

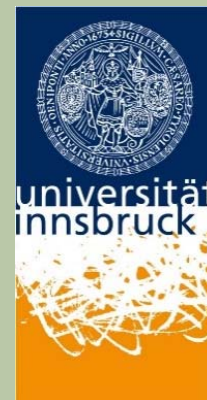
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UNDERSTANDING THE ANTHROPOGENIC AND NATURAL DRIVERS OF WATER BALANCE IN CHANGING ALPINE GRASSLANDS USING A NETWORK OF SMALL-SCALE LYSIMETERS

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TERENO conference
29/10- 02/10.14 Bonn



EURAC
research

SETTING THE SCENE



THE HYDROLOGICAL CYCLE OF THE ALPS

■ AND ITS ROLE IN EUROPE FRESHWATER SUPPLY

Figure 3.1 The Alps, the main river basin districts and climatic sub-regions

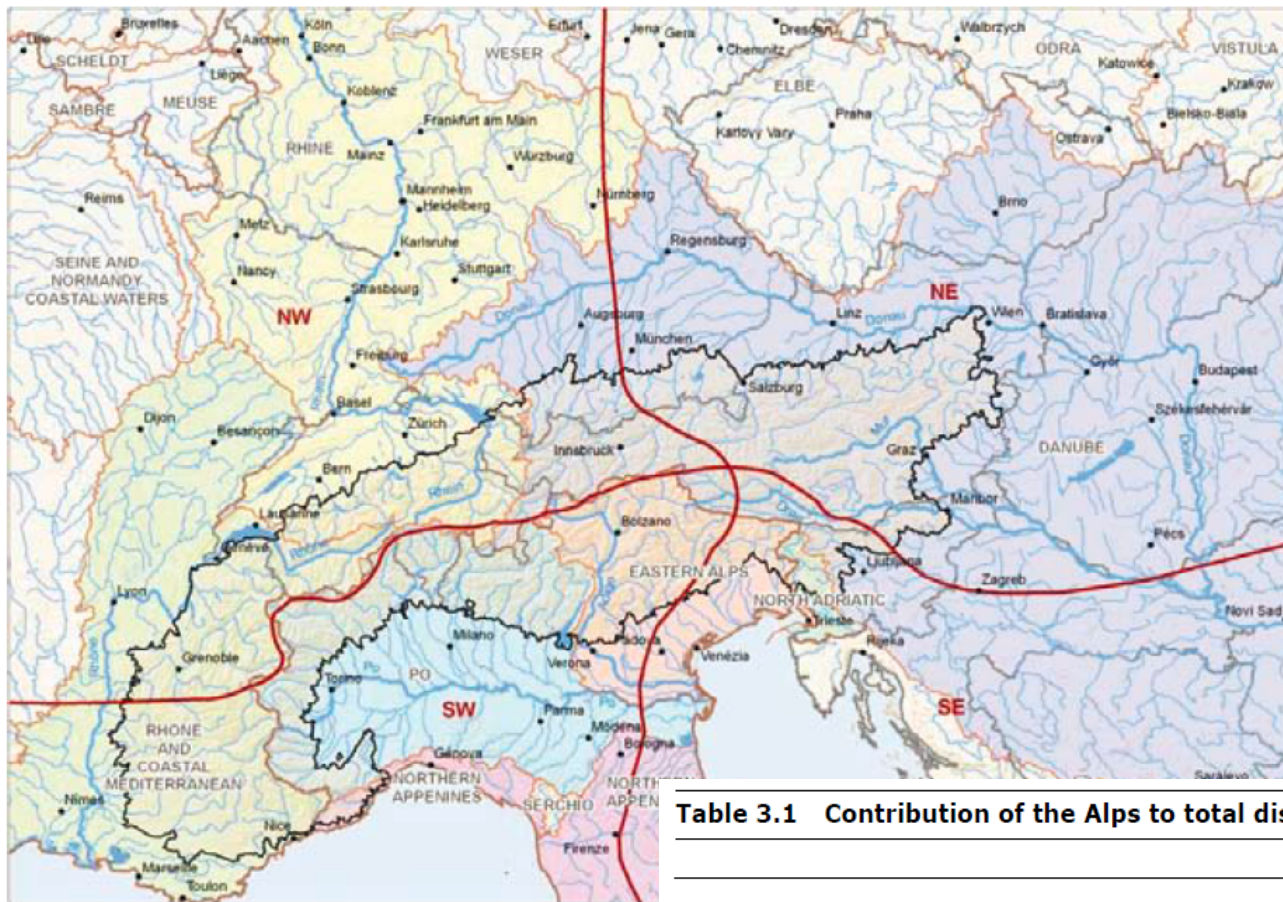


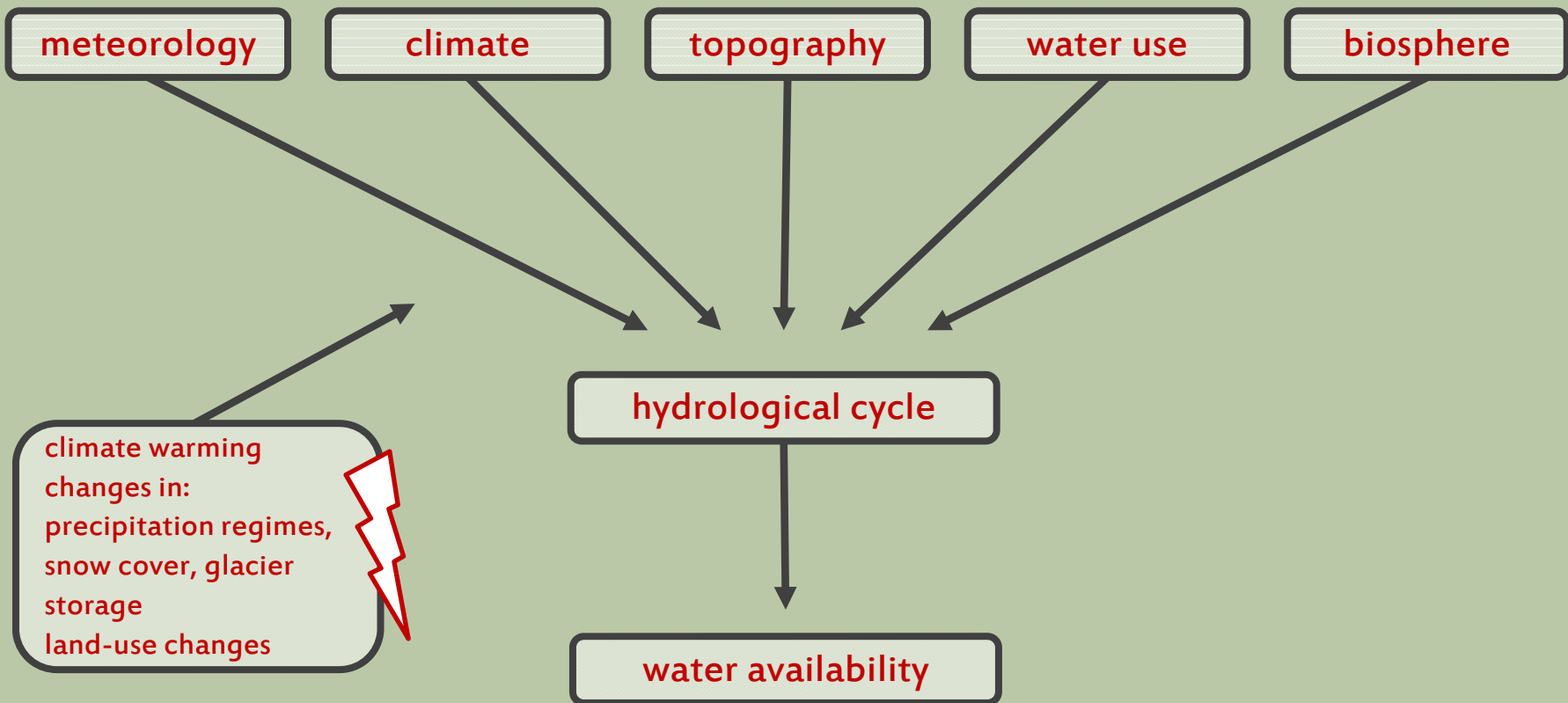
Table 3.1 Contribution of the Alps to total discharge of the four major alpine streams

	Rhine	Rhône	Po	Danube
Mean contribution of the Alps to total discharge (%)	34	41	53	26
Areal proportion of total Alps (%)	15	23	35	10
Disproportional influence of the Alps	2-3	1-8	1-5	2-6

sources:
Roder, 2009
Weingartner *et al.* 2007

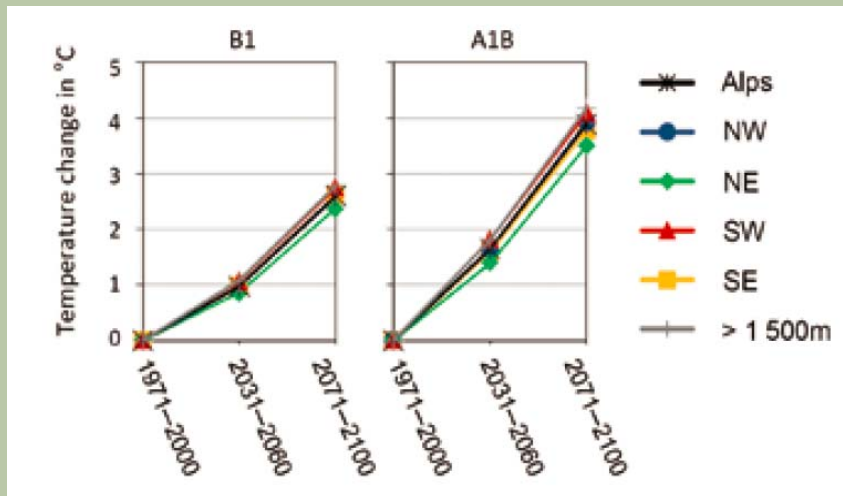
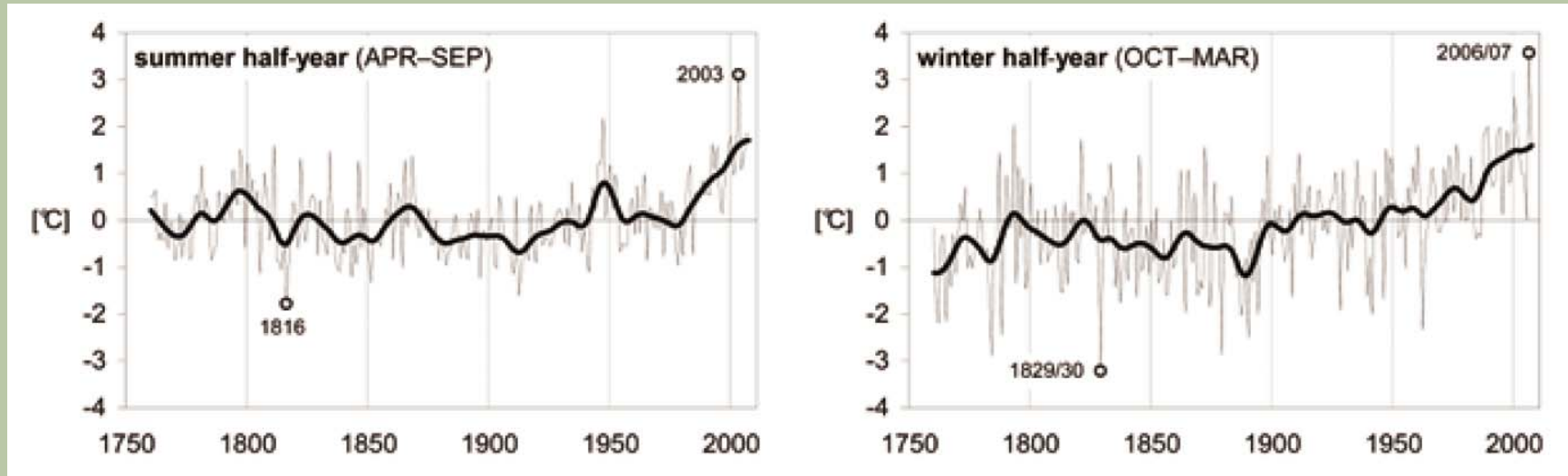
THE HYDROLOGICAL CYCLE OF THE ALPS

■ AND ITS VULNERABILITY TO CLIMATIC CHANGE



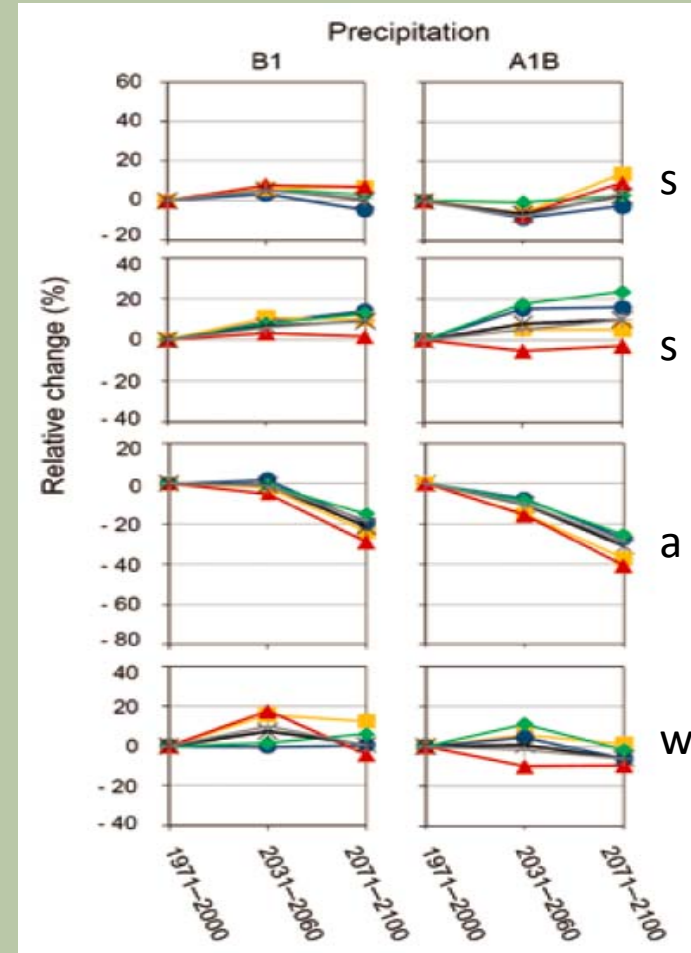
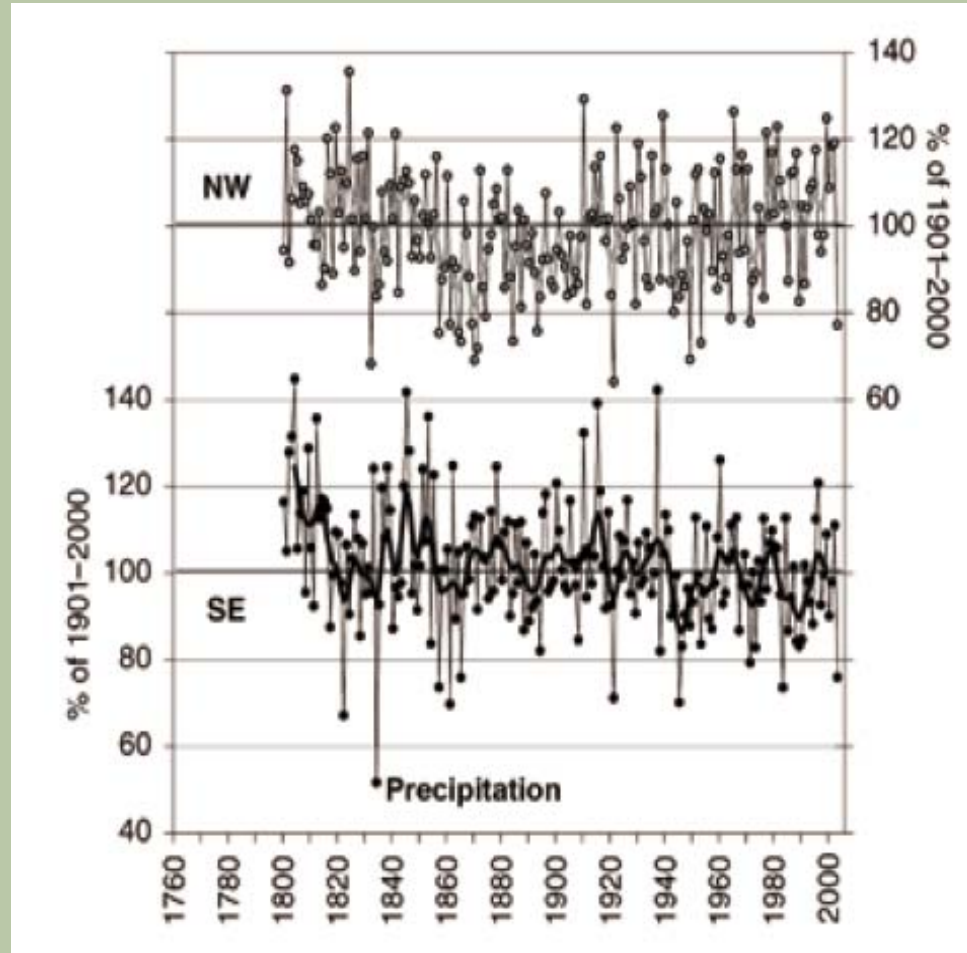
CLIMATE CHANGE IN THE ALPS

■ TEMPERATURE



CLIMATE CHANGE IN THE ALPS

■ PRECEPITATION

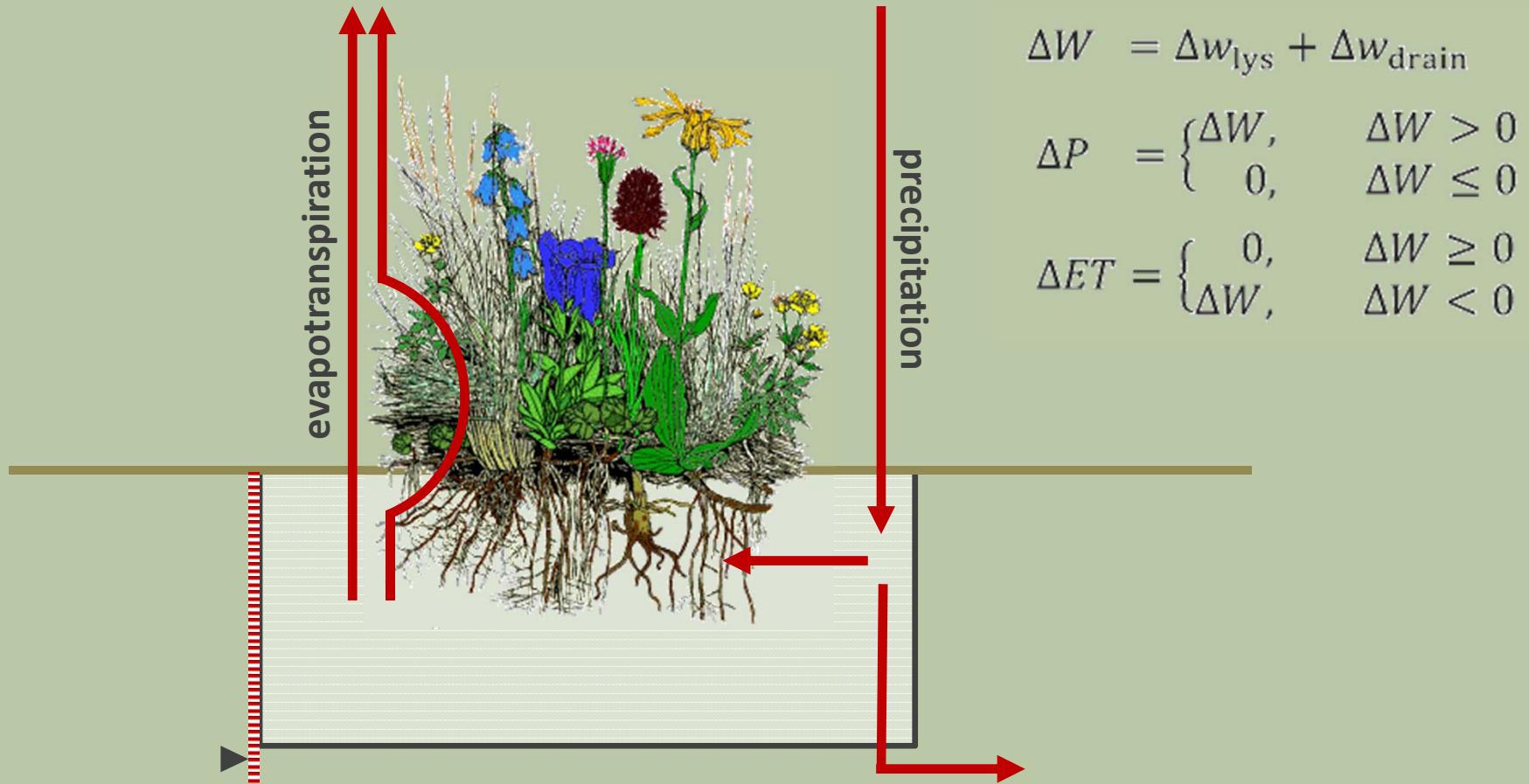


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THE LYSIMETER APPROACH

■ ECOSYSTEM WATER BALANCE

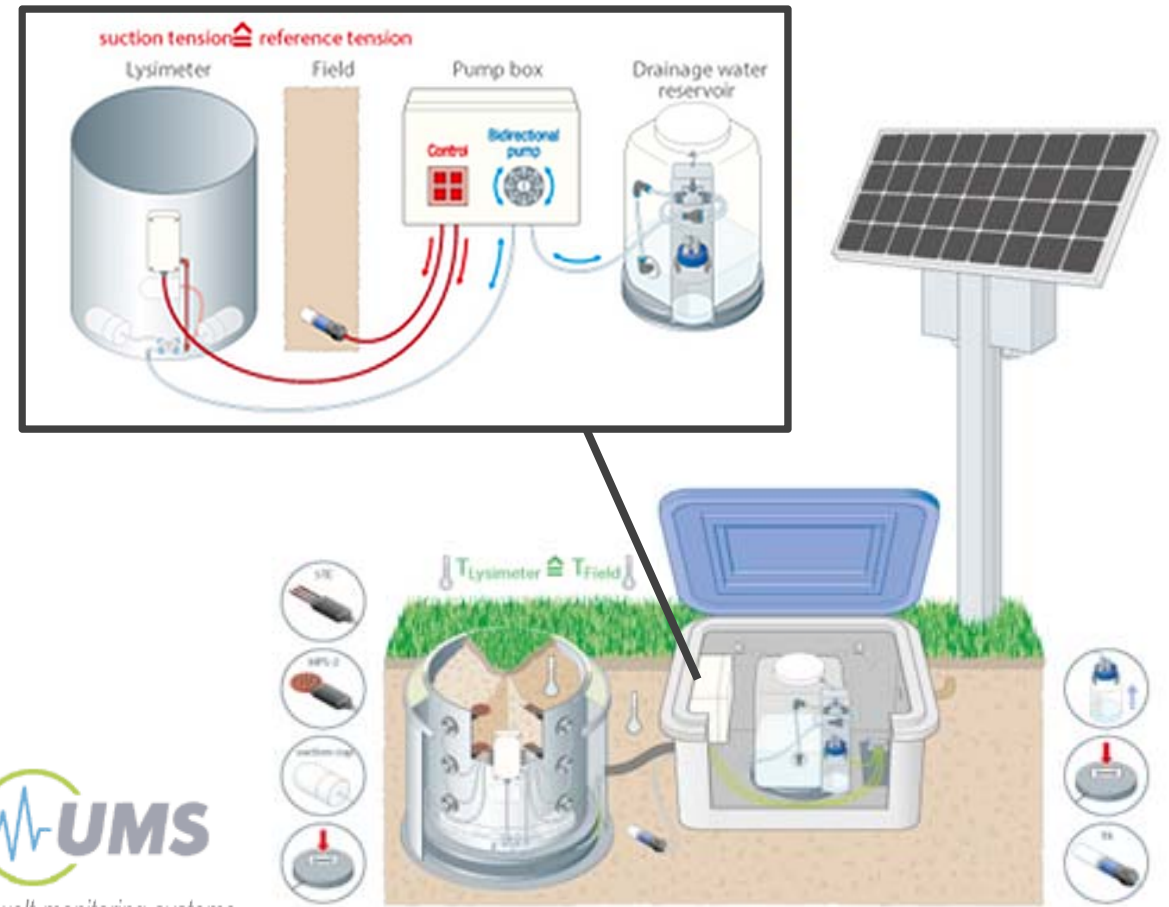


THE LYSIMETER APPROACH

■ SMALL-SCALE LYSIMETERS



30 cm



suction tension $\hat{=}$ reference tension

Lysimeter Field Pump box Drainage water reservoir

Control Bidirectional pump

UMS
umwelt-monitoring-systeme

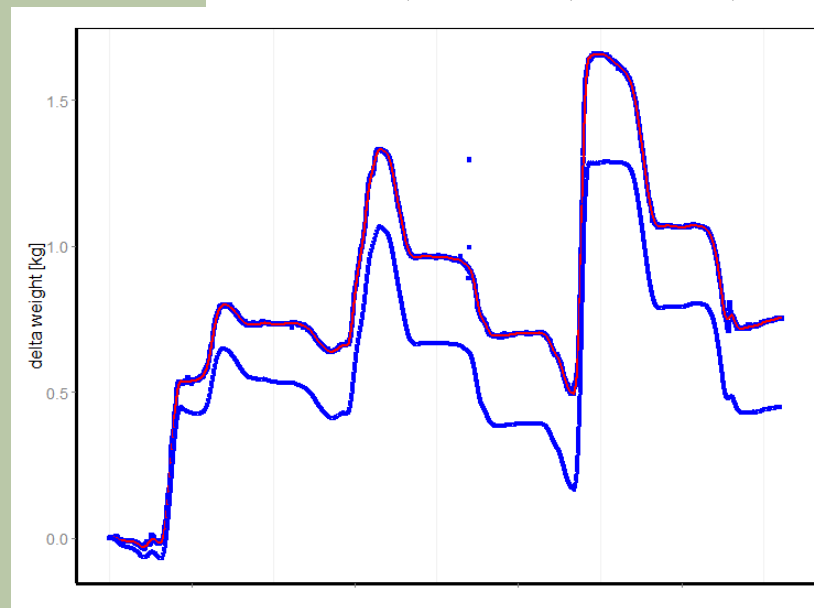
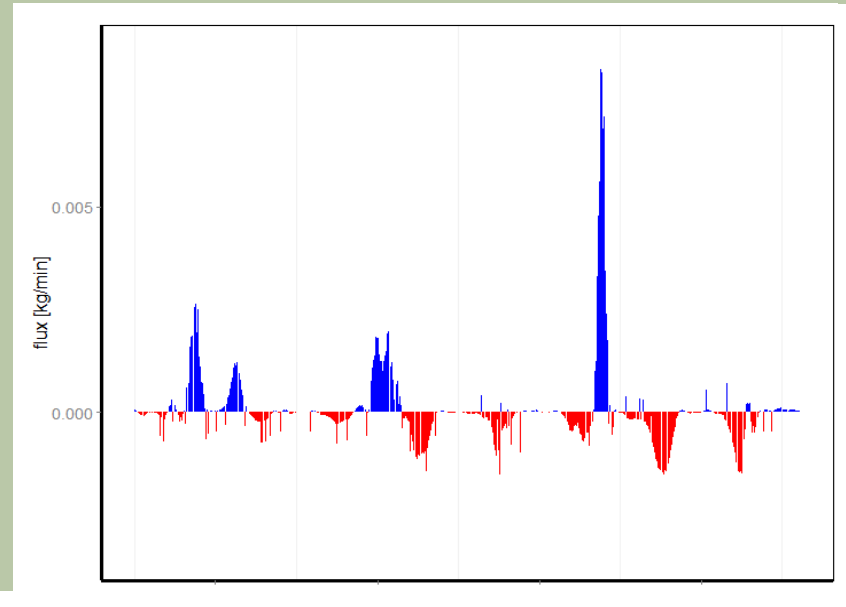
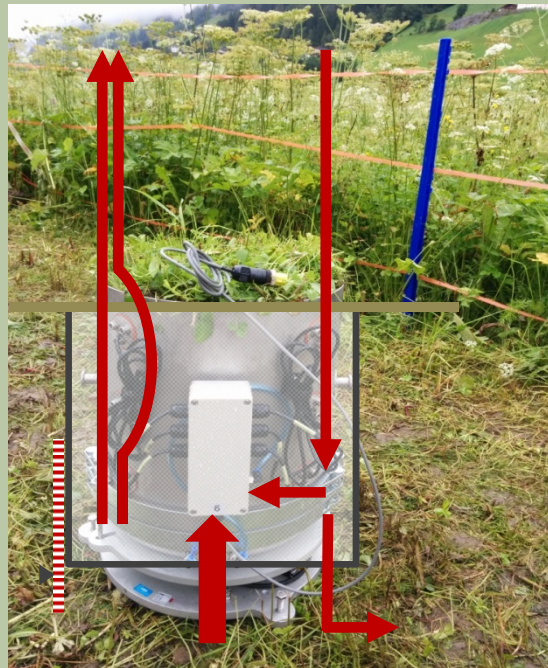
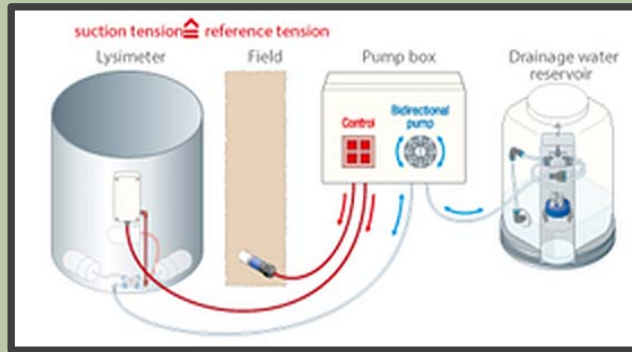
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■ INSTALLATION



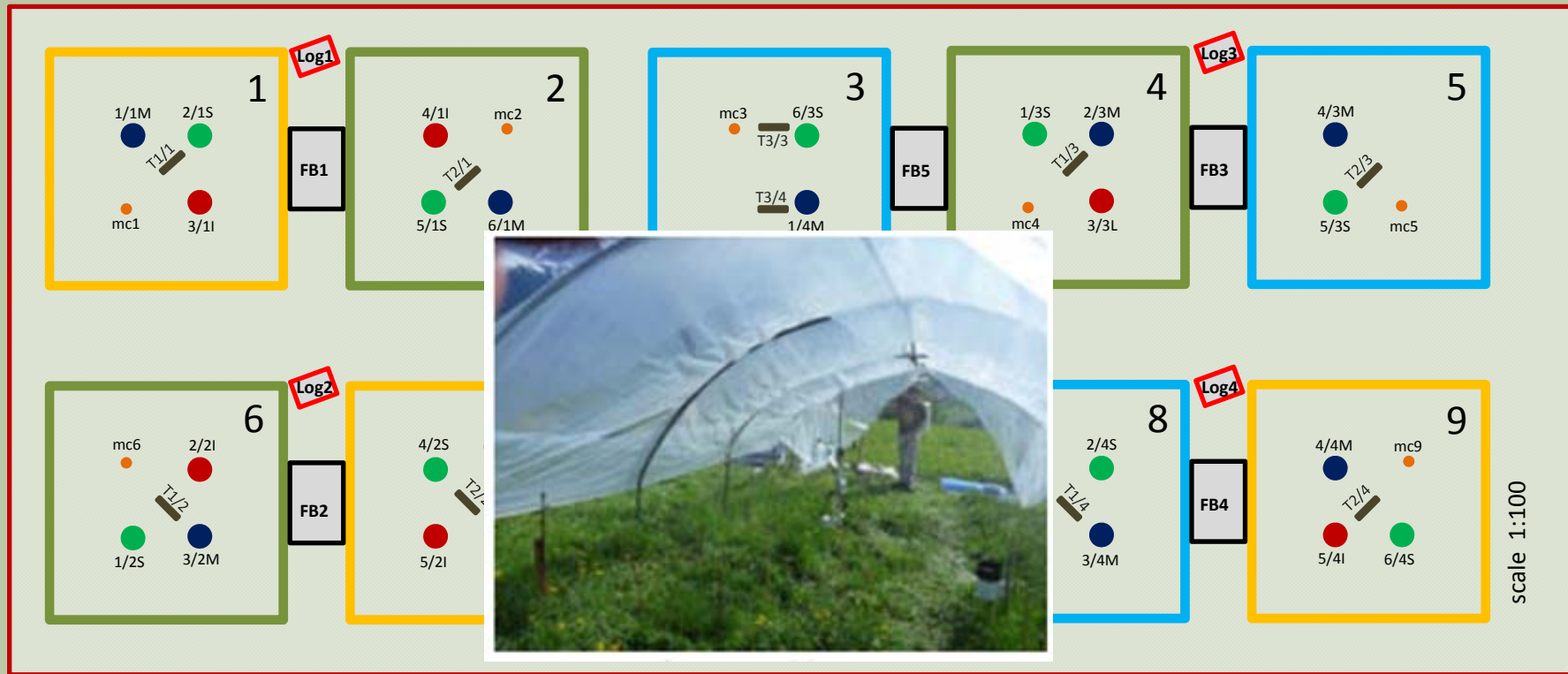
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■ LOWER BOUNDARY CONTROL



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EXPERIMENTAL DESIGN



Environmental manipulations

- Control (shelter, precipitation)
- Treatment 1 (shelter, precipitation ↓)
- Treatment 2 (shelter, precipitation ↓, temperature ↑)

Biological manipulations

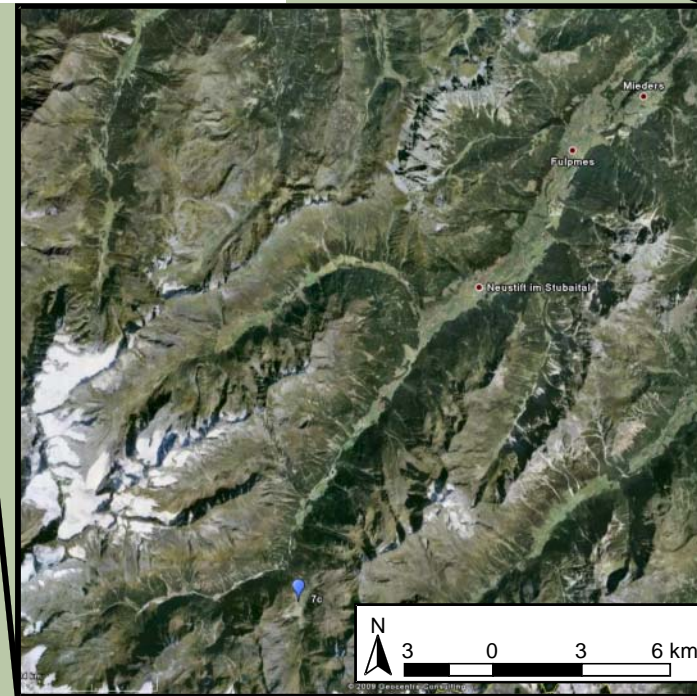
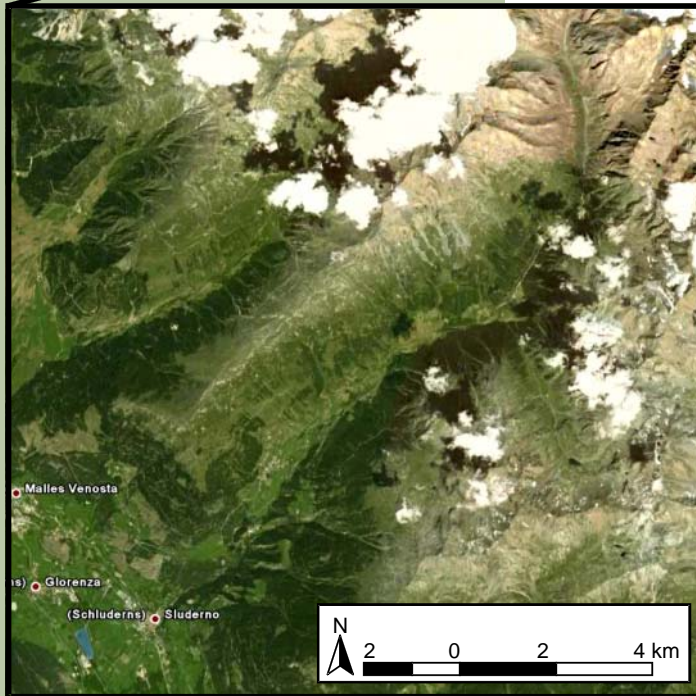
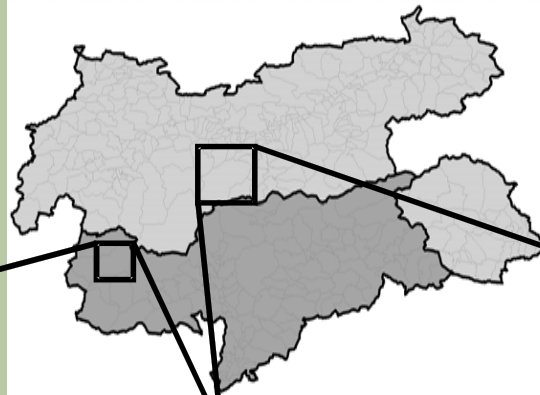
- Stubai vegetation – *in situ*
- Matscher vegetation
- 6 species intensive meadow mix

Matsch Valley

dry inner alpine climate;
precipitation = 526.7 mm
mean temperature = 6.6°C

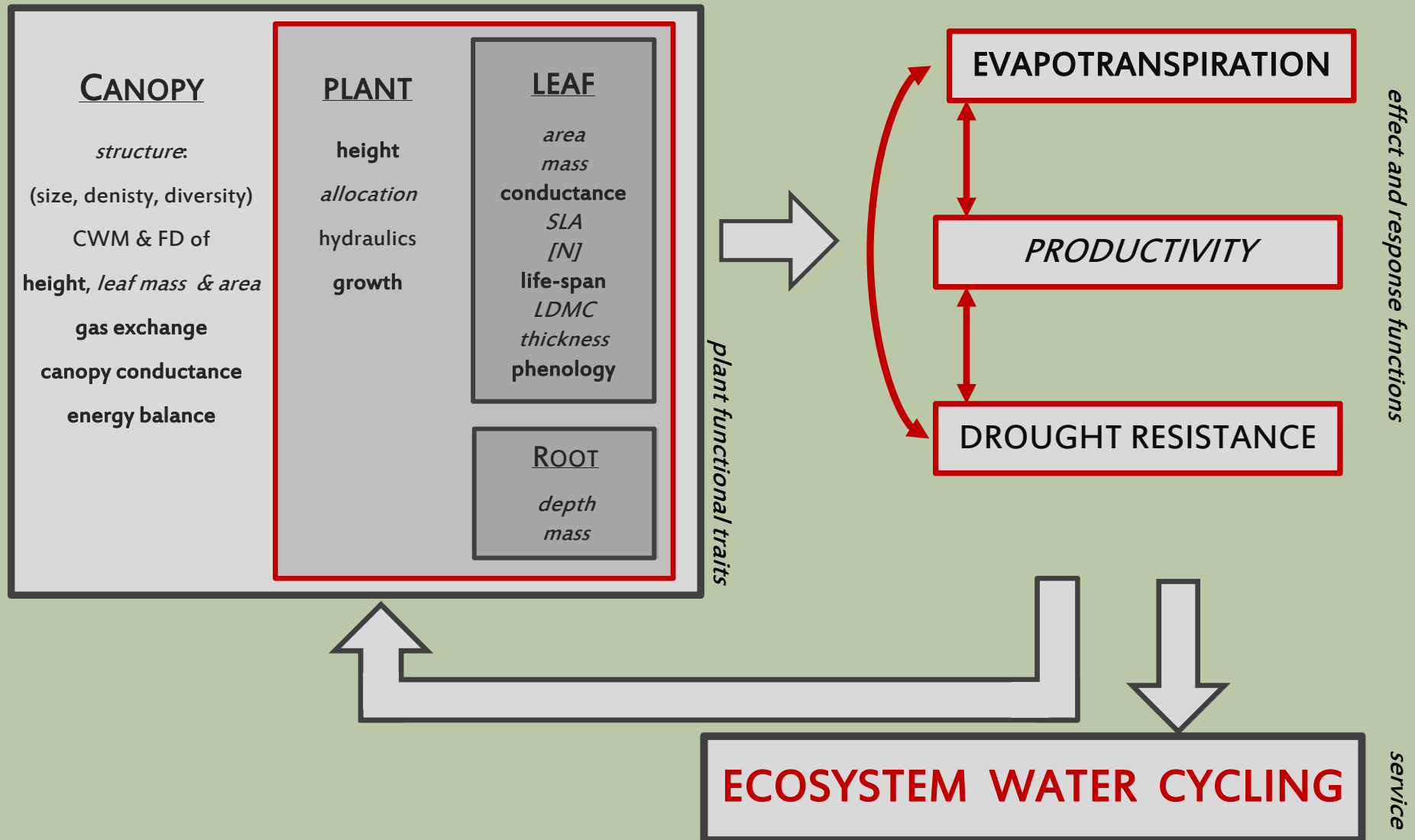
Stubai Valley

northern Central-European climate
precipitation = 1097 mm
mean temperature = 6.3°C



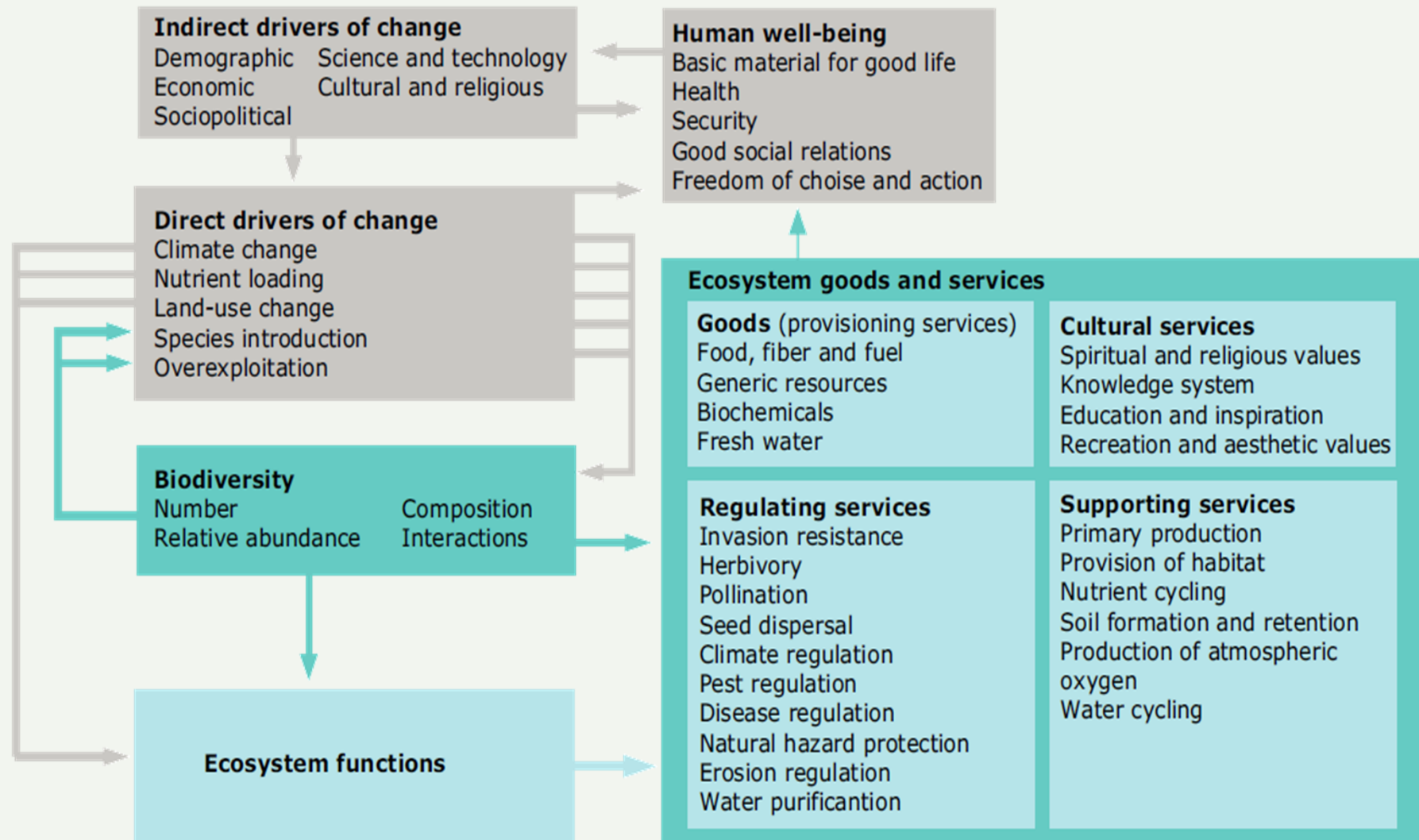
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■ INTEGRATING PLANT AND ECOSYSTEM FUNCTIONING



▪ **THANK YOU**

ECOSYSTEM SERVICES



Source: CBD, 2008a.