

High N retention in Mediterranean catchments enhanced by water management practices

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Outline

We assess the fluxes and retention of N within 38 Iberian catchments

We compare catchments with contrasting climatic characteristics (temperate and Mediterranean), land uses, and water management strategies

We hypothesize that N retention is tightly related to water regulation practices

Methods

→ 2000-2010 period

→ N Retention (*sensu lato*) = total inputs - river outputs

N Inputs

Net anthropogenic N inputs (NANI) approach:

- (1) synthetic fertiliser application
- (2) biological N fixation
- (3) net atmospheric deposition
- (4) net import of food and feed

N Outputs

(5) the export of N at the outlet of the river

→ Water regulation features

Number of dams and reservoirs, water storage capacity (Hm³)

2 Indices:

Impounded Runoff (IR) = f (Hm³ storage capacity, mean annual runoff)

Indirect Alteration (IA) = f (% irrigated land, dams, Hm³ storage capacity)

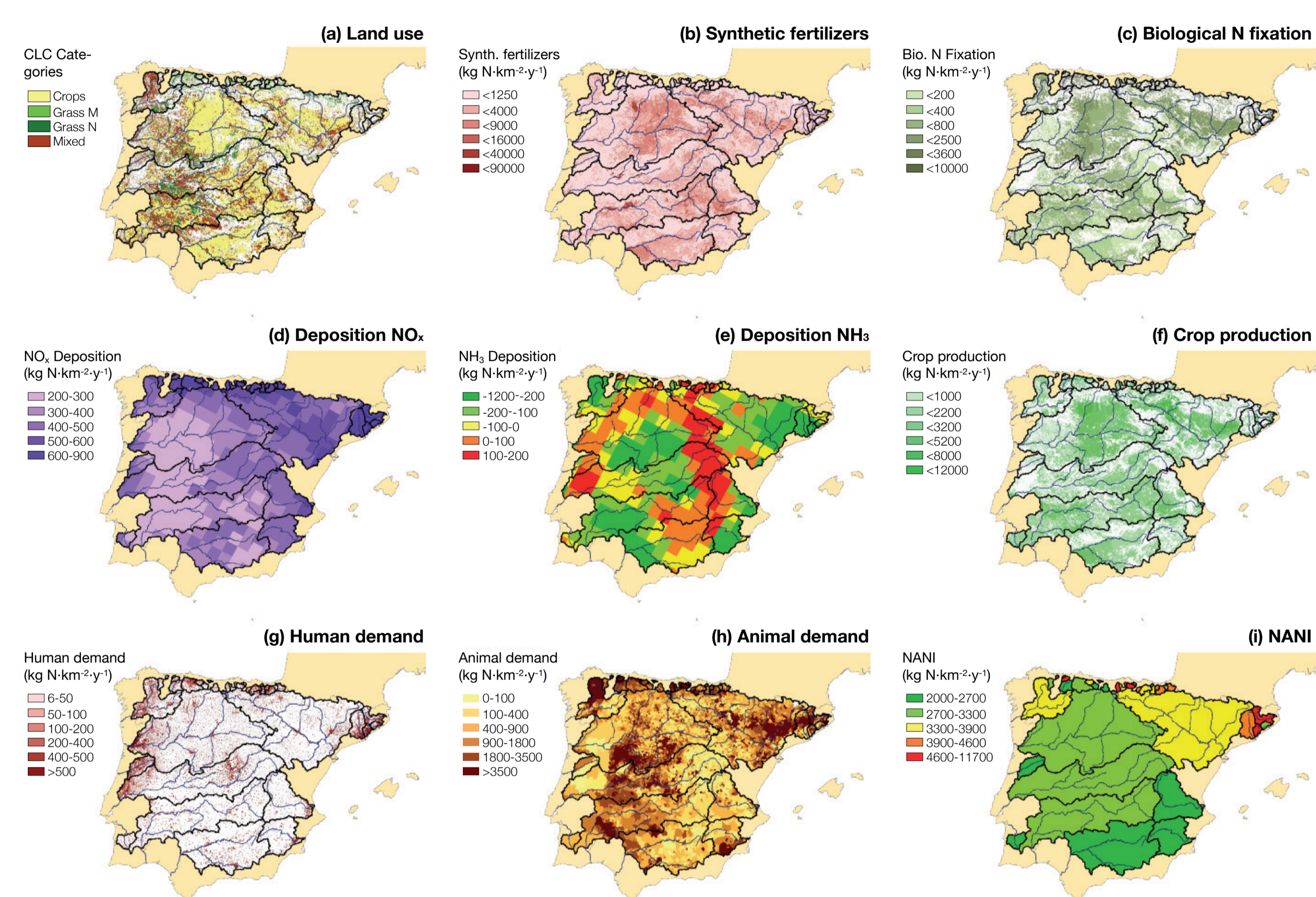


Fig. 1. A composite of the spatialized NANI terms (2000–2010 average)

Results & Discussion

N export to coastal seas vs N retained on land

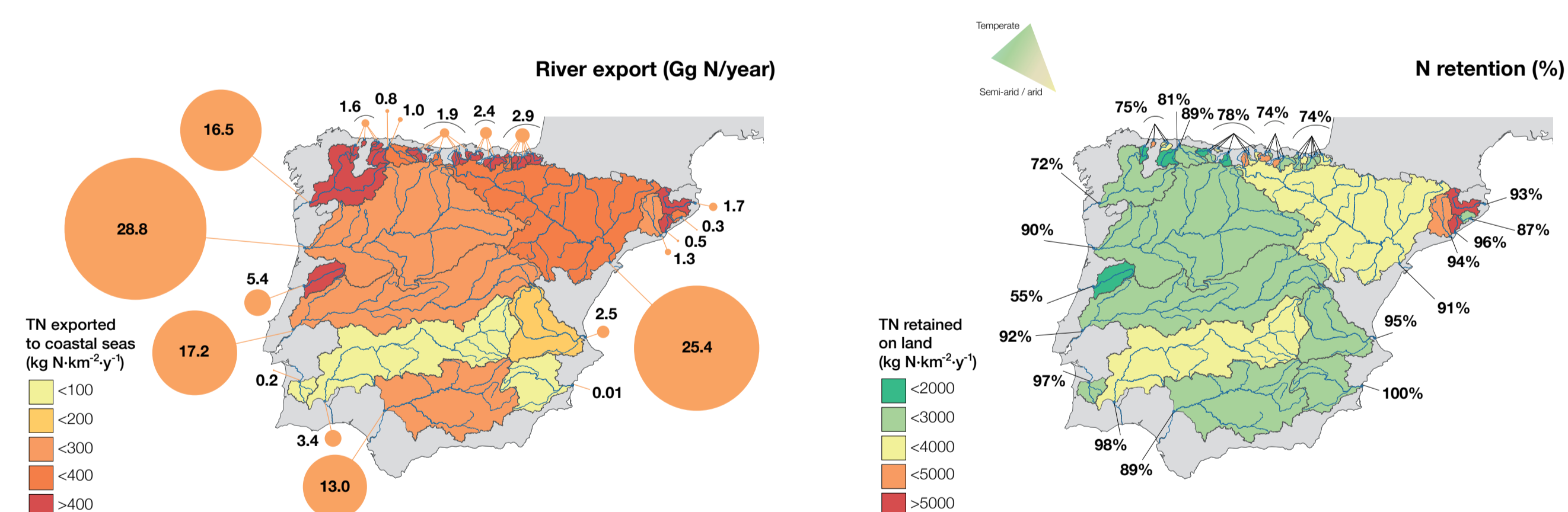
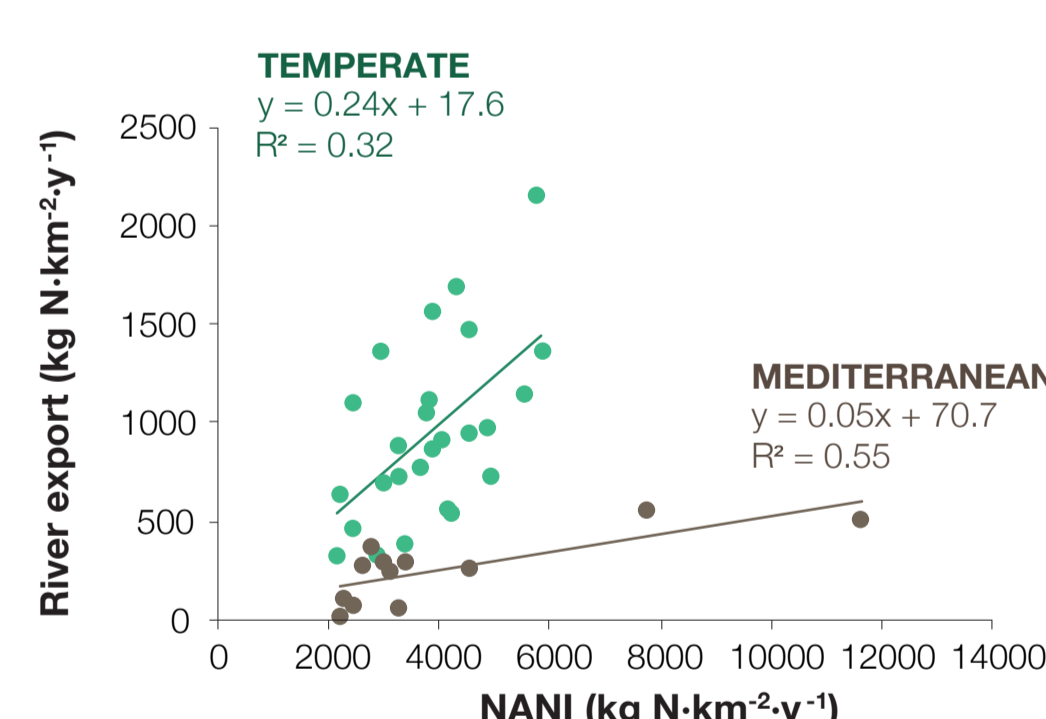
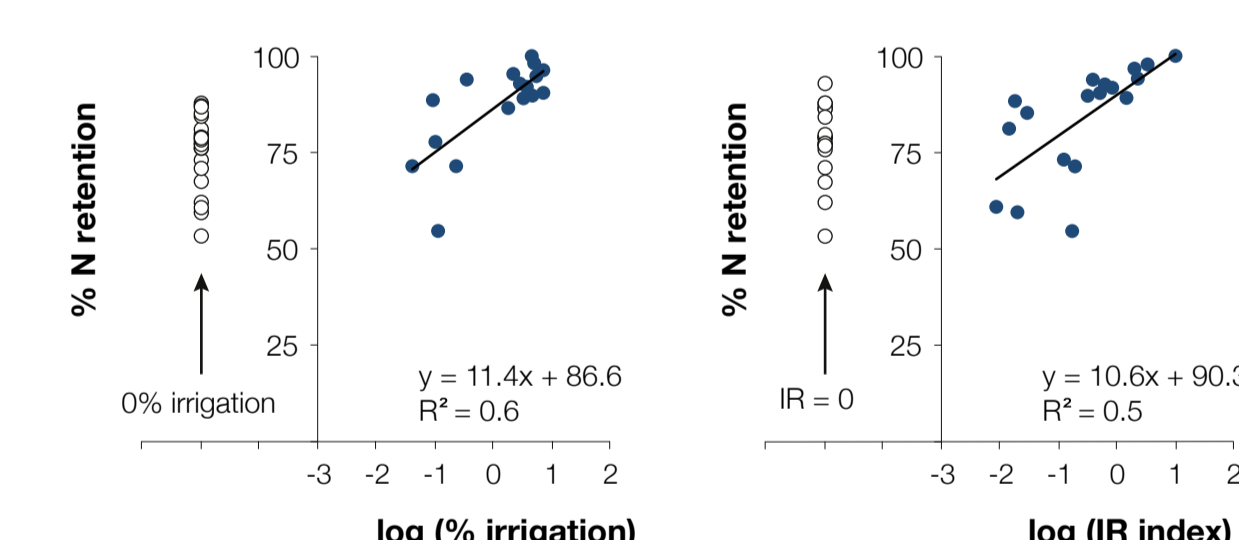


Fig. 2. River export and N retention (in % and absolute values) in the 38 Iberian catchments

For similar N inputs, retention is much higher in Mediterranean catchments



The extreme flow regulation of Mediterranean rivers -high number of dams, large storage capacity, multi-year regulatory strategies- strongly influences N retention



Conclusions

Reservoirs and irrigation channels account for >50% of the variability in N retention
Above a certain regulation threshold, N retention peaks to values >85–90%

Future projections in arid / semi-arid regions

→ - decrease rainfall
+ intensification agriculture
+ expansion irrigation

→ increased water demand, greater flow regulation
Similar to Iberian Mediterranean catchments

Resulting high N retention and the associated environmental risks (i.e., acidification of soils, emission of ammonia and greenhouse gases, or the pollution of aquifers) must be therefore considered as an important consequence of water regulation, and must be adequately managed.

Further details and contact:

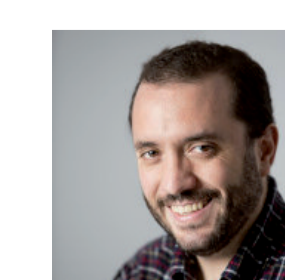
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