



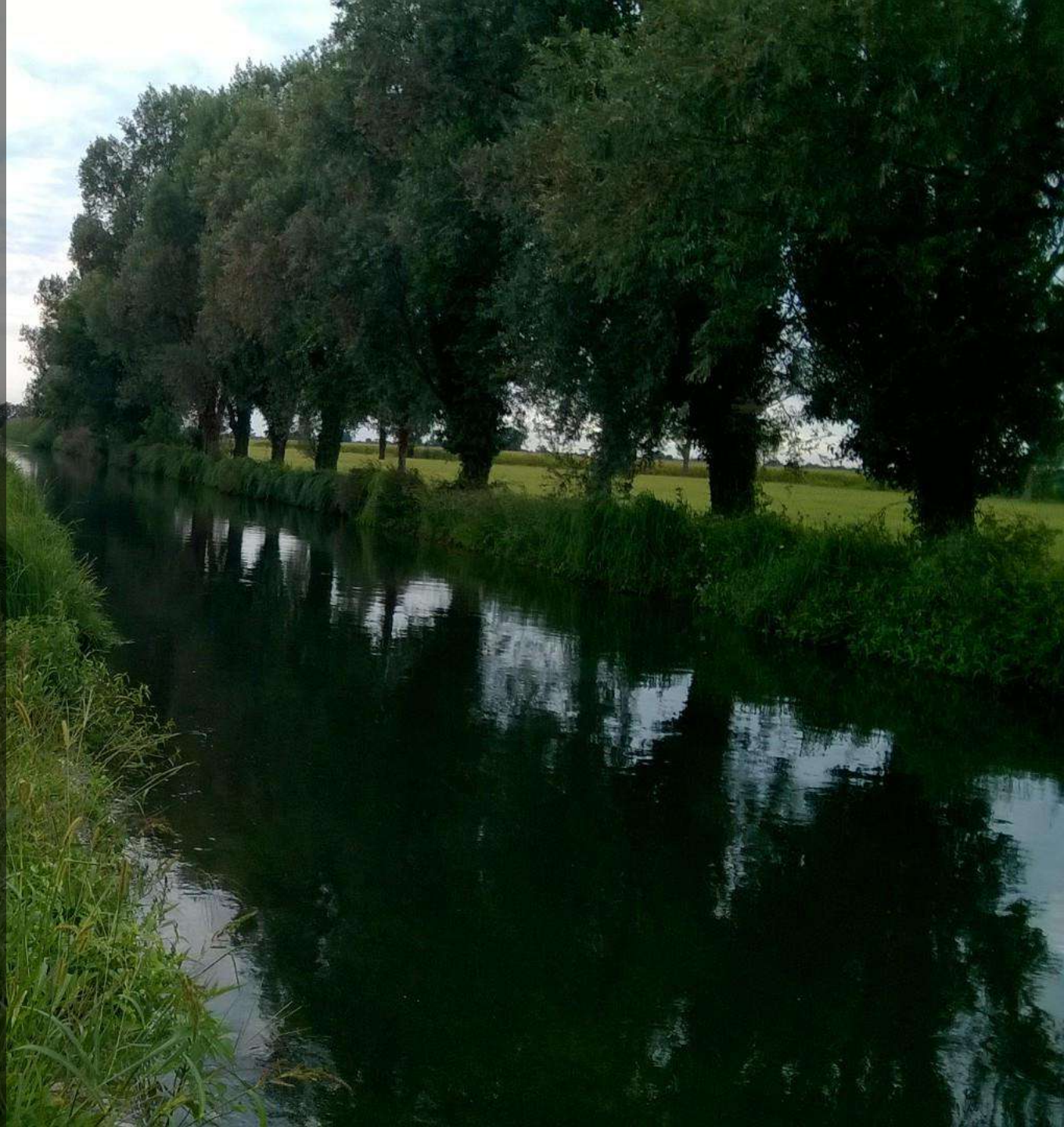
UNIVERSITÀ
DEGLI STUDI
DI MILANO

Stima del fabbisogno irriguo **modelli matematici a supporto** **dell'agricoltura**

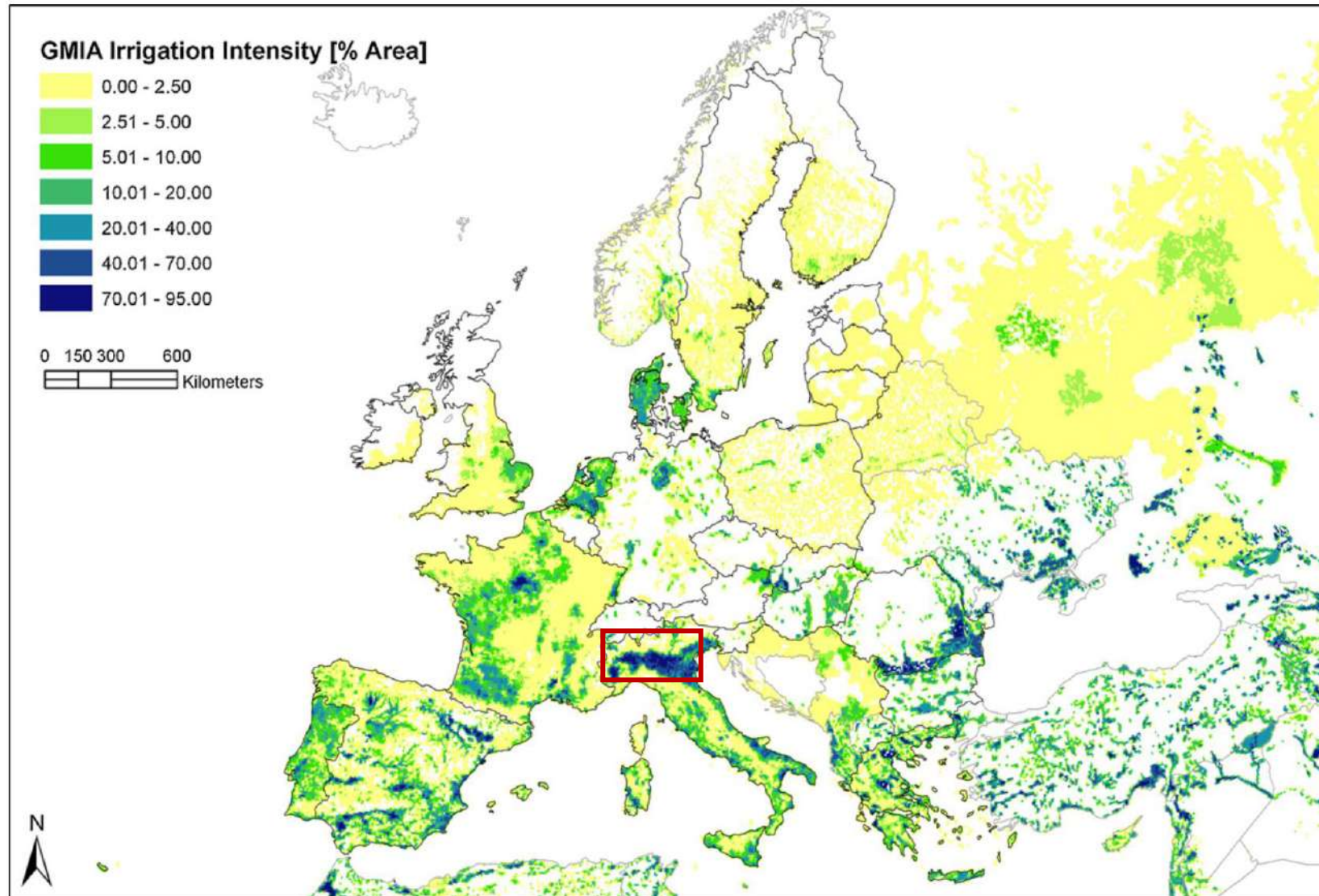
Claudio Gandolfi

CONOSCERE PER INTERVENIRE

Milano, 18 giugno 2019



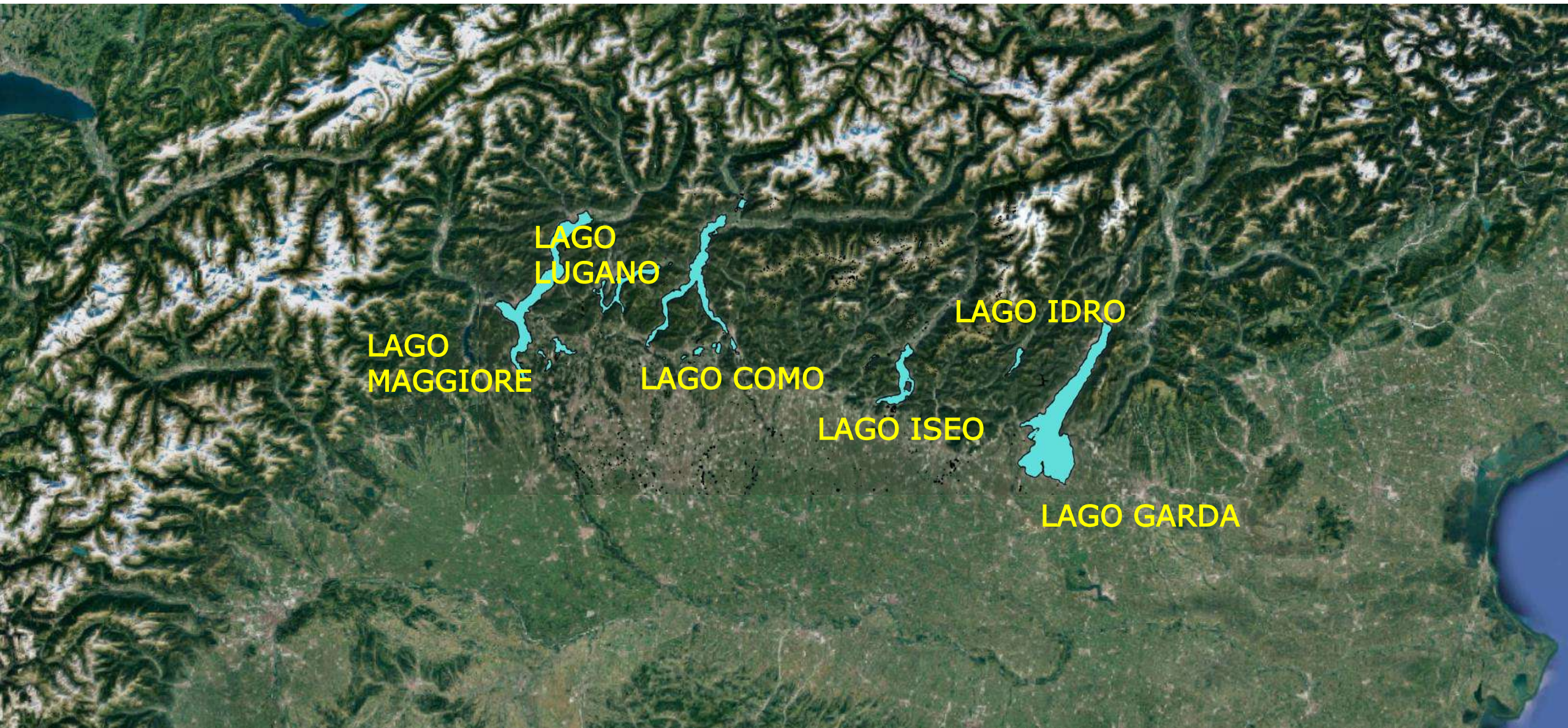
Area equipaggiata per l'irrigazione in Europa



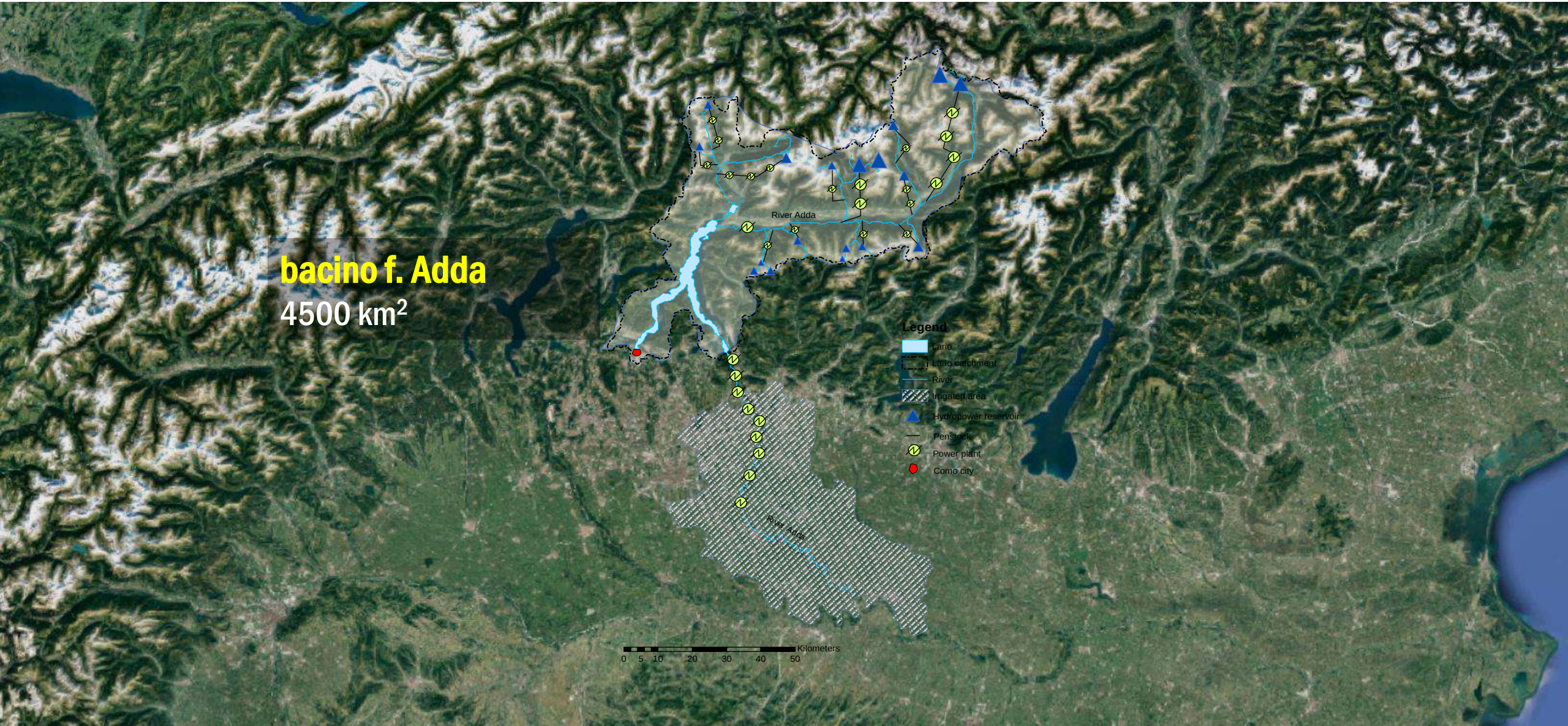
Global map of irrigation areas (GMIA)

Wriedt G. et al (2009). A European irrigation map for spatially distributed agricultural modelling.

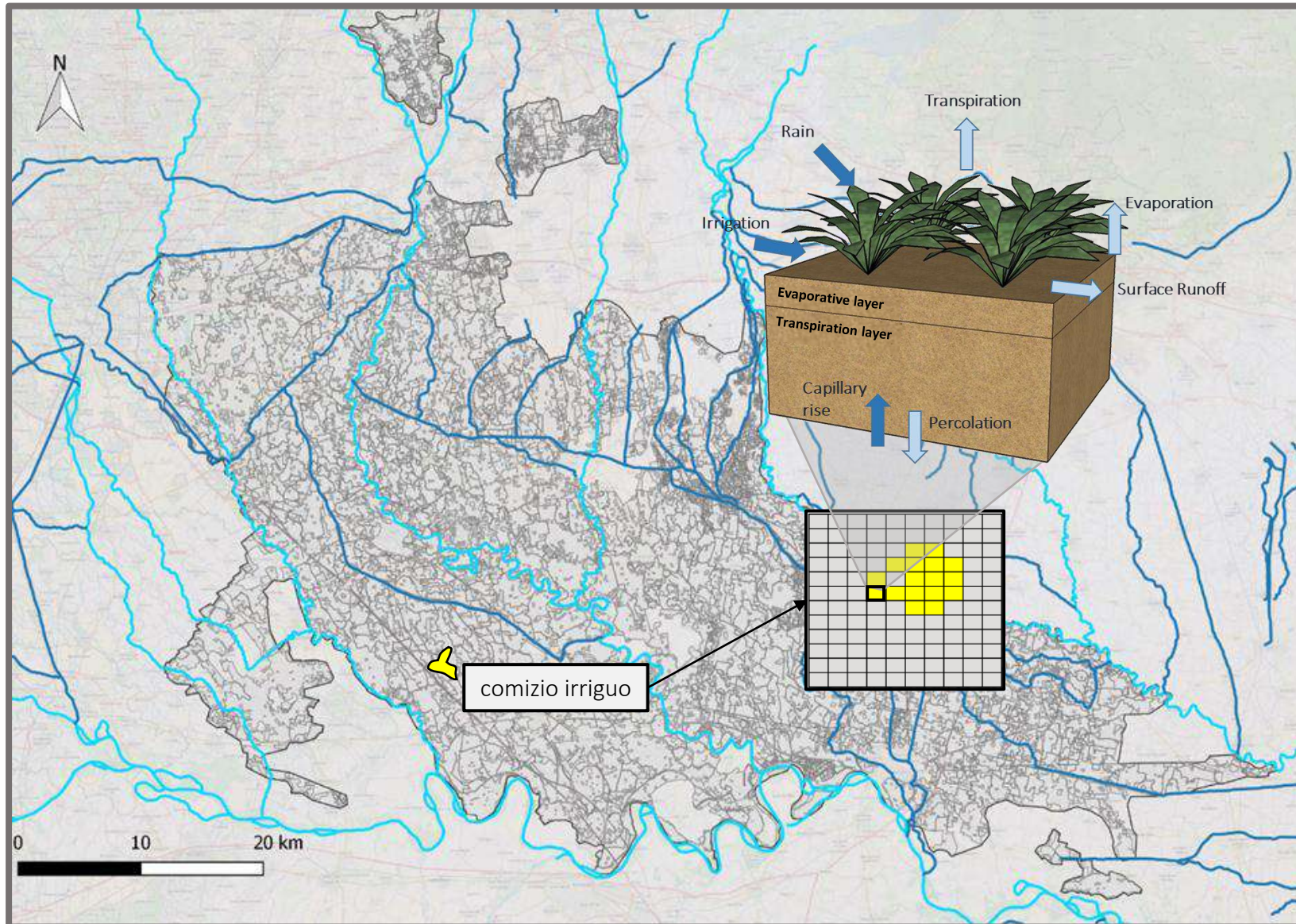
La regione dei laghi subalpini



The Italian subalpine lake district - focus on the Adda river

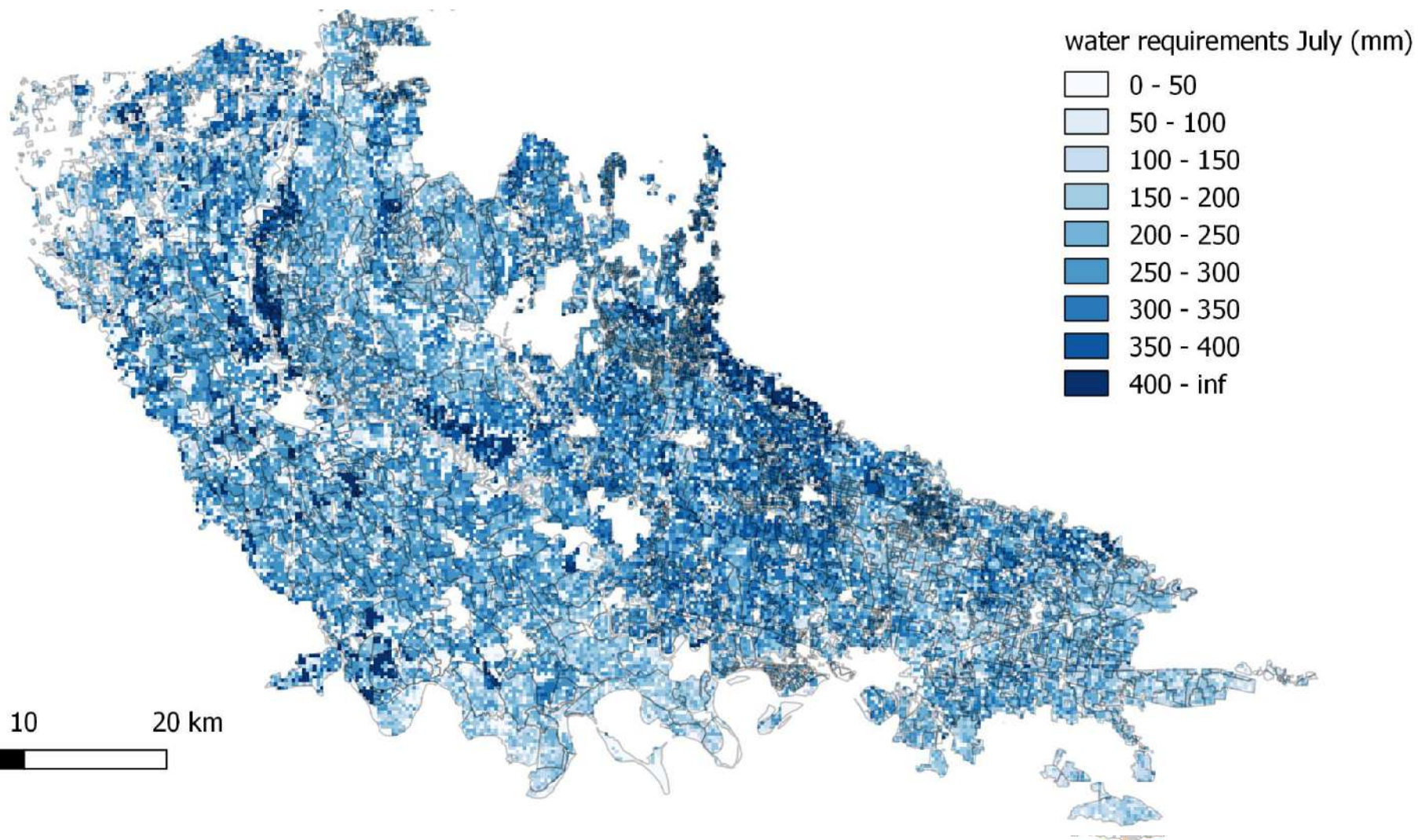


Stima dei fabbisogni irrigui netti

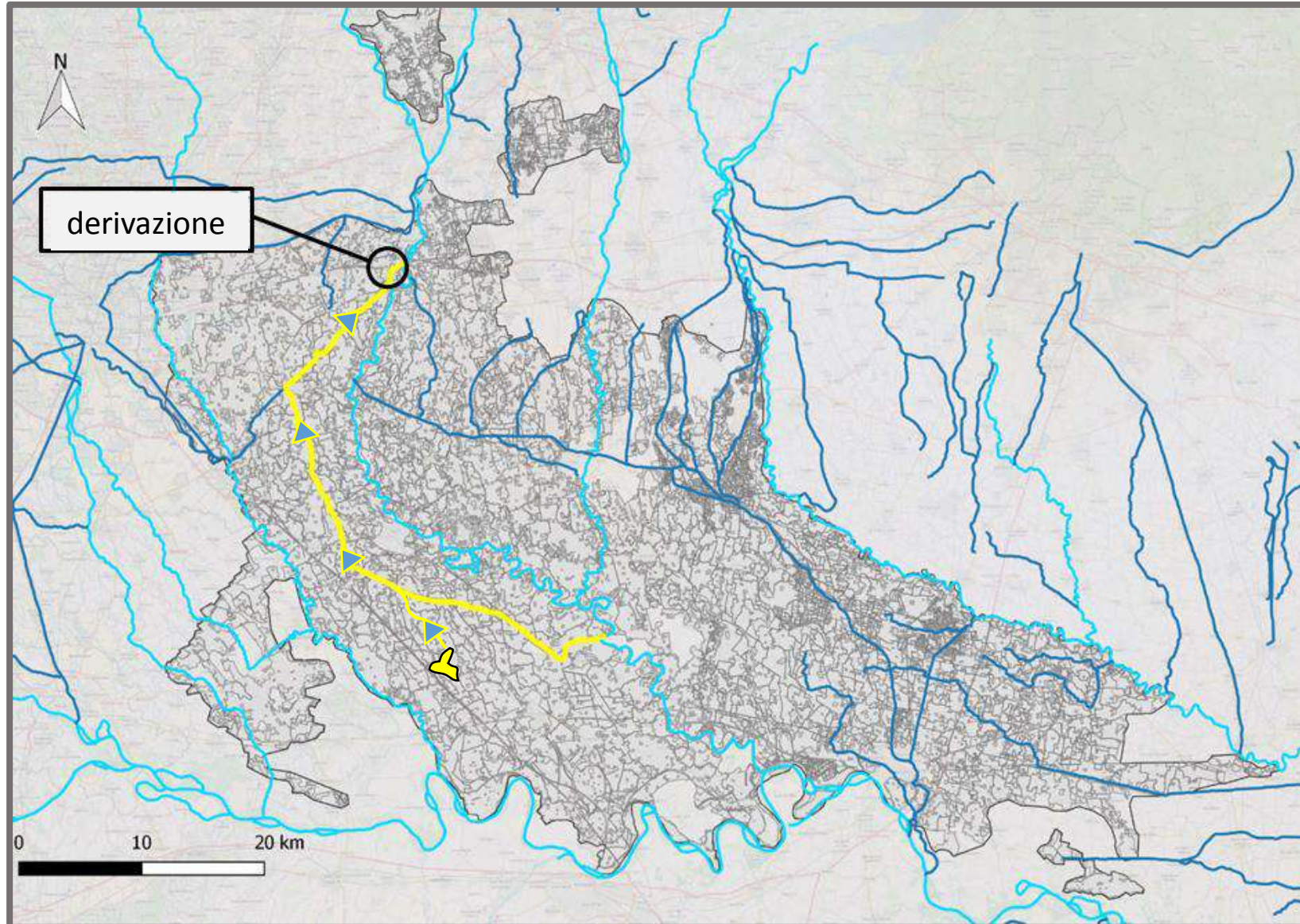


- uso del suolo
- dati agro-meteo
- parametri colturali
- parametri suolo
- soggiacenza falda

Fabbisogni irrigui netti mese di luglio – medie 2014-2017

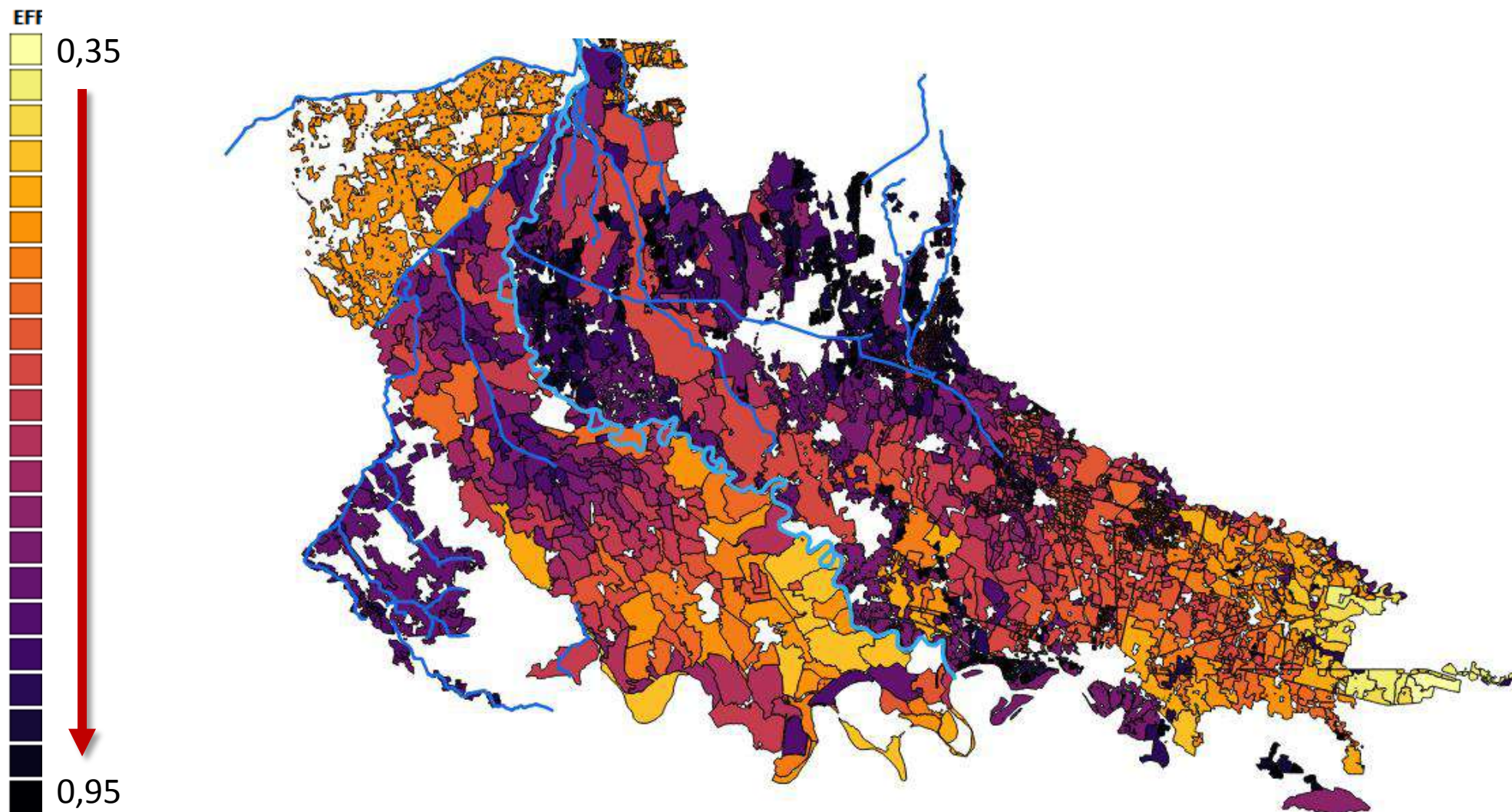


Stima dei fabbisogni irrigui lordi

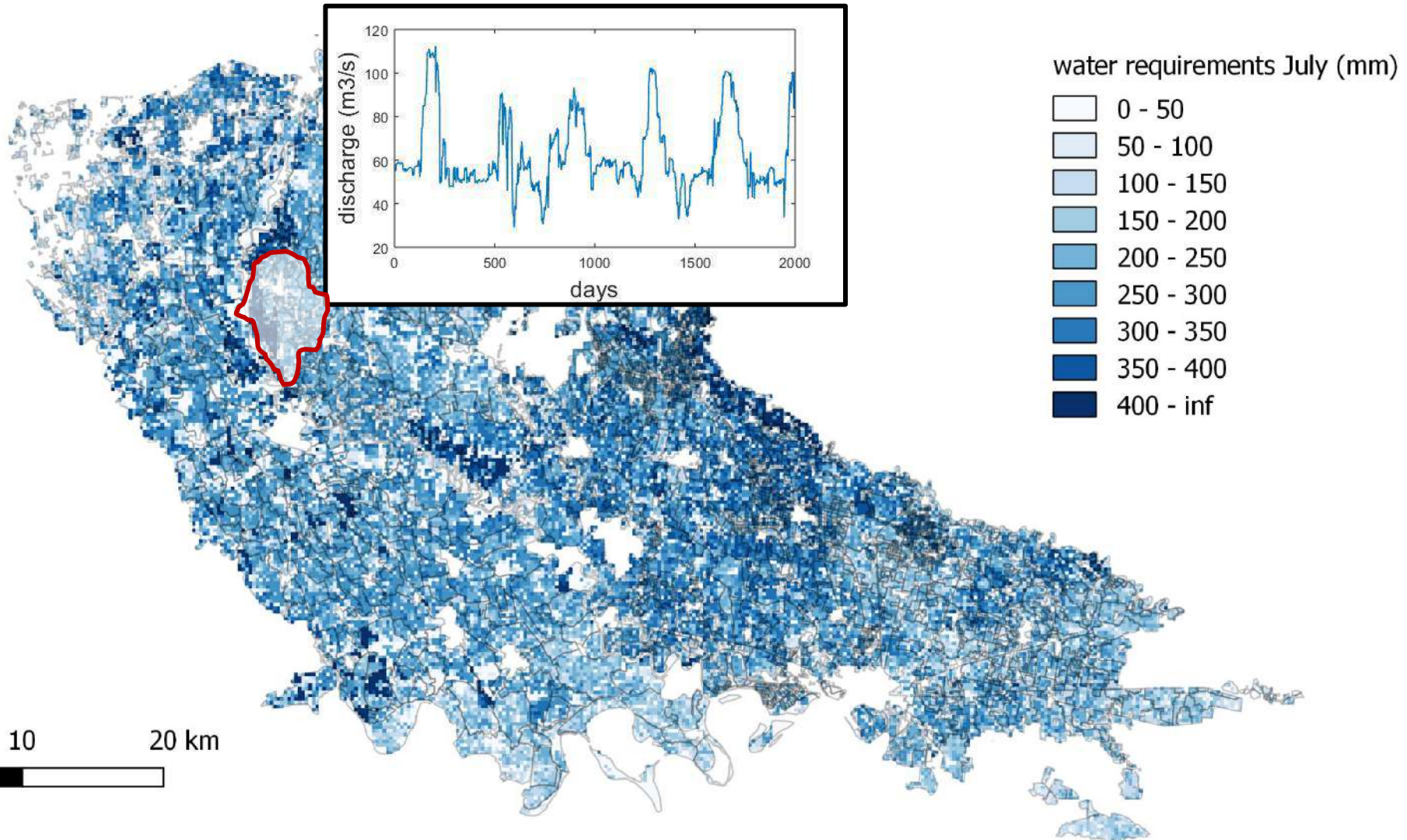


- uso del suolo
- dati agro-meteo
- parametri colturali
- parametri suolo
- soggiacenza falda
- metodo irriguo
- rete irrigua

Stima dei fabbisogni irrigui lordi



Fabbisogni irrigui lordi mese di luglio – medie 2014-2017

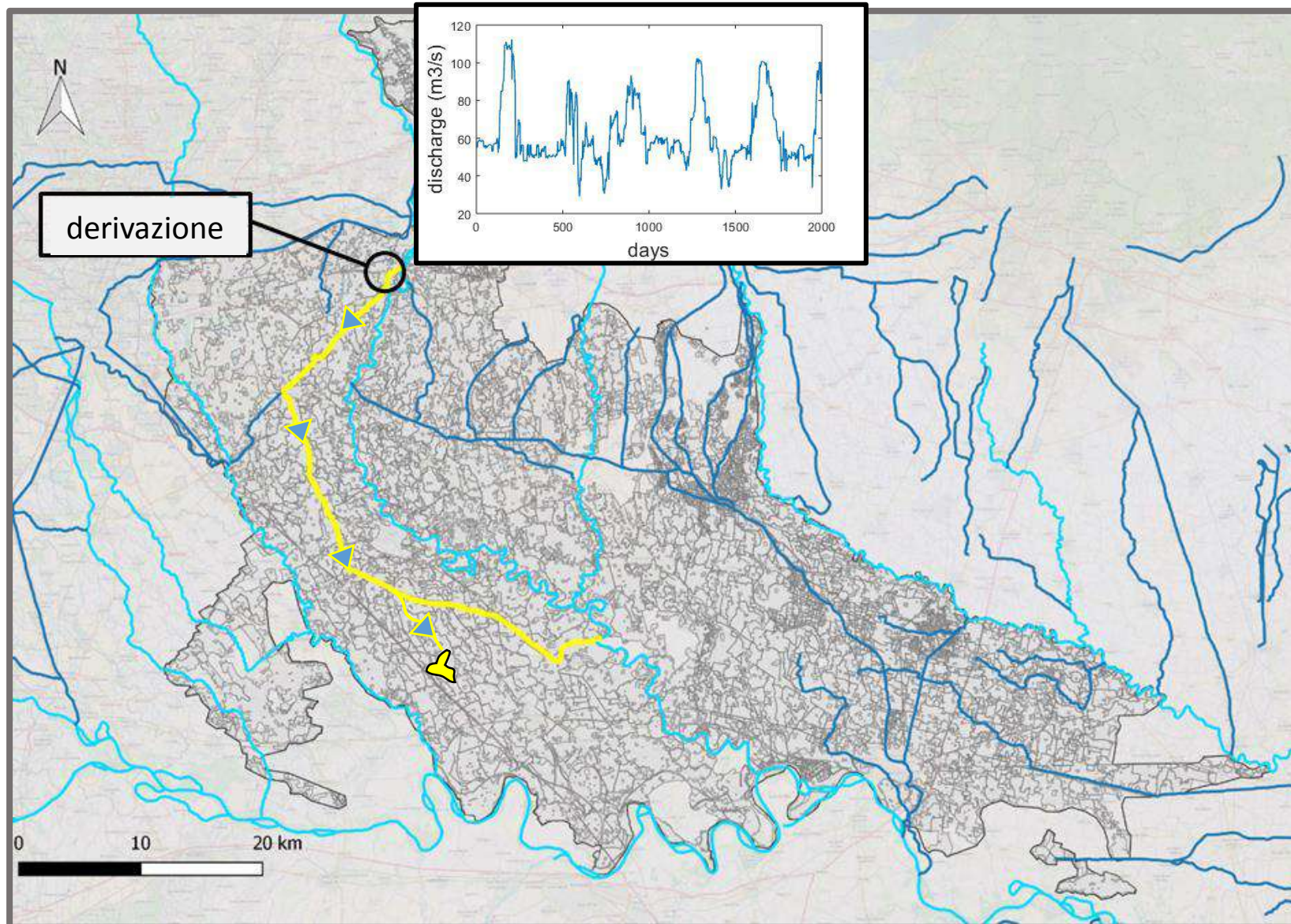




Misure!!!



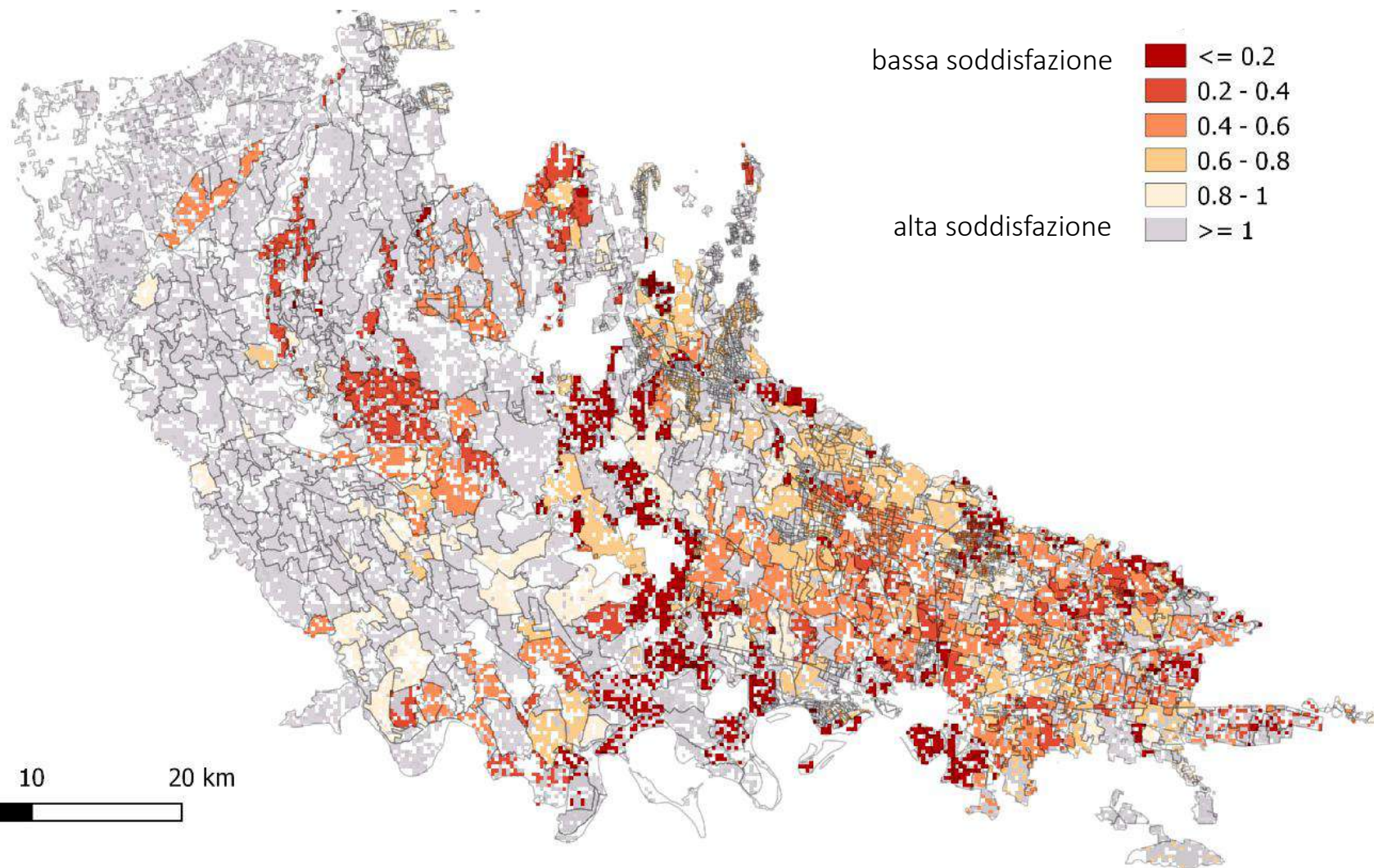
Simulazione degli utilizzi irrigui (e stima dei loro effetti)



- uso del suolo
- dati agro-meteo
- parametri colturali
- parametri suolo
- soggiacenza falda
- metodo irriguo
- rete irrigua
- portate derivate
- prelievi da falda

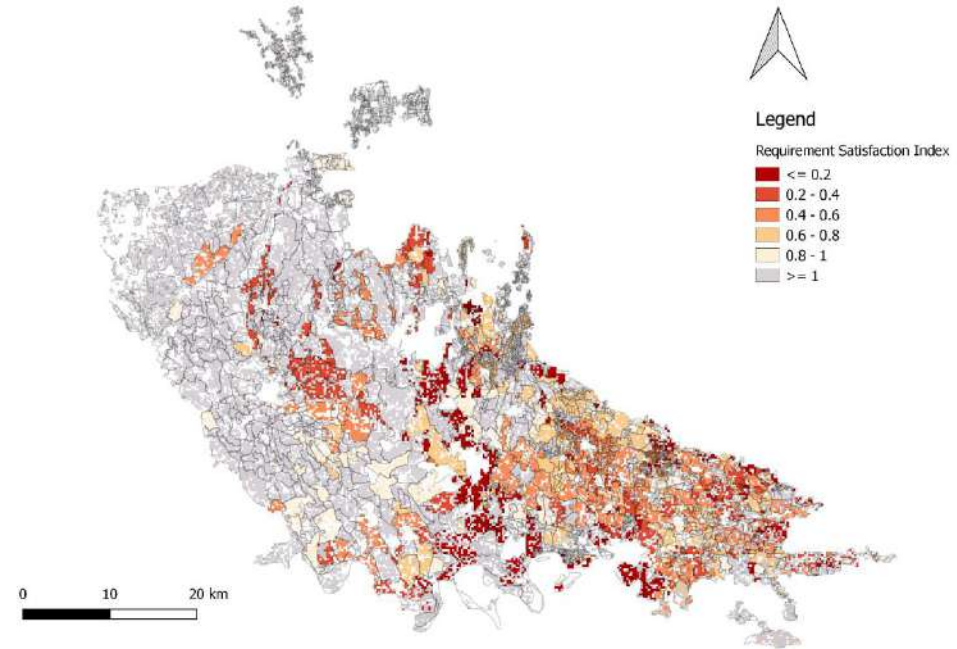
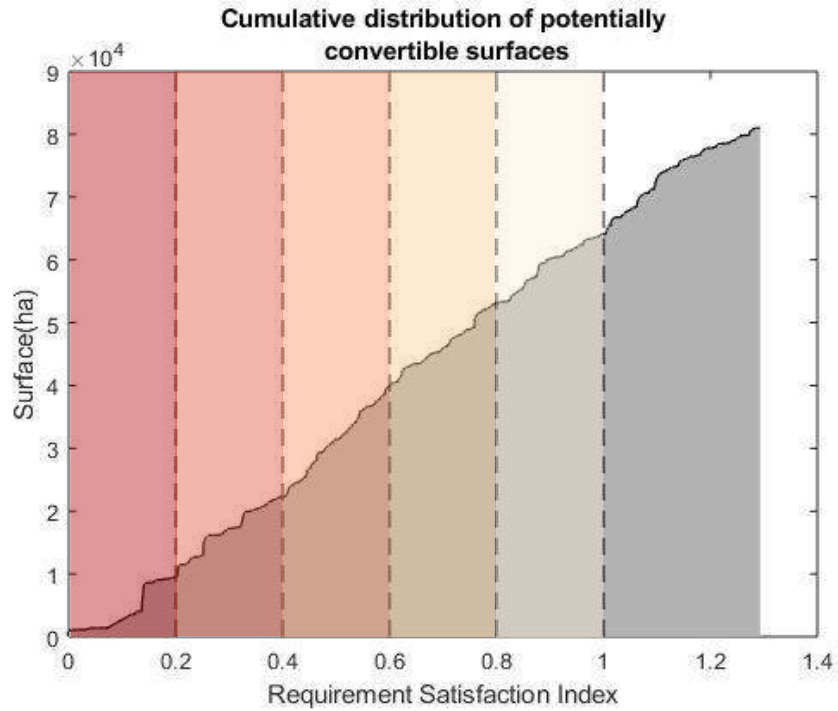
Indice di soddisfazione dei fabbisogni

$$RSI = \frac{\text{volume fornito da derivazioni superficiali}}{\text{fabbisogno irriguo colturale}}$$

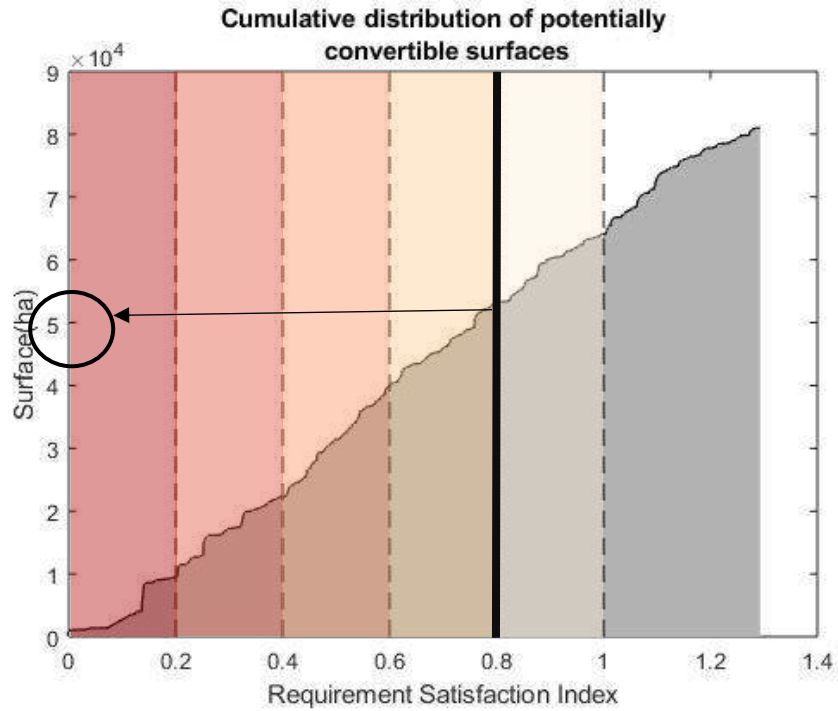




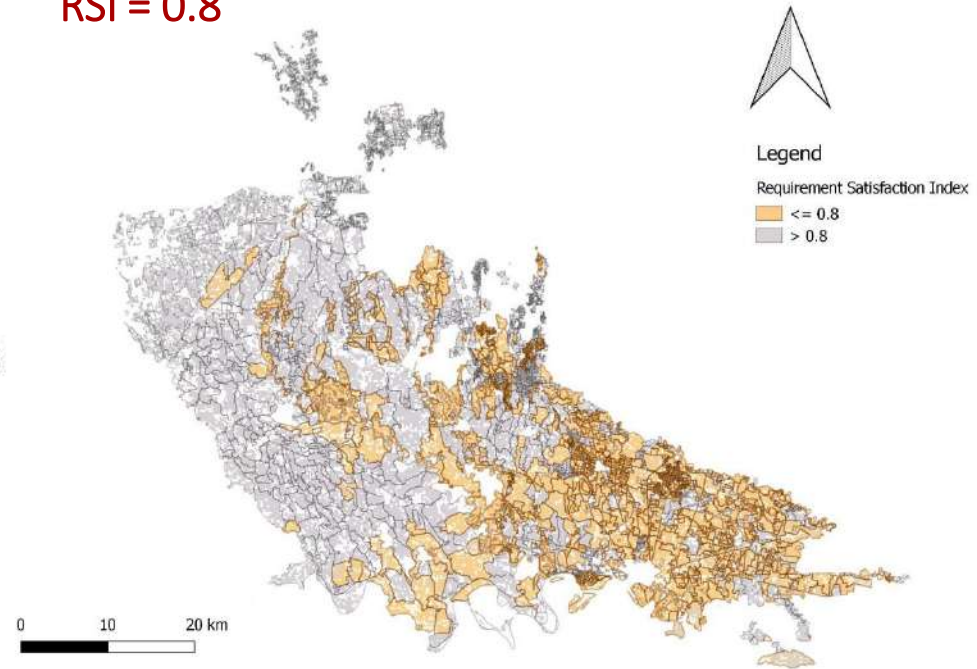
Superfici irrigue cumulate per RSI crescente



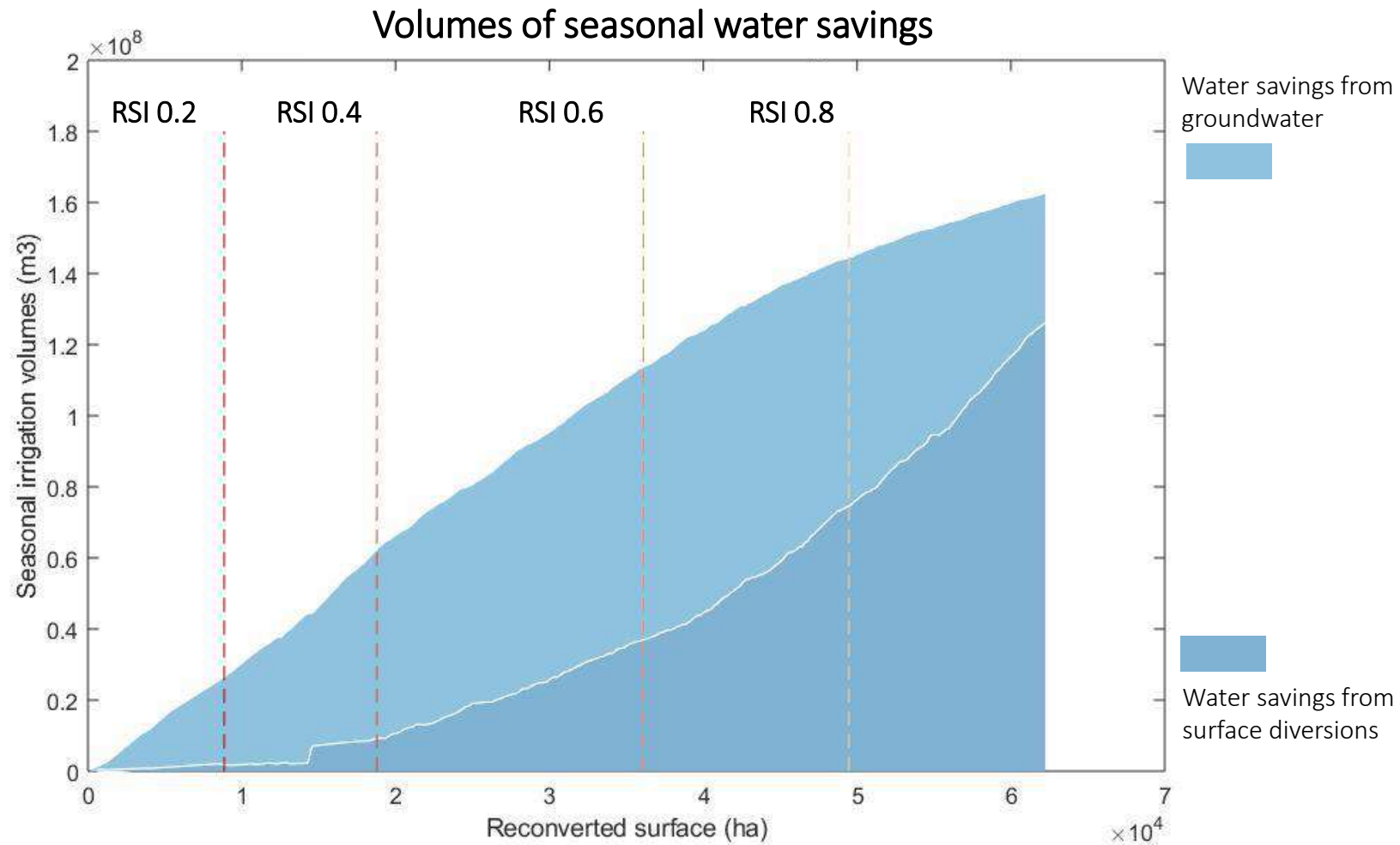
Superfici irrigue cumulate per RSI crescente



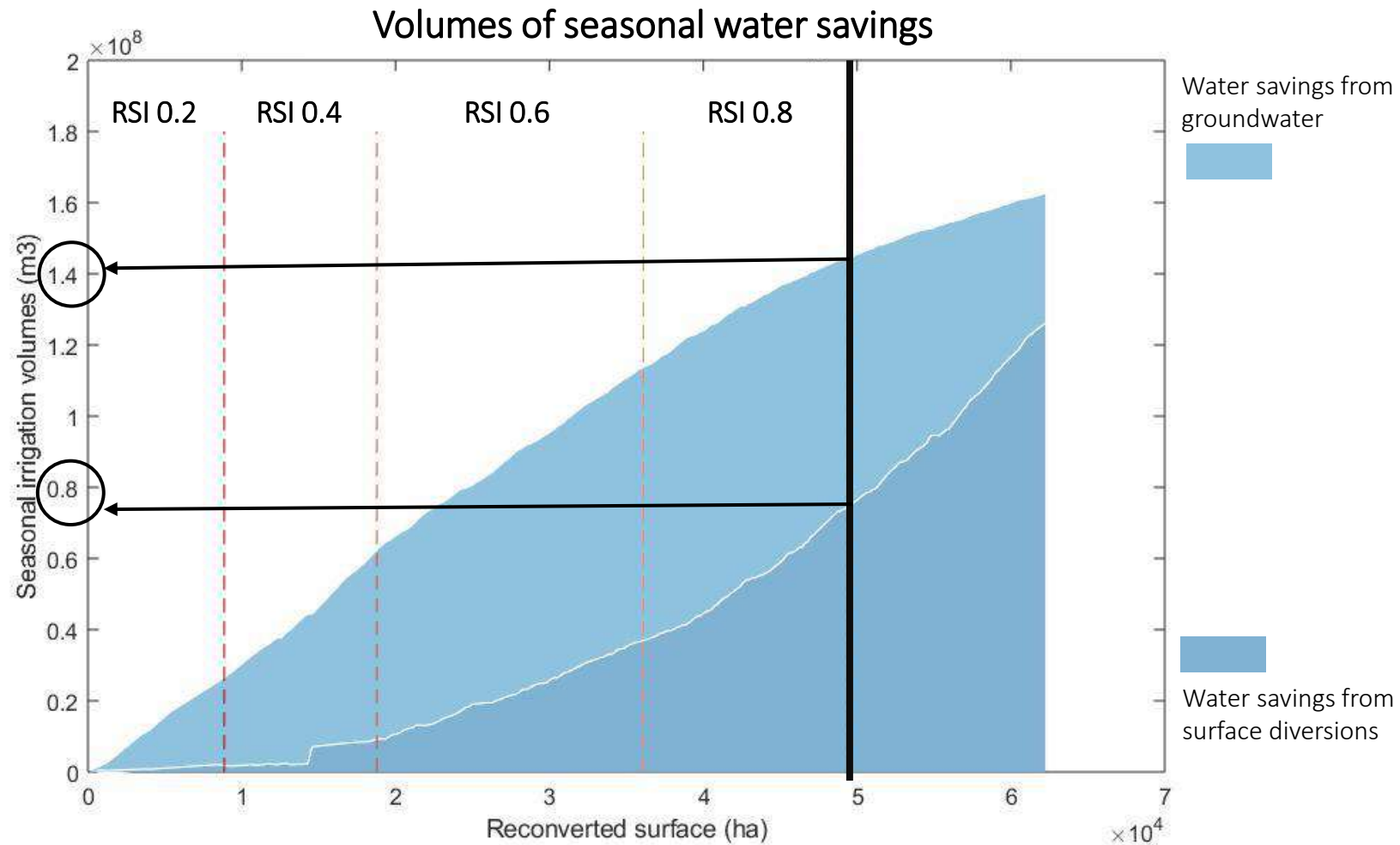
RSI = 0.8



Riduzione volumi stagionali derivati

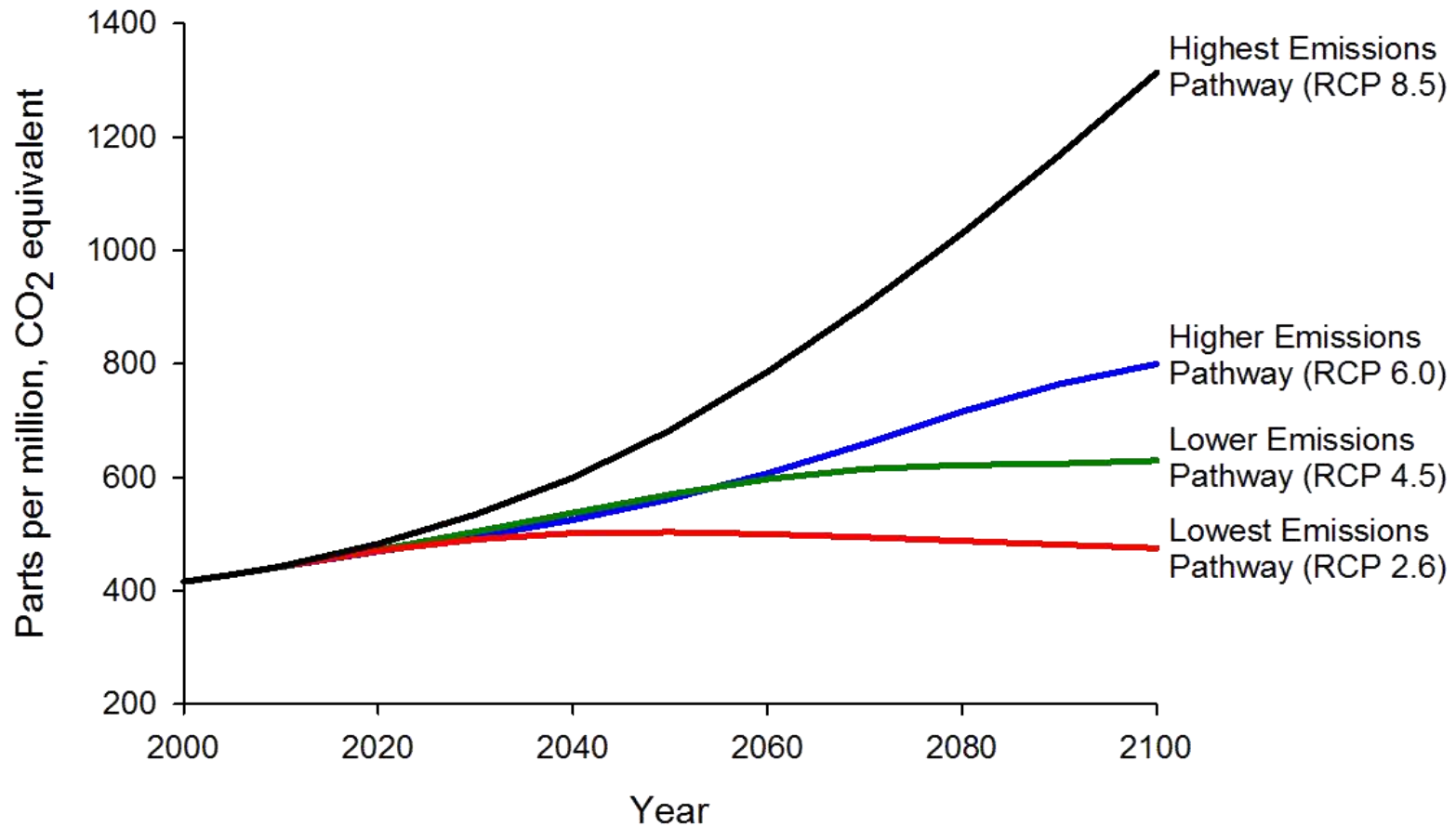


Riduzione volumi stagionali derivati



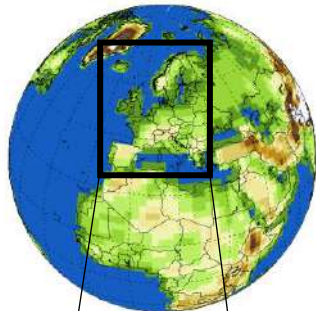
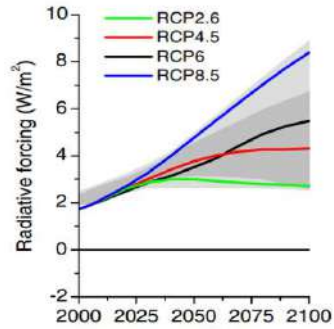
Stima degli effetti del cambio climatico

Projected Atmospheric Greenhouse Gas Concentrations



Fonte: EPA 2018

Riduzione volumi stagionali derivati con CC



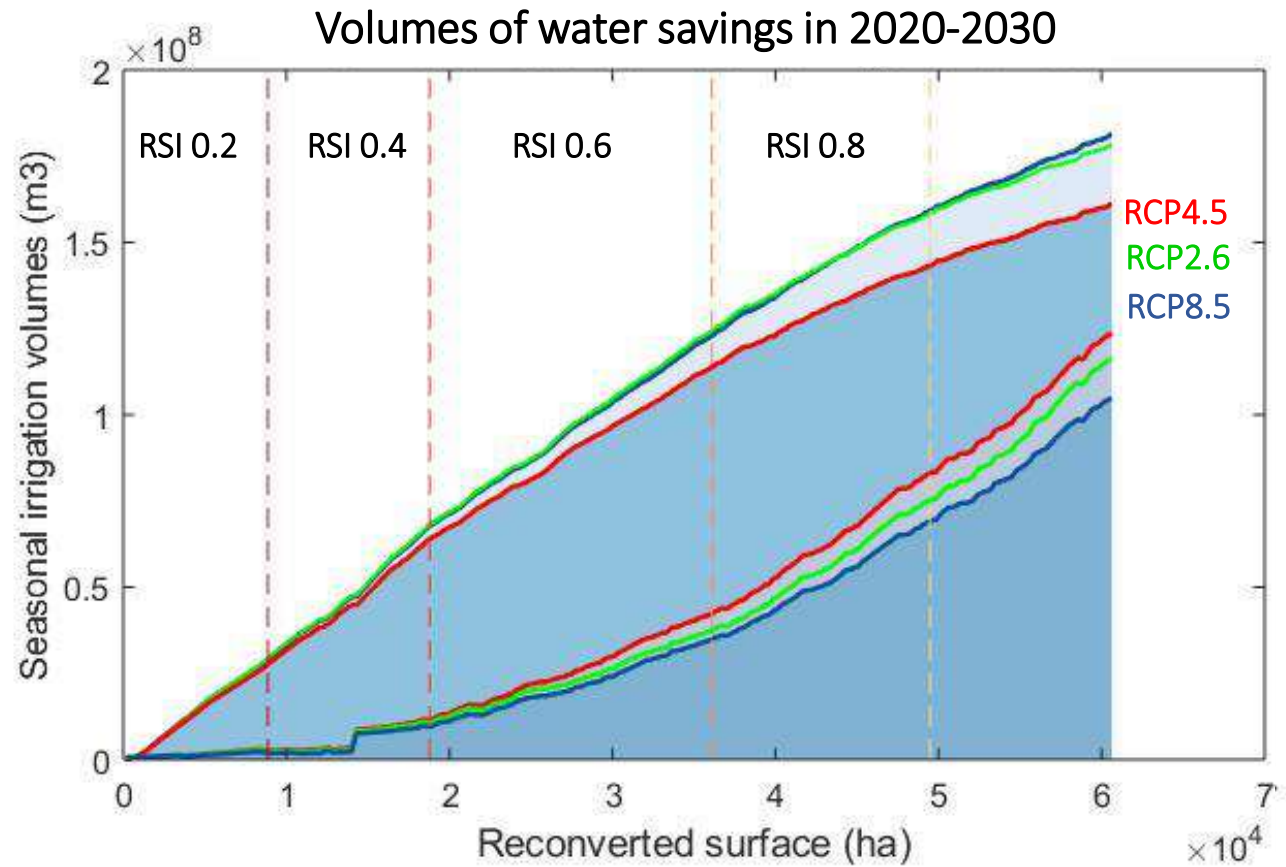
GCM
Resolution
100-500 km



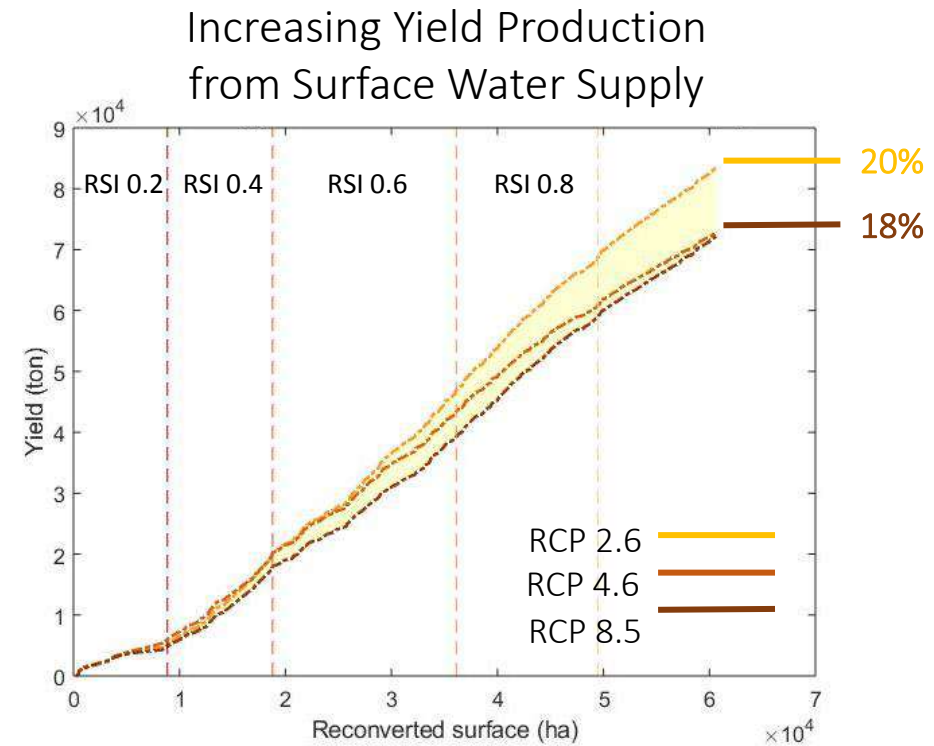
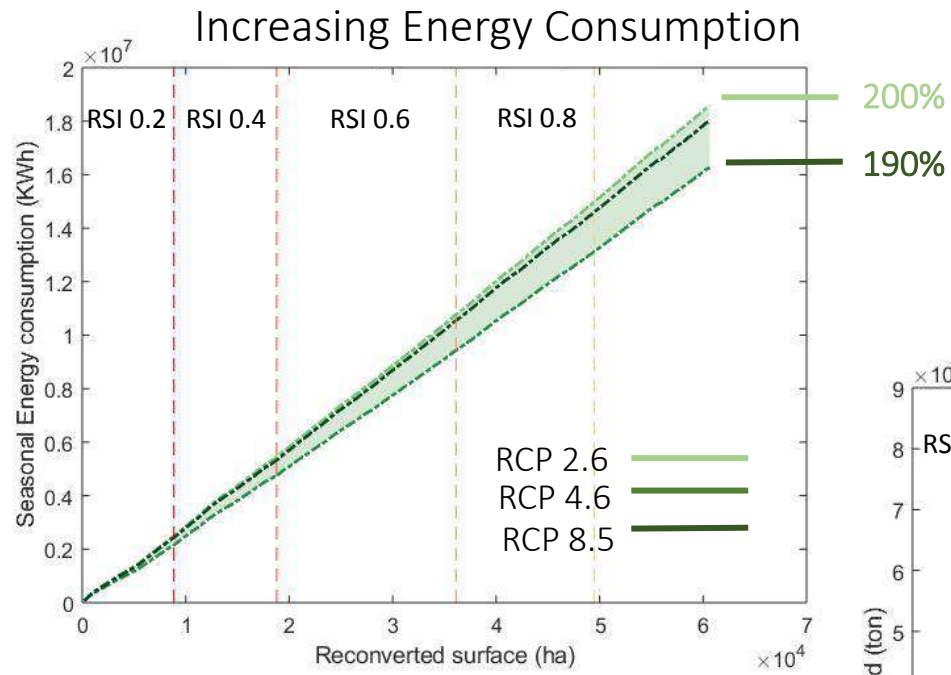
RCM
Resolution
10-50 km



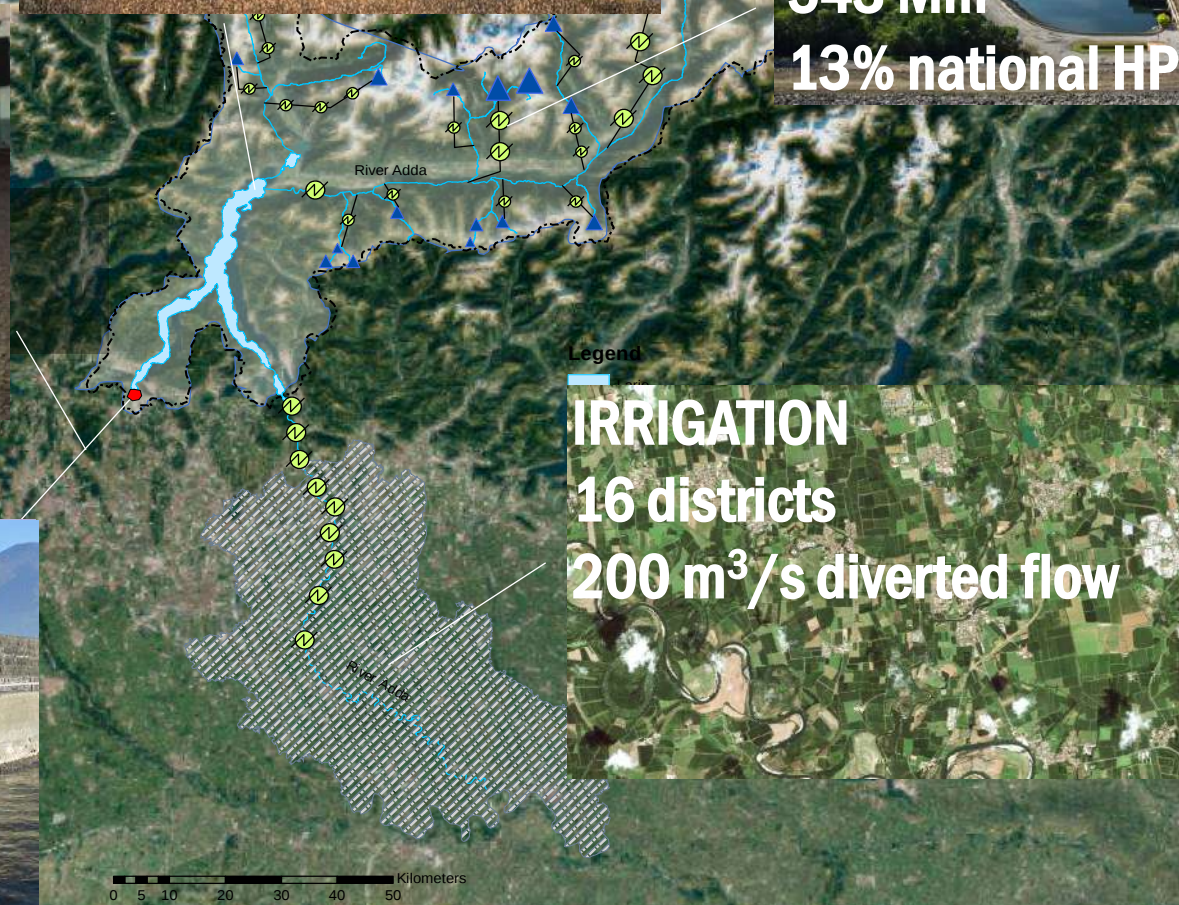
Station level



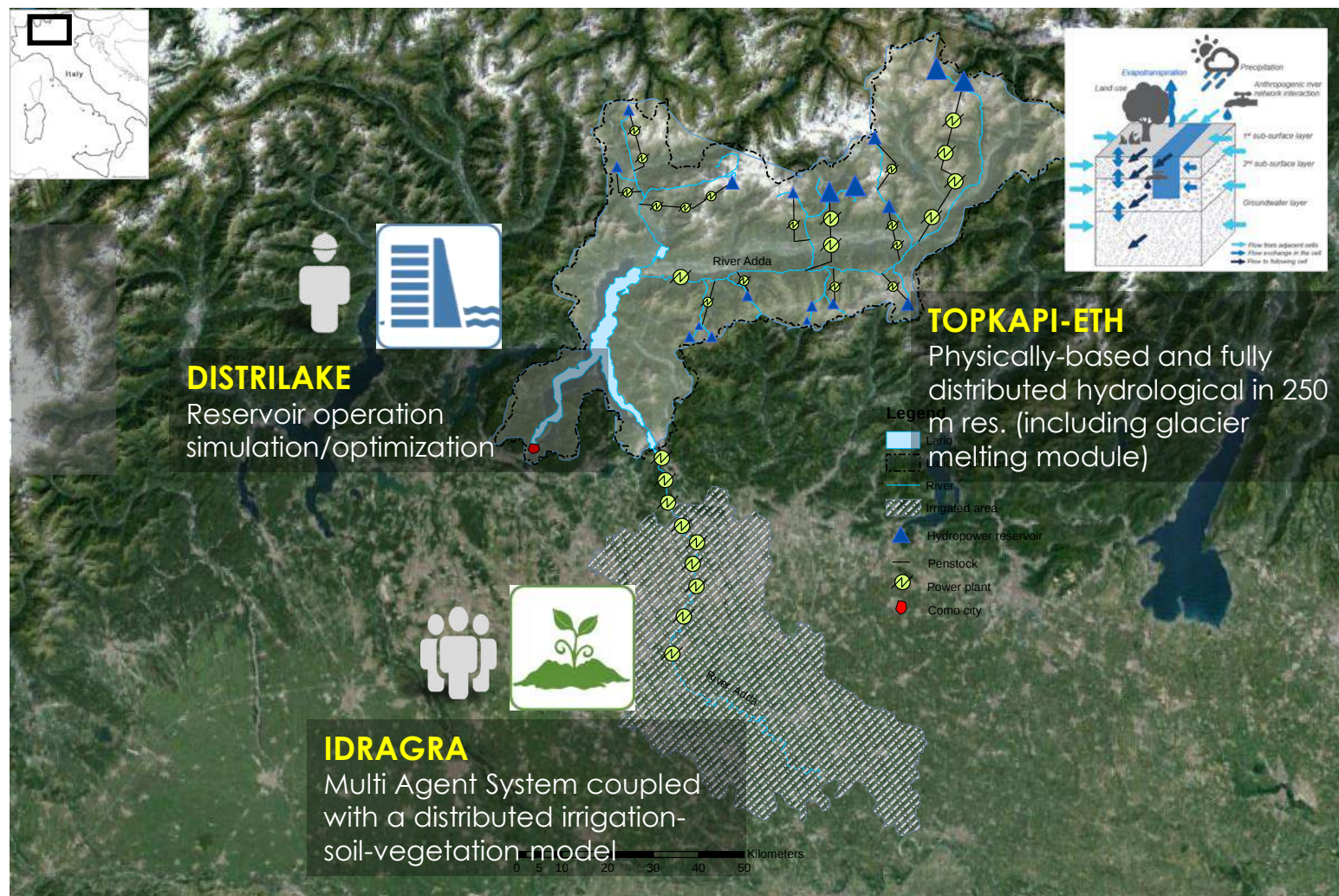
Fabbisogni energetici e produzioni



Da valle a monte

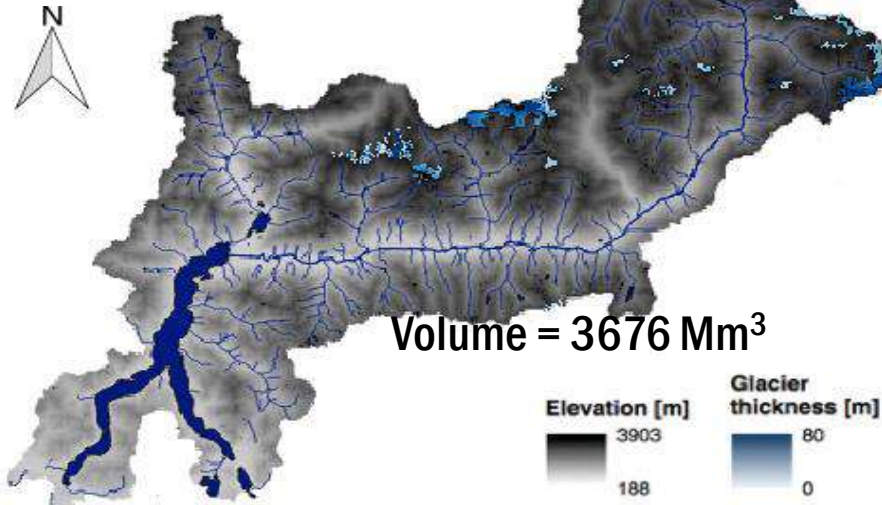


Da valle a monte: la scala di bacino

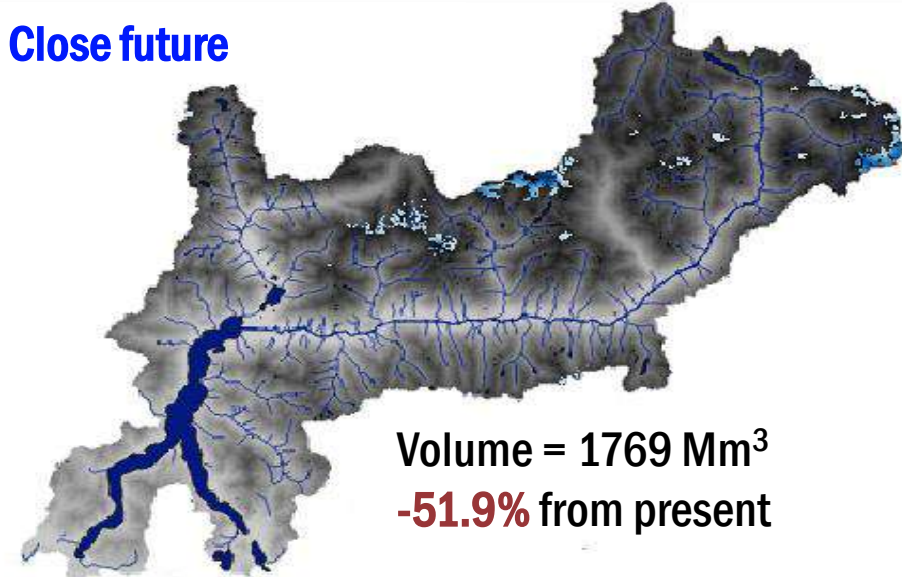


Evoluzione ghiacciai Valtellina

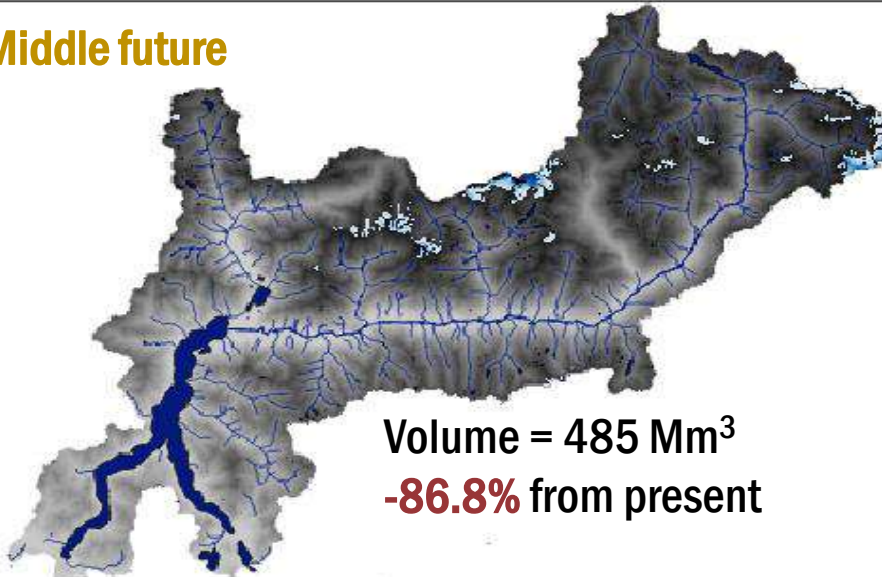
Present



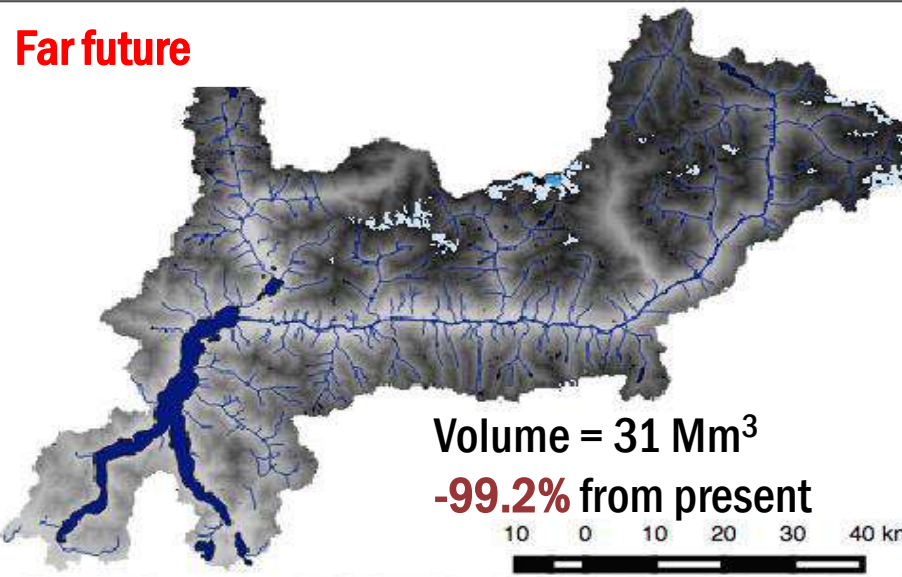
Close future



Middle future

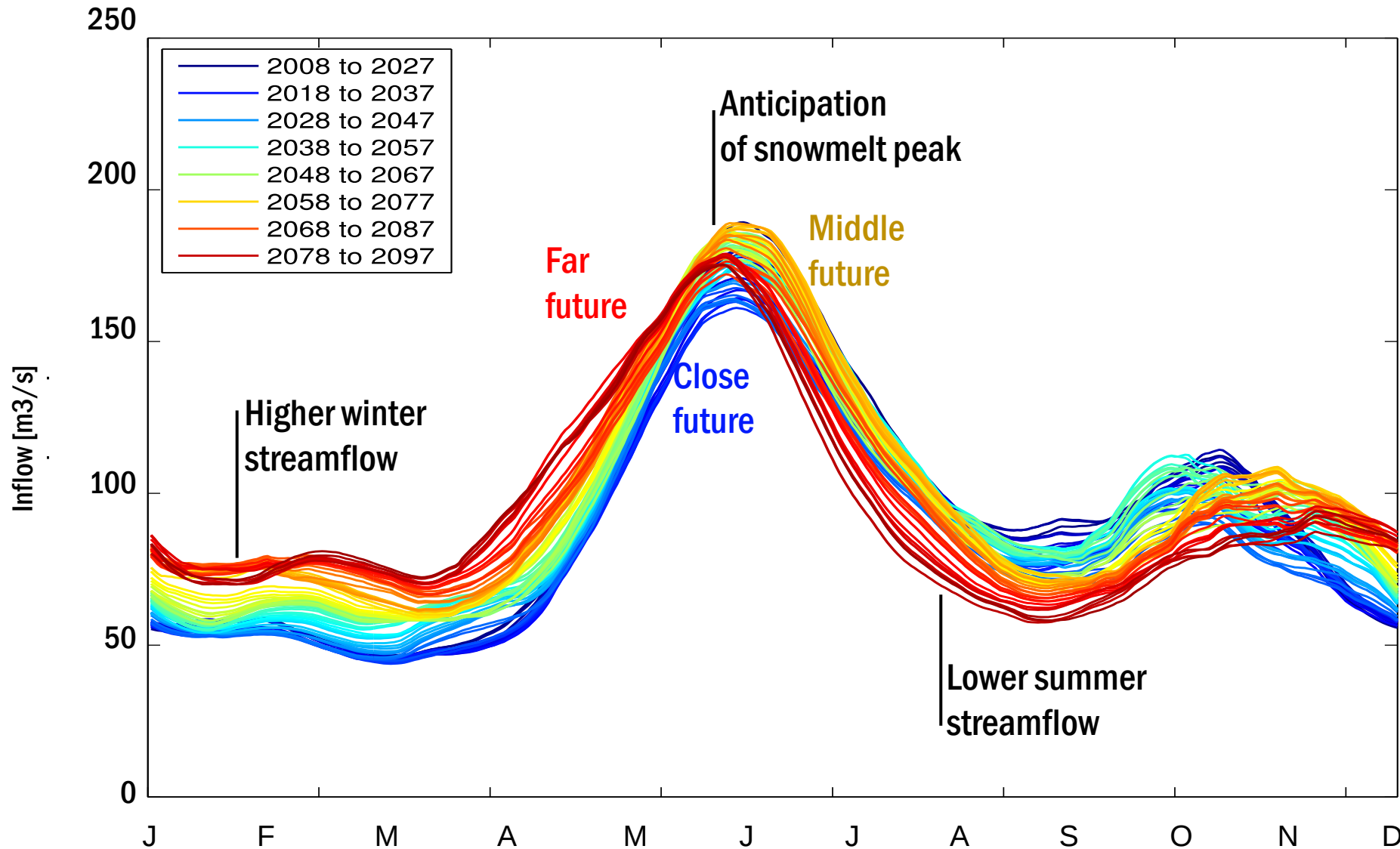


Far future



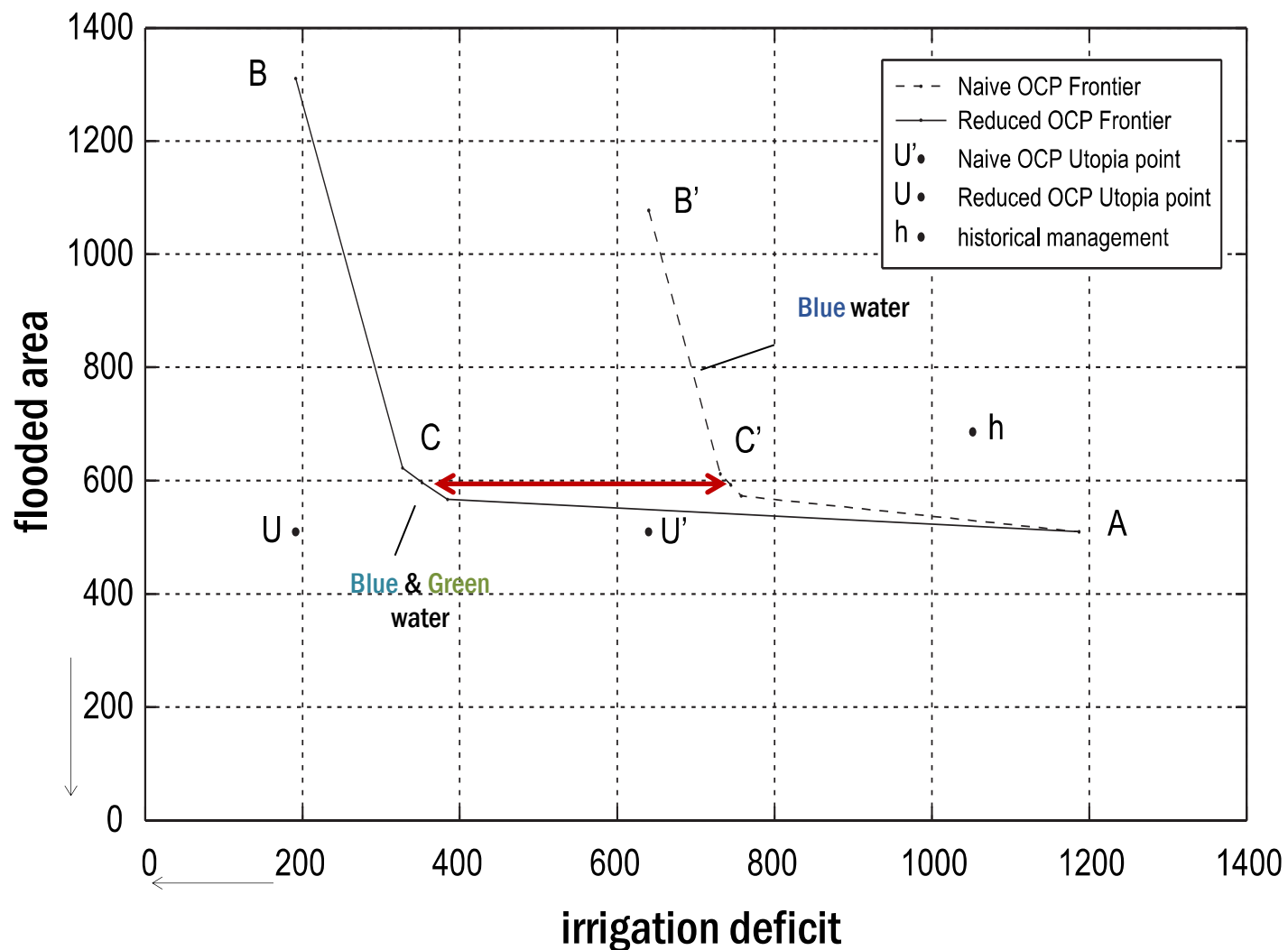
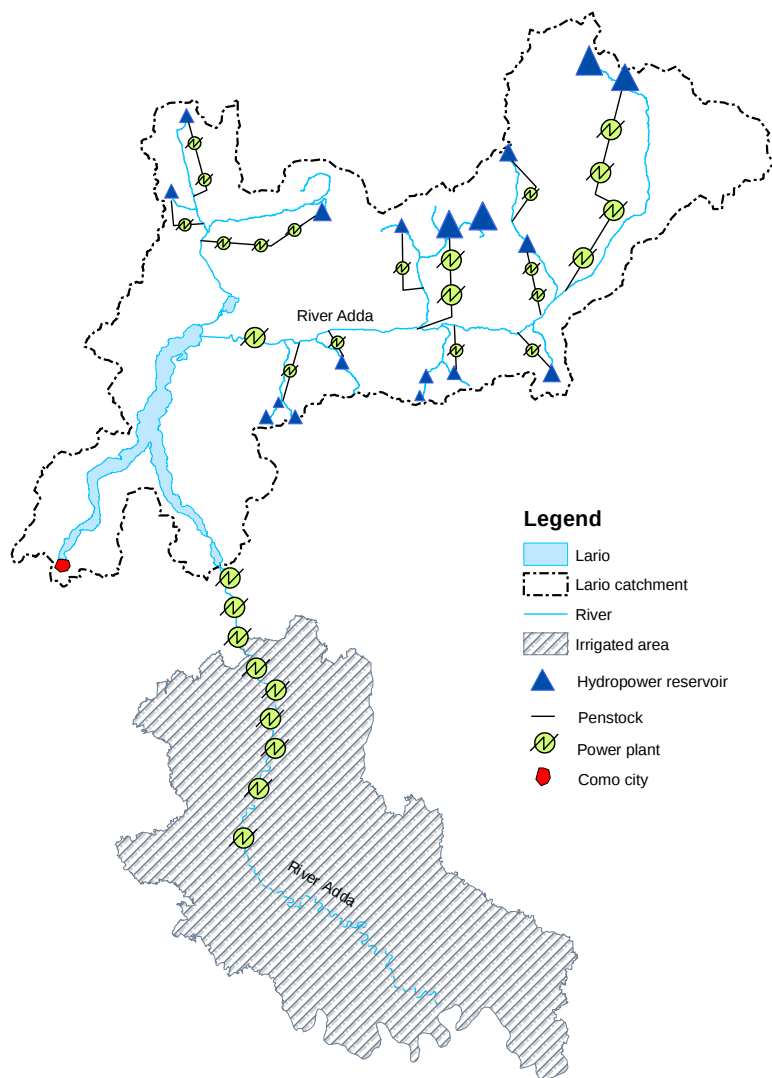
**RCP 8.5
SMHI-RCA4**

Affussi al lago

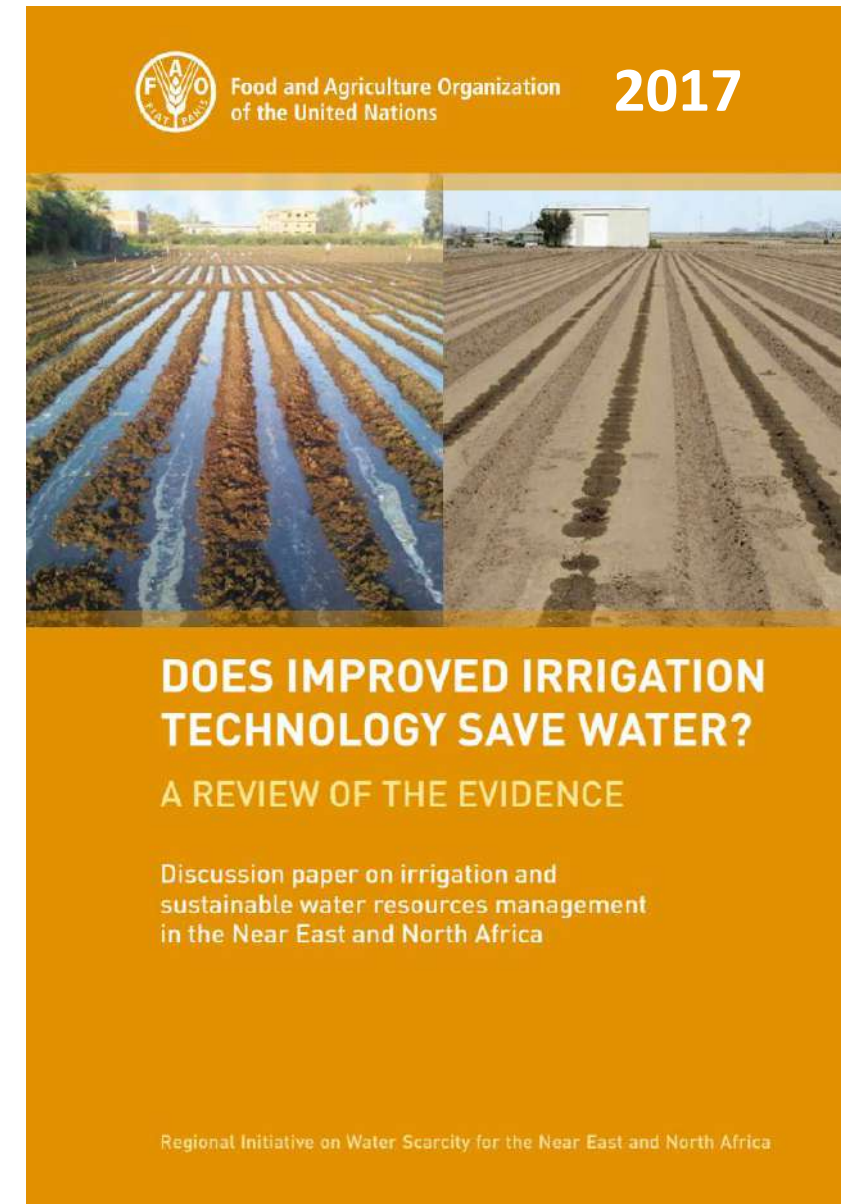


RCP 8.5
SMHI-RCA4

Regolazione del lago di Como



un “mondo difficile”





fine