams. DW: groundwater boreholes.	River irrigation channels, groundwater boreholes.
Hydrological regime	Upstream wadies, branched out network with tributaries, aquifer refills by lakes / dams & irrigation.		Upstream infiltration → sub-surface flows → downstream aquifer.	Limited surface water. Private wells for groundwater pumping.
	Lake & dam drying, cracked aquifer under dam.	No dryness, porous aquifer under dam.		

# ALTOS: assets / international joint laboratories



# ALTOS: environmental observatories



Labelled observatories  
Observation systems



ORE  
Tensift

Merguellil



Fate of natural resources under  
anthropogenic and climatic forcing

# ALTOS: previous projects

MISTRALS SICMED (M, T)	MTC	P	Monitoring and modelling tools for structures and functioning.
ANR DIGISOL-HYMED (T)		P	Remote sensing methods for mapping soil properties.
EU RISE REC (M, F)		P	Multi-sensor methods for monitoring soil moisture.
ANR AMETHYST (M + T, 2014 - 2018)		P	Integrated analysis: coevolutions of water uses and resources.
FP7-AFRICA-2010 EAU4Food (M + T, 2011-2015).			Participative seminars about practices for increasing irrigated farming food production.
ANR ALMIRA (M + T, 2014 - 2018)		C	Integrated analysis: impacts of land use changes on yield & hydro-erosive fluxes.
ARIMNet 2 VIANA (T + L, 2018 - 2020)		C	Land use related to adoption of agroecological solutions for small irrigated farming.
ERANET-MED CHAAMS (T + M + L, 2019 - 2021)		C	Past & current trends on land use & water governance. Process model calibration.
SAGESSE (M, 2016-2019)		C	Design of decision support systems for water resource management.
Irrig-Bekaa (L, 2016-2019)		C	Methods for quantifying water use by irrigated crops.
CNES / THEIA Sentinel-2 (T, 2016 - 2020)		C	Availability of Sentinel-2 data over Tunisia once pre-processed by French Space Agency.
MISTRALS HighLandDEM (T, 2017 - 2018)		C	Methodologies for producing high spatial resolution DEM.
H2020 VISCA (S, 2017- 2019)		C	Modelling vineyards phenological trend under climate change.

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# ALTOS :Results dissemination and exploitation

- Knowledge management strategy
- Data management plan



# ALTOS :Results dissemination and exploitation

Table 2.3 (to be continued). Panel of specific actions to be conducted for transferring ALTOS outcomes towards targeted stakeholders.

Targeted audience→ Products ↓	National directorates (link with ministries)	Regional directorates (link with governorates and farmers)	Farmer / water user associations.	Engineering offices	Academics	NGOs and think tanks	National and international organisations
Monitoring protocols (WP1 & WP2)	<ul style="list-style-type: none"> <li>• Databases and technical reports about                             <ul style="list-style-type: none"> <li>○ infrastructures (reservoir geometries, soil maps);</li> <li>○ fluxes and storages (aquifer levels, reservoir filling, chemical contents).</li> </ul> </li> <li>• Trainings on monitoring systems setup with observatories.</li> </ul>						Databases for country reports on climate change
Data processing algorithms (WP1 & WP2)	<ul style="list-style-type: none"> <li>• Trainings.</li> <li>• User manuals.</li> <li>• GITHUB platforms.</li> <li>• Support to get started.</li> </ul>			<ul style="list-style-type: none"> <li>• Trainings.</li> <li>• User manuals.</li> <li>• GITHUB platforms.</li> </ul>	<ul style="list-style-type: none"> <li>• Publications.</li> <li>• Online databases / user manuals &amp; GITHUB platforms.</li> <li>• Advanced trainings.</li> </ul>		
Open source models (WP3)							
Simulation tools (WP3)							

# ALTOS :Results dissemination and exploitation

Table 2.3 (continued). Panel of specific actions to be conducted for transferring ALTOS outcomes towards targeted stakeholders.

Targeted audience→ Products ↓	National directorates (link with ministries)	Regional directorates (link with governorates and farmers)	Farmer / water user associations.	Engineering offices	Academics	NGOs and think tanks	National and international organisations
Build and assessment of management methods (WP4)	<ul style="list-style-type: none"> <li>• Database</li> <li>• Technical reports from simulation analysis</li> <li>• Policy briefs on catchment management from participative seminars.</li> </ul>				<ul style="list-style-type: none"> <li>• Publications.</li> <li>• Advanced trainings.</li> </ul>	<ul style="list-style-type: none"> <li>• Technical reports from simulation analysis</li> <li>• Policy briefs on catchment management from participative seminars.</li> </ul>	Policy brief on irrigated and rainfed systems
Expertise (WP4)	Tailored						

# ALTOS :Results dissemination and exploitation



[Home](#)

Search

## Project presentation

The ALTOS project aims to improve water management models for rainfed and irrigated agriculture, by considering the modulation of spatial structures and connectivities induced by hydro-agricultural infrastructures and practices (e.g., modulating regional land use to drive upstream / downstream water repartition).

Four study sites are considered for integrated analysis in Morocco, Lebanon and Tunisia; and two study sites are considered for methodological developments in Spain and Italy.

WP1 deals with monitoring and modelling tools for characterizing spatial structures. It includes the use of innovative sensors for structure observations, and of innovative methods for data processing.

WP2 addresses innovative monitoring tools for characterizing processes induced by spatial structures (e.g., water flows). It includes several protocols relying on complementary measurements.

WP3 addresses innovative modelling for simulating individual (e.g., evapotranspiration) and combined (e.g., hydrological cycle) processes. It includes multi-objectives / multi-criteria calibration procedures relying on distributed / nested measurements.

WP4 simulates matter fluxes and storages for possible structure modulations, to next conduct an integrated analysis with end-users on the basis of participative seminars. It also cross-analyses irrigated and rainfed agrosystems, by addressing vulnerabilities and adaptation margins.

WP5 deals with (1) the sharing of data and methods within the ALTOS consortium, and (2) the results dissemination and exploitation. For this latter item, we rely on long-term collaborations with several stakeholders (farmer associations, resource managers, engineering offices). Expected outcomes are related to SDG #2 (sustainable agriculture), #6 (water supply services), and #12 (responsible consumption and production).

ALTOS contributes to PRIMA outcome indicators, including (1) newly modelling routines, (2) new irrigation technologies, and (3) innovative farming system.

[Read more](#)



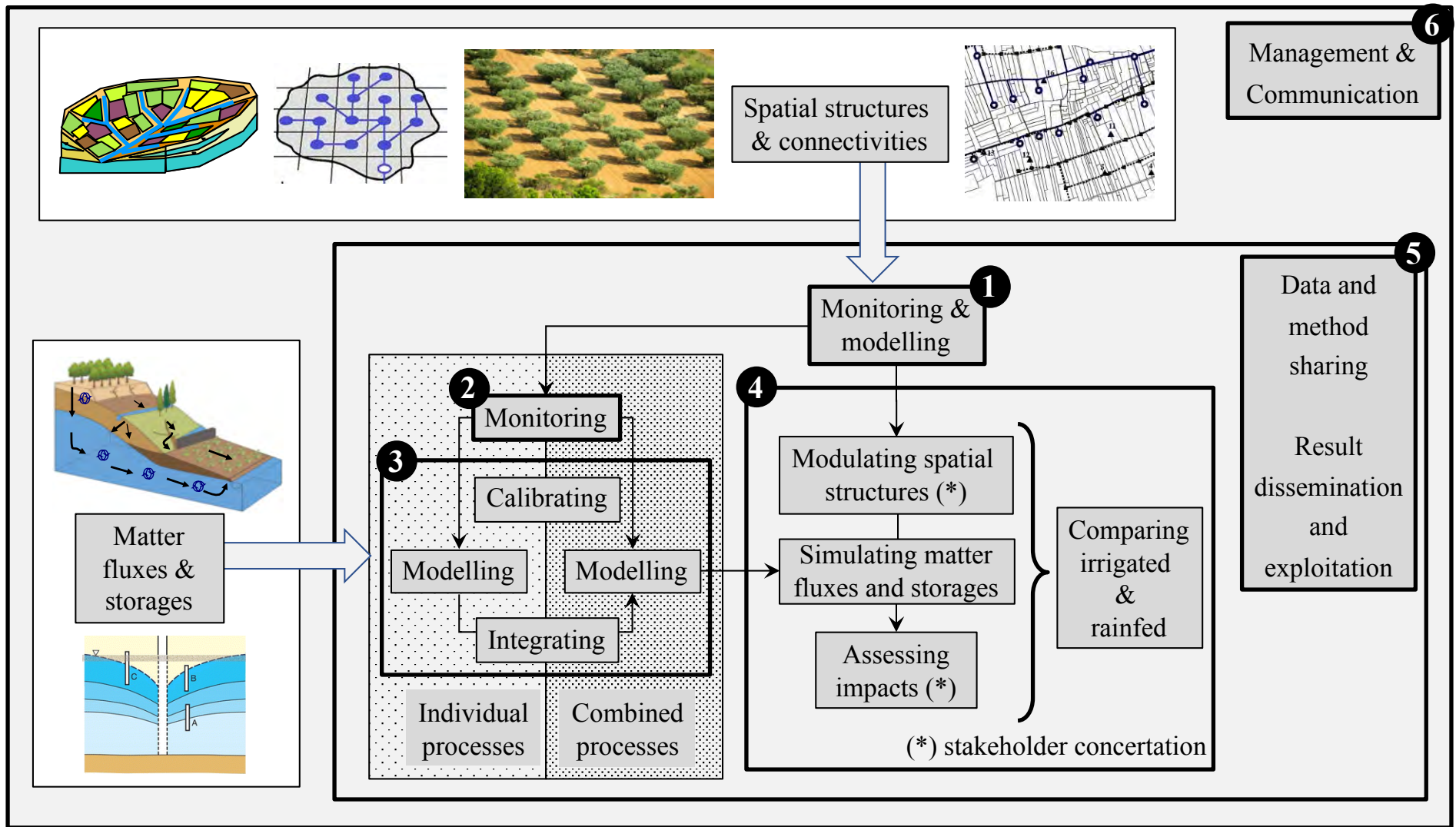
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# ALTOS: activity structuration



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- To be presented and discussed on tomorrow

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- MCT (leader + PM): monitoring work progress with regard to deliverables and milestone calendar, interacting with PRIMA office about ALTOS. Gather when necessary.
- MB (MCT + partners representatives + task leaders): monitoring strategic steering, make arbitration and final decision if necessary. Gather every 6 months and when necessary.
- Started last year with CA, and today with first MB meeting, to be continues as defined in project.