

National Meeting on Hydrogeology

Viterbo, June 18-20, 2014 Università degli Studi della Tuscia
Aula Magna del Rettorato – Complesso di Santa Maria in Gradi

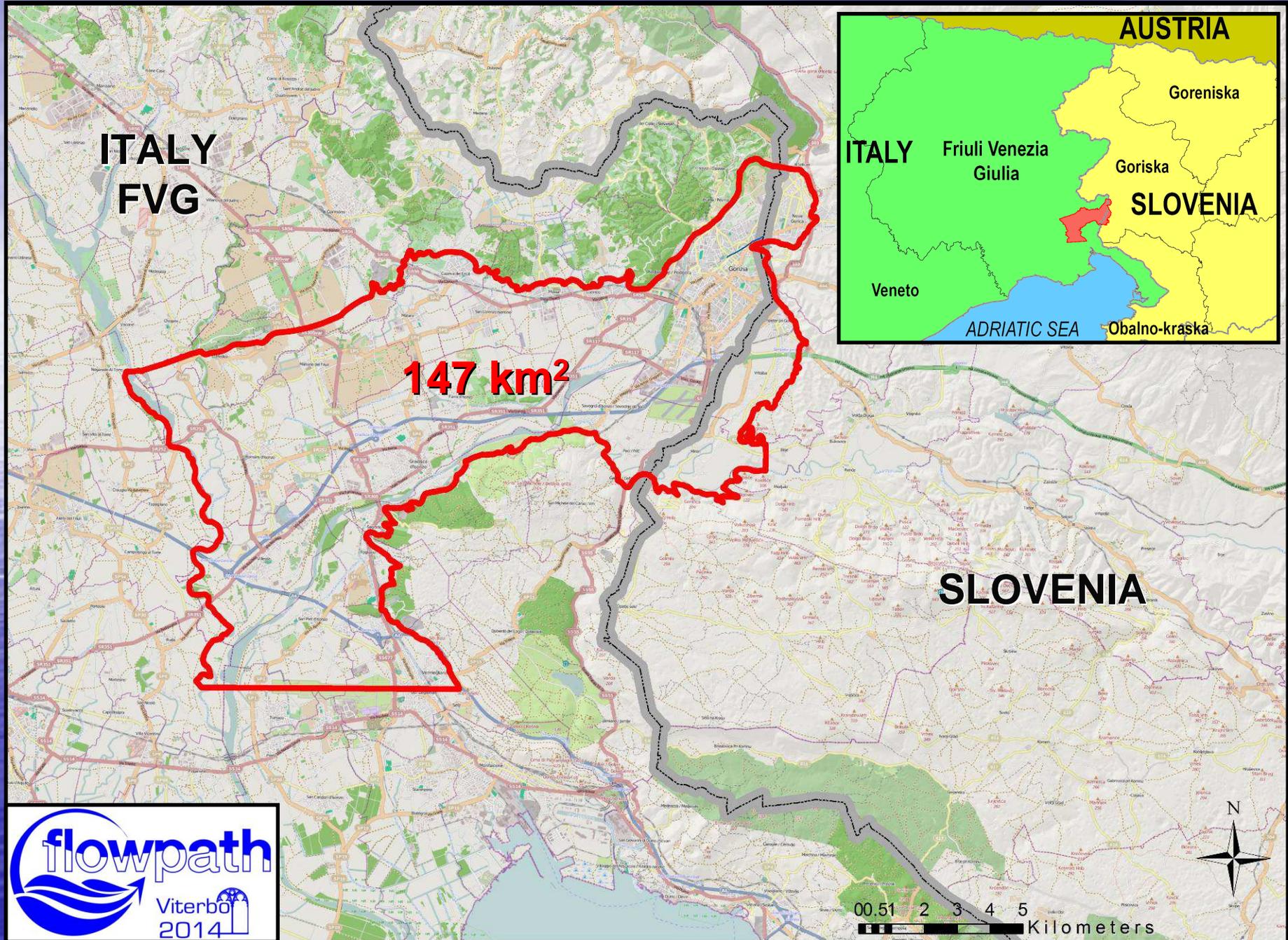
The phreatic aquifer of the Isonzo Plain (NE Italy): hydrodynamic and vulnerability

F. TREU¹, E. ZAVAGNO¹, L. ZINI¹, S. BIOLCHI¹, F. CUCCHI¹,
G. ZUECCO², T. FERJAN³, S. RUSSO⁴

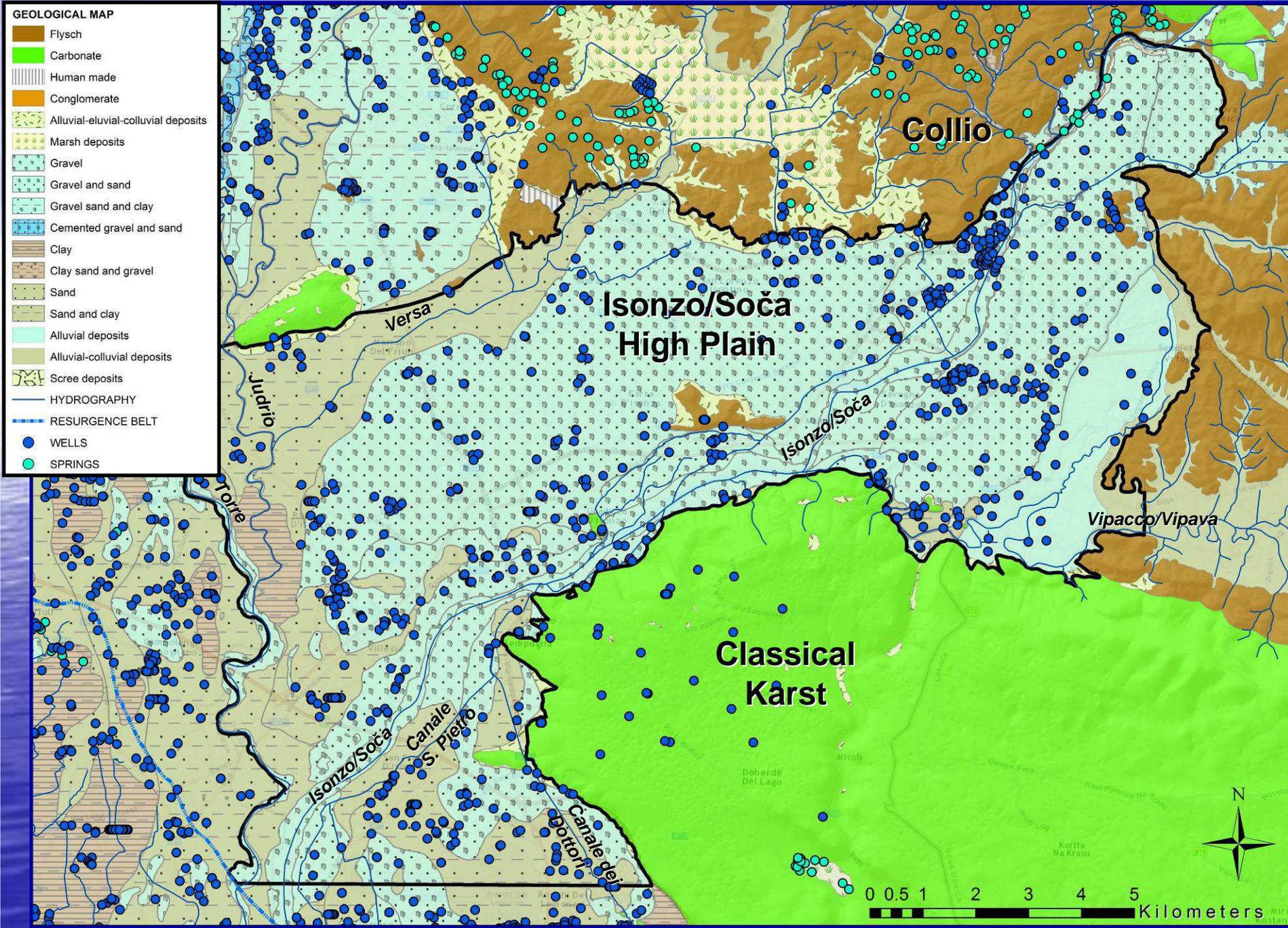
1. Dipartimento di Matematica e Geoscienze, DMG - Università degli Studi di Trieste
2. Dipartimento di Territorio e Sistemi Agro-Forestali, TESAF - Università degli Studi di Padova
3. Geološki Zavod Slovenije, GeoZS, - Ljubljana, Slovenia
4. Dipartimento di Scienze della Terra, DFST- Università di Ferrara



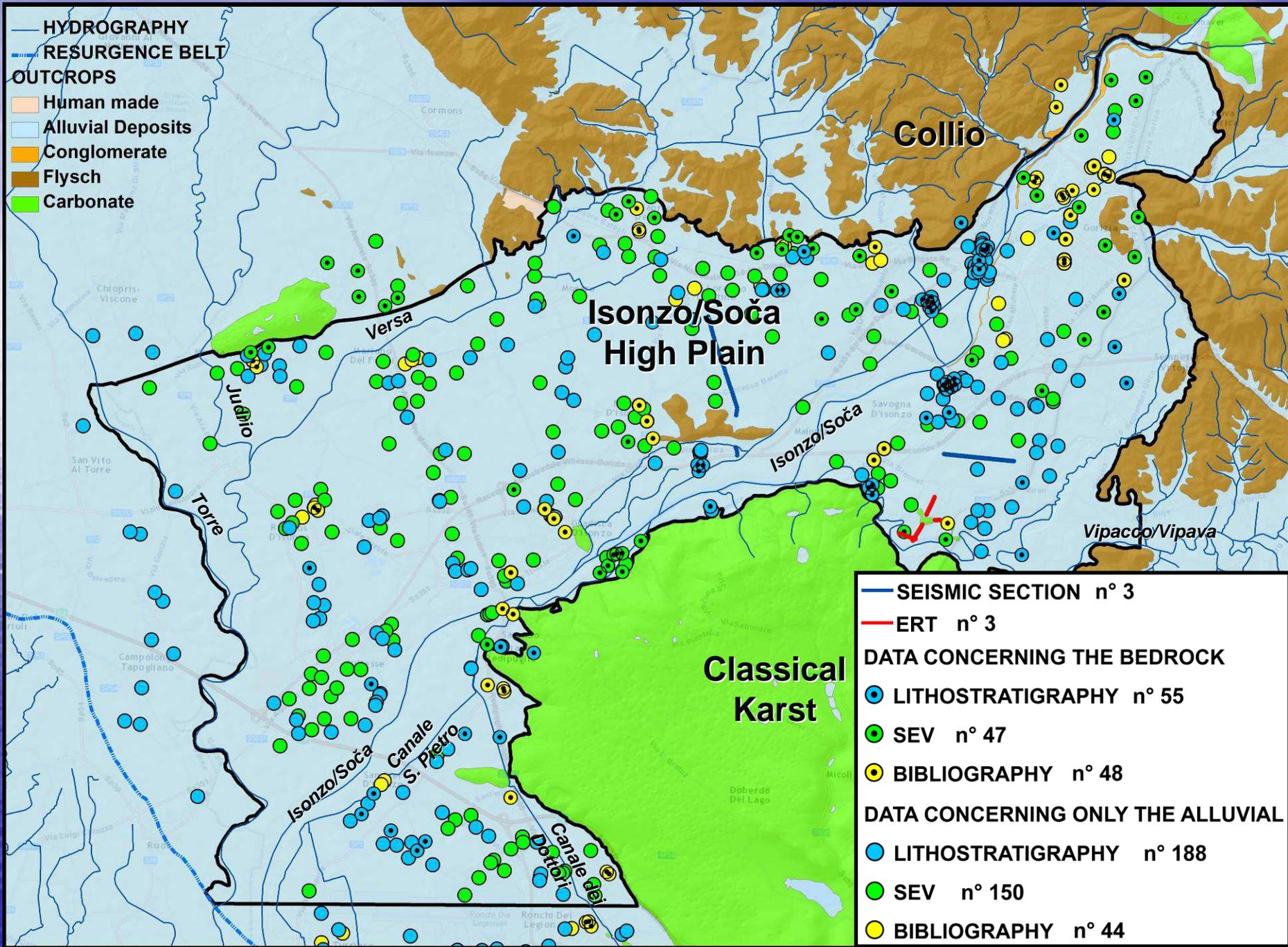
THE STUDY AREA



GEOLOGICAL MAP



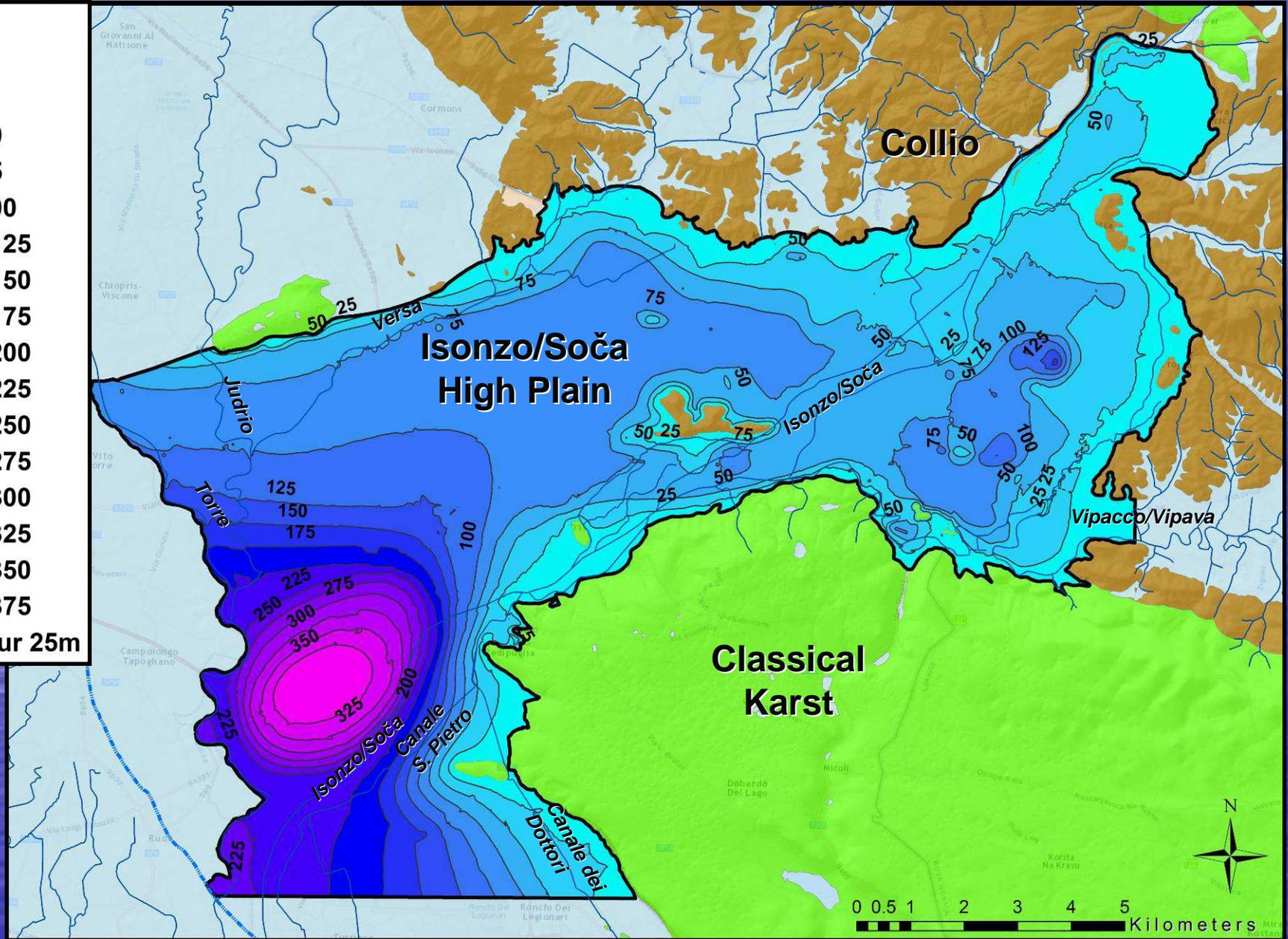
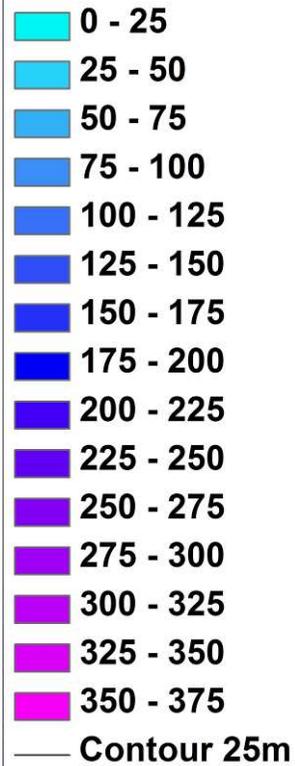
ISOBATH AND BEDROCK



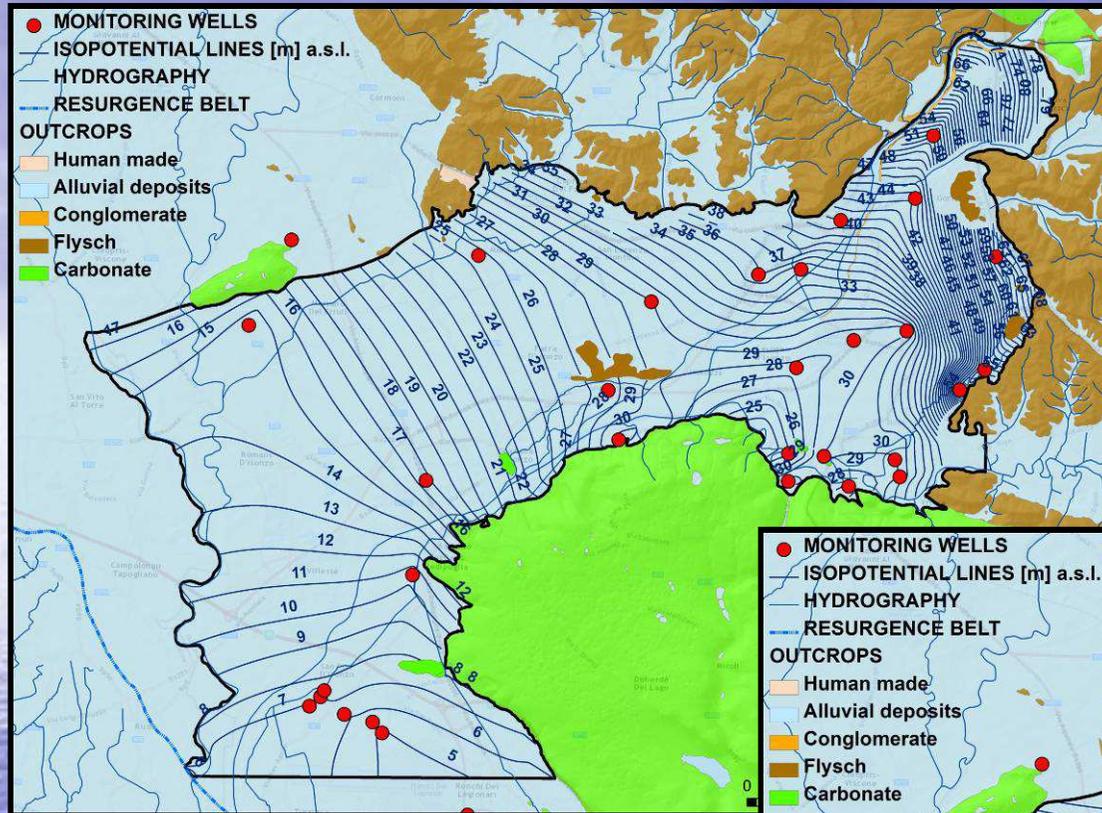
ISOPACH

ISOPACH

[m]



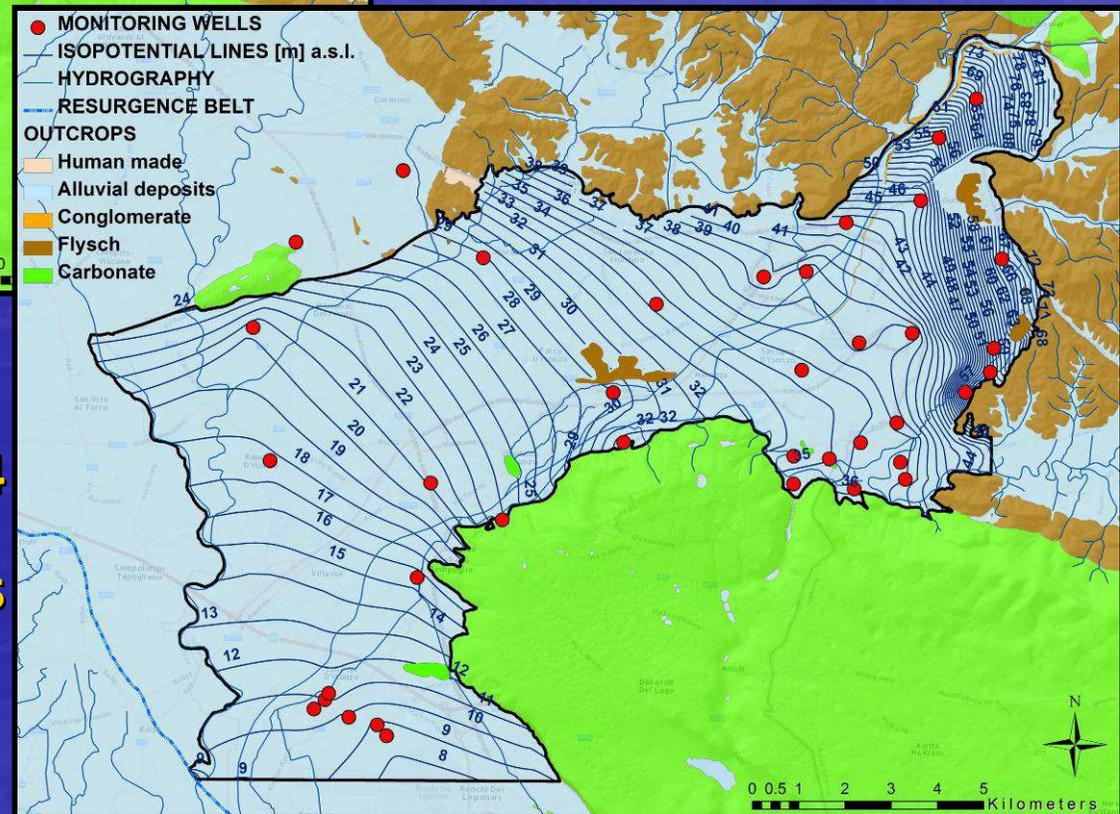
THE WATER TABLE



36 monitoring wells

08 August 2013

Low flow conditions



44 monitoring wells

04-07 February 2014

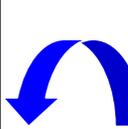
High flow conditions



HYDROGEOLOGICAL WATER BALANCE

INPUT

 RIVER LOSING

 IRRIGATION
RETURN
FLOW AND
INFILTRATION

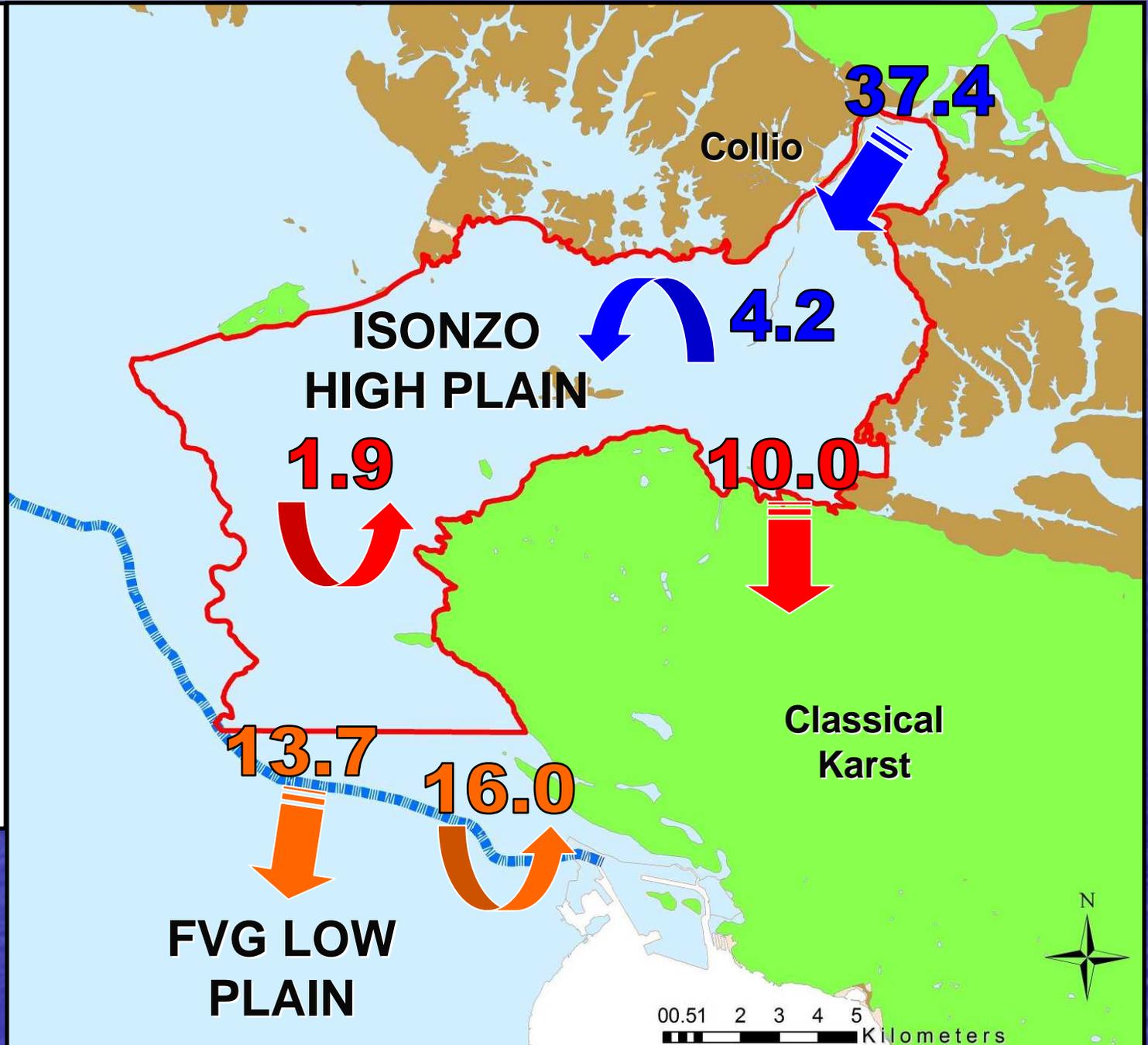
OUTPUT

 WELL
WITHDRAWALS

 KARST
DRAINAGE

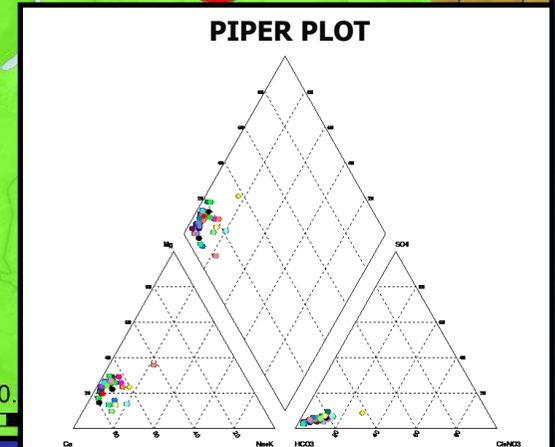
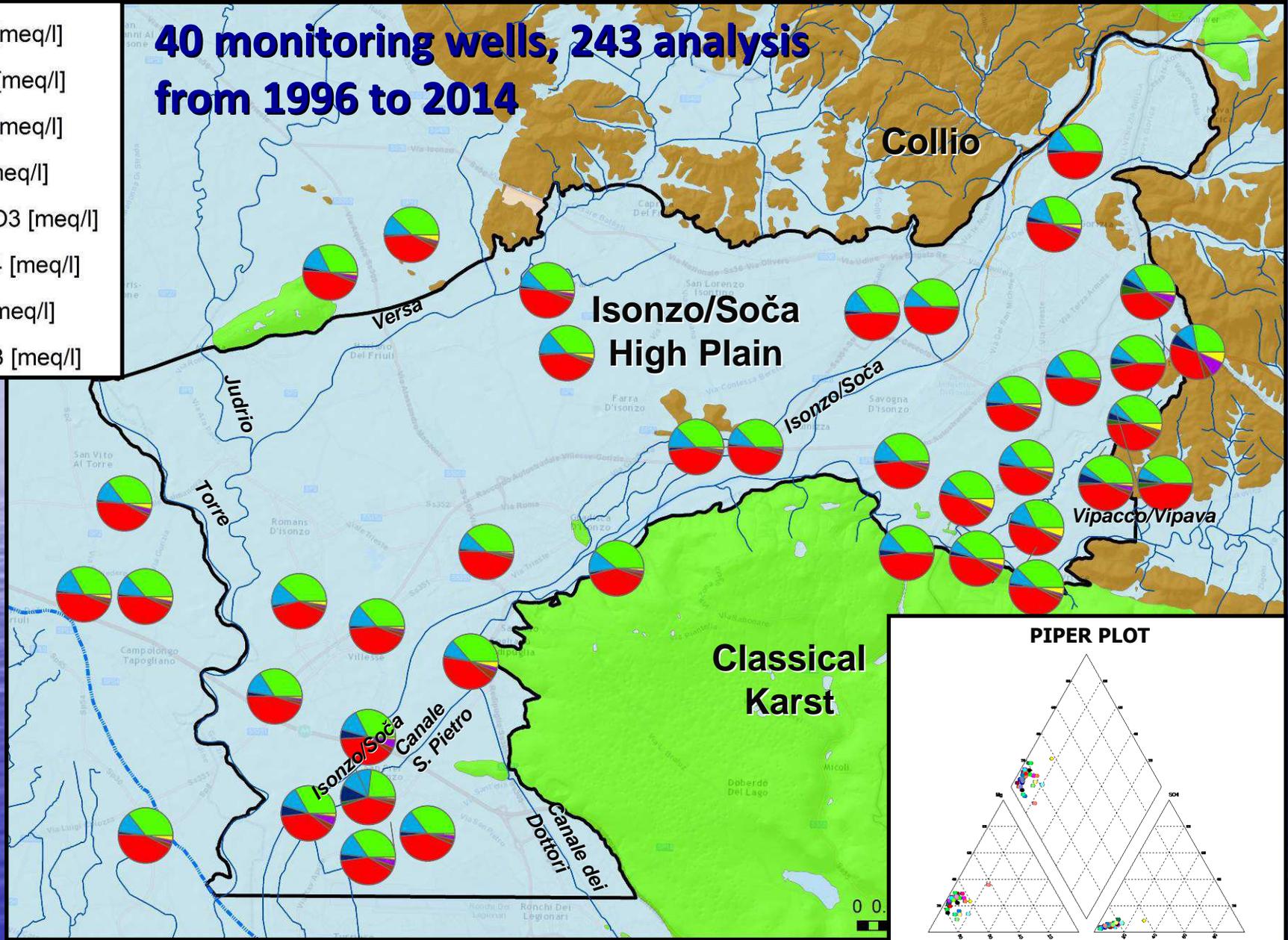
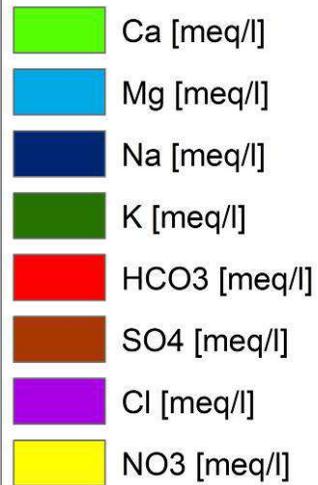
 RESURGENCE
BELT
DISCHARGE

 LOW PLAIN
RECHARGE



HYDROCHEMICAL ANALYSIS

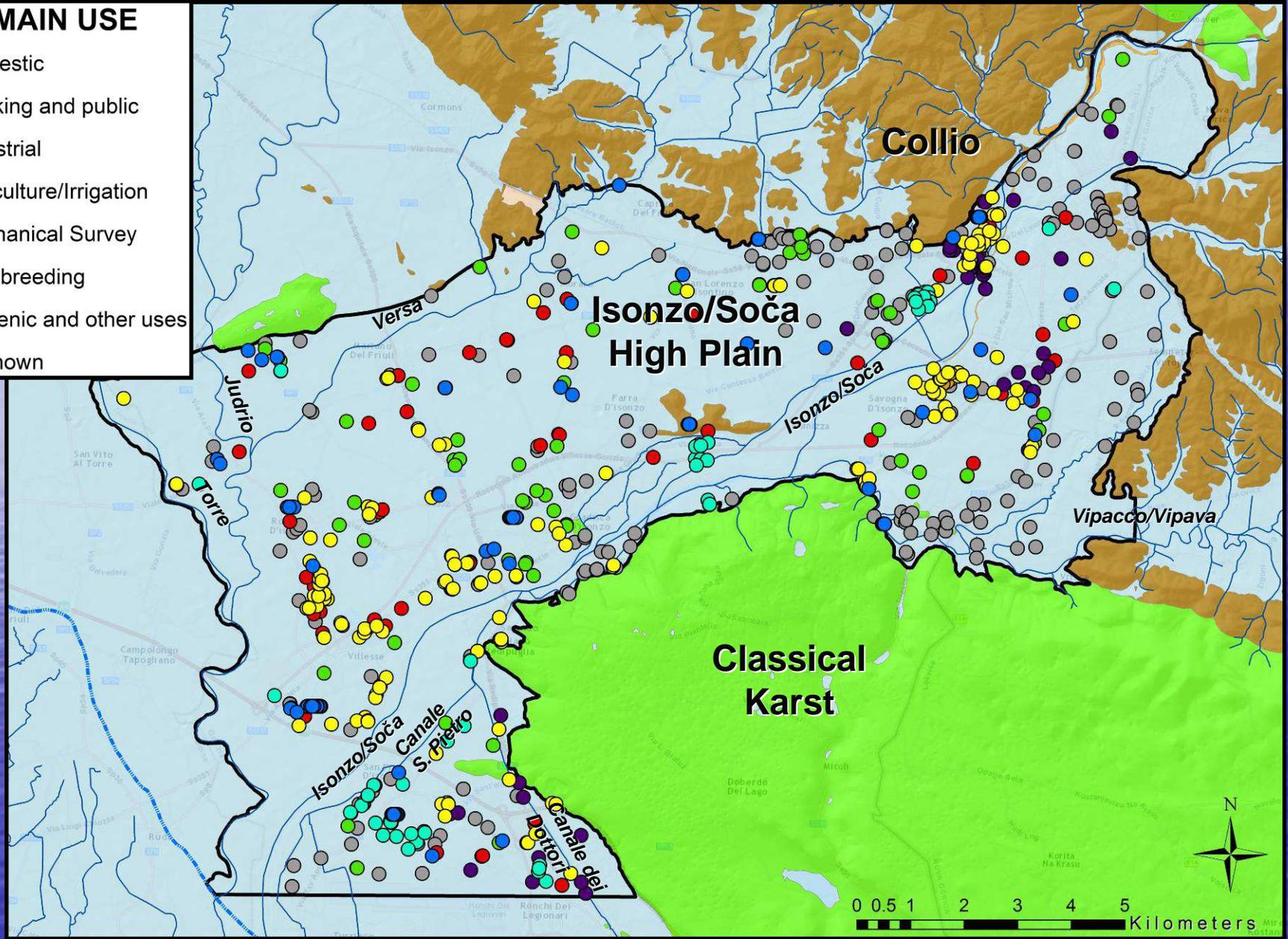
**40 monitoring wells, 243 analysis
from 1996 to 2014**



GROUNDWATER USES

WELLS MAIN USE

- Domestic
- Drinking and public
- Industrial
- Agriculture/Irrigation
- Mechanical Survey
- Fish breeding
- Hygienic and other uses
- Unknown

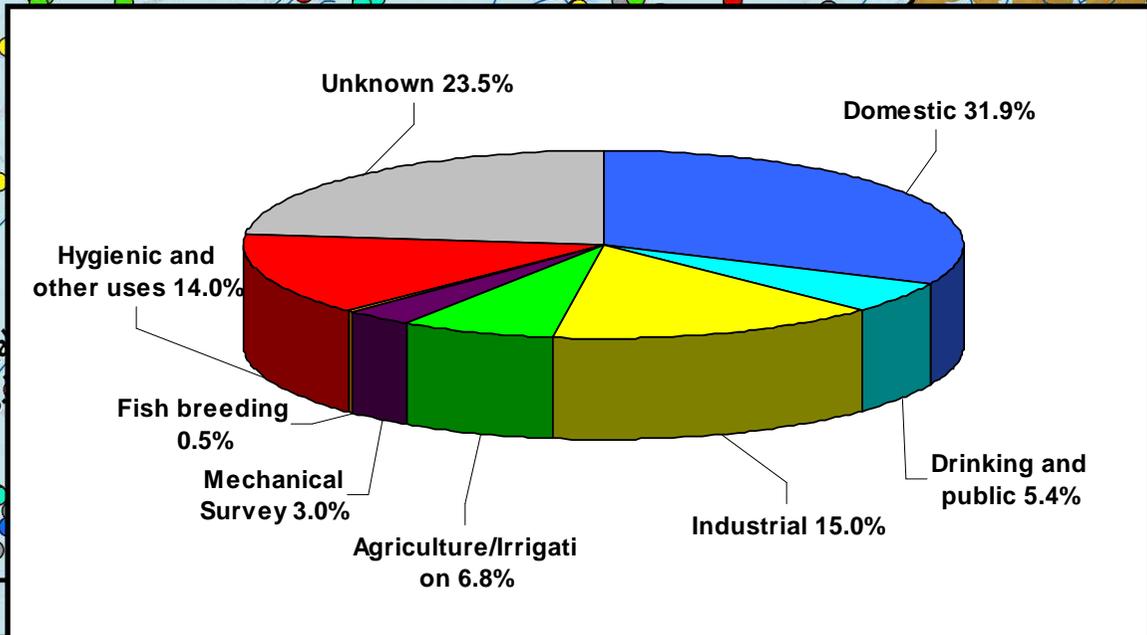
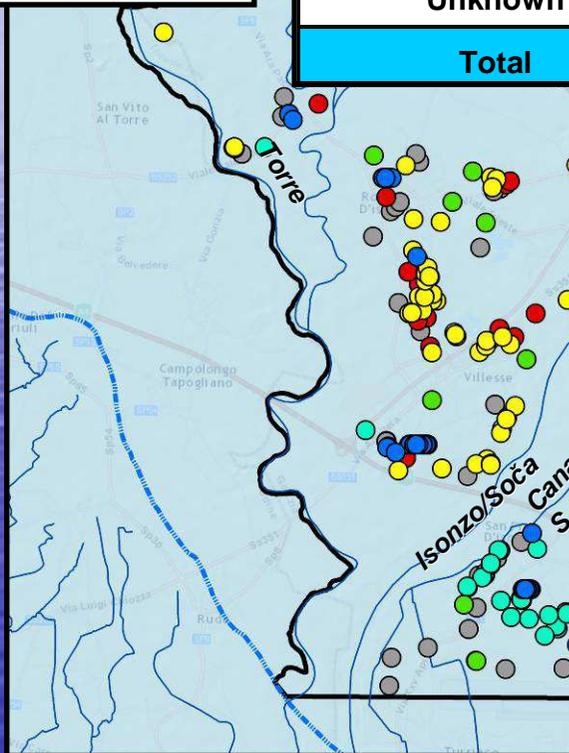
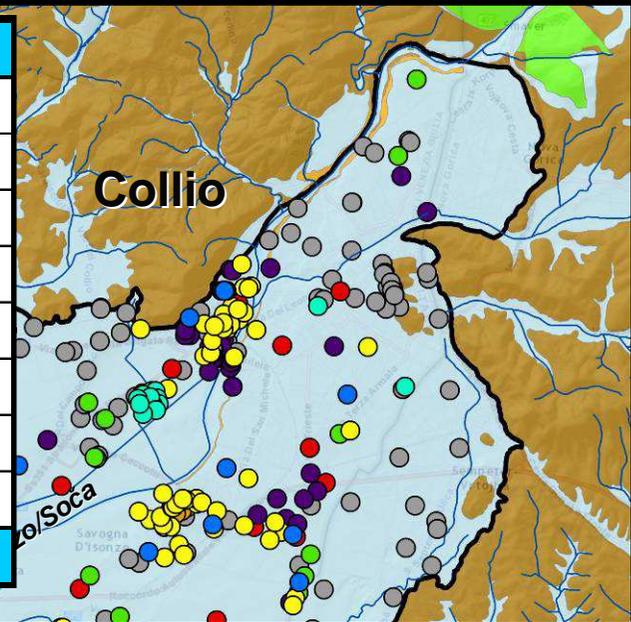


GROUNDWATER USES

WELLS MAIN USE

- Domestic
- Drinking and public
- Industrial
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- Fish breeding
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- Unknown

MAIN USE	n° OF WELLS	%
Domestic	495	31.9
Drinking and public	84	5.4
Industrial	233	15.0
Agriculture/Irrigation	106	6.8
Mechanical Survey	46	3.0
Fish breeding	7	0.5
Hygienic and other uses	217	14.0
Unknown	364	23.5
Total	1552	100.0



SINTACS

Point Count System Model

S depth to the ground water table

I effective infiltration

N unsaturated zone attenuation capacity

T soil attenuation capacity

A hydrogeological characteristic of the aquifer

C coefficient of hydraulic conductivity

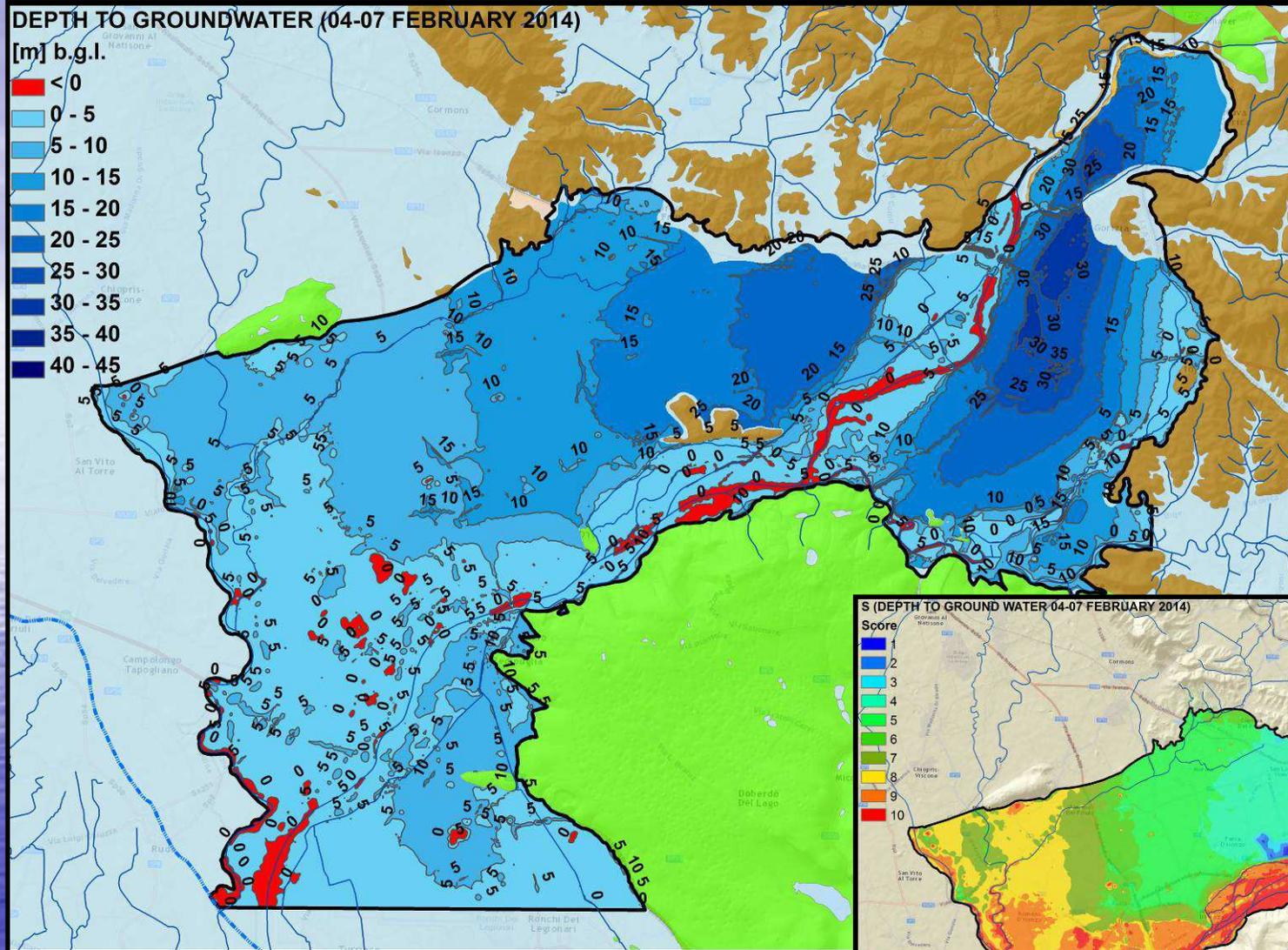
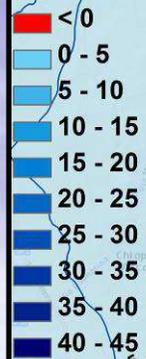
S topographical slope

Scores from 1 to 10

S DEPTH TO GROUND WATER

DEPTH TO GROUNDWATER (04-07 FEBRUARY 2014)

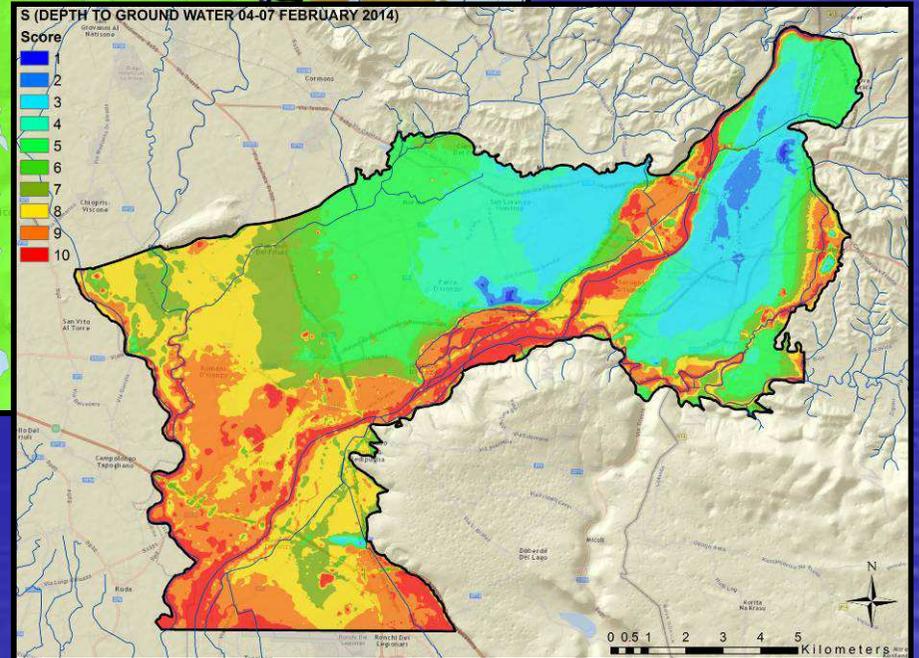
[m] b.g.l.



44 monitoring wells
04-07 February 2014
High flow conditions

S (DEPTH TO GROUND WATER 04-07 FEBRUARY 2014)

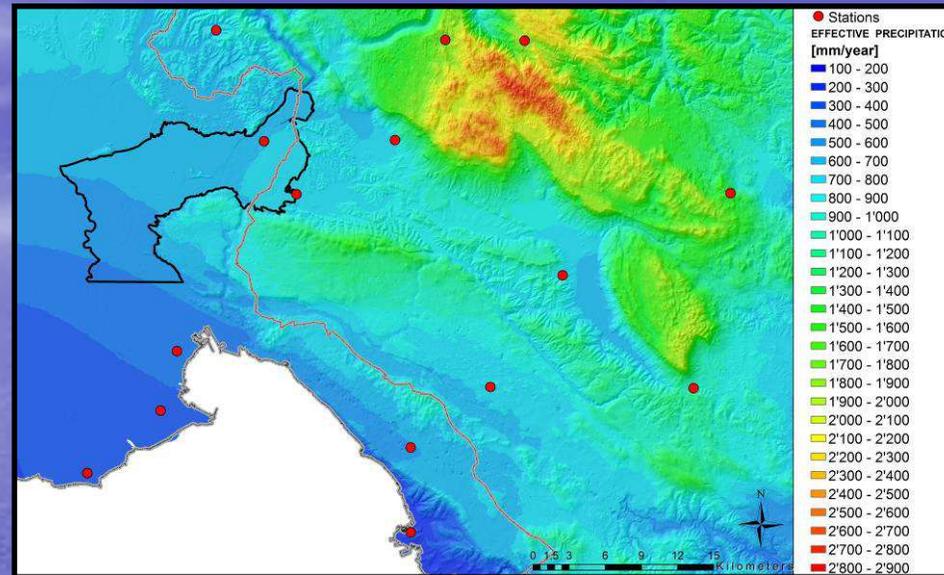
Score



S score

EFFECTIVE INFILTRATION

Effective precipitation map

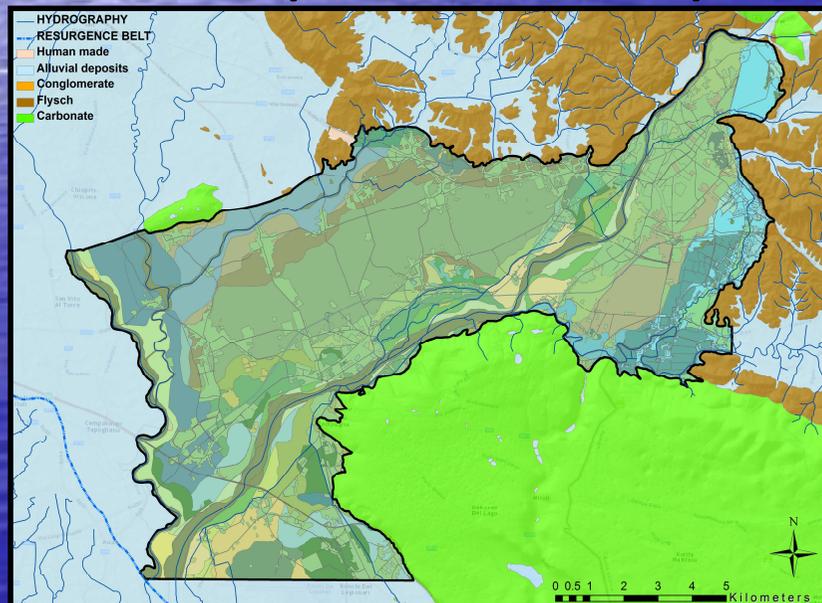


15 meteo stations
(raingauges and
thermometers)

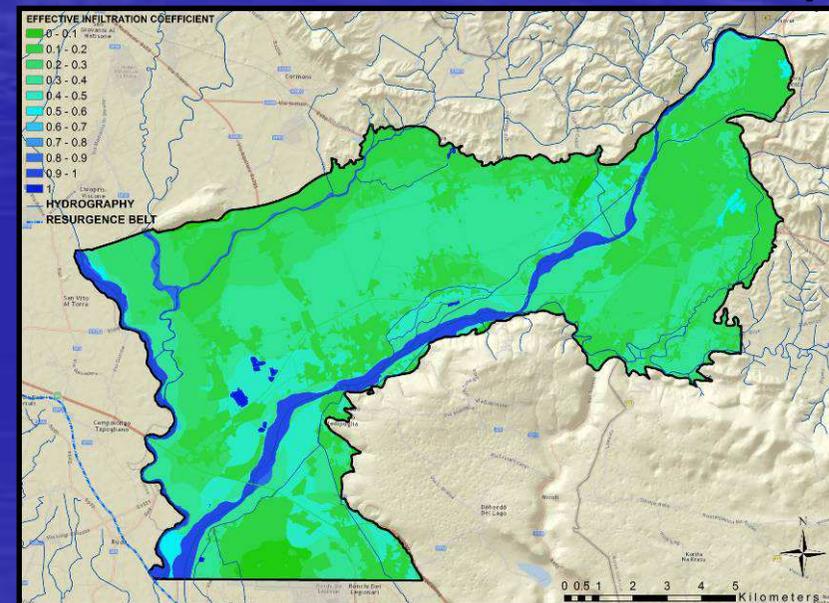
Data from 1981 to
2010

Turc method

Soil map and land use map

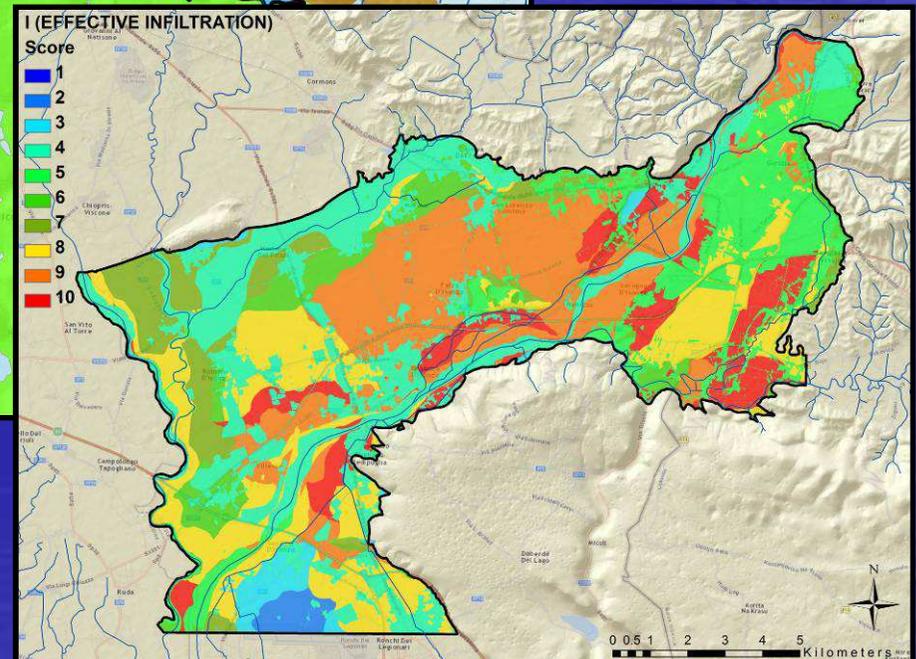
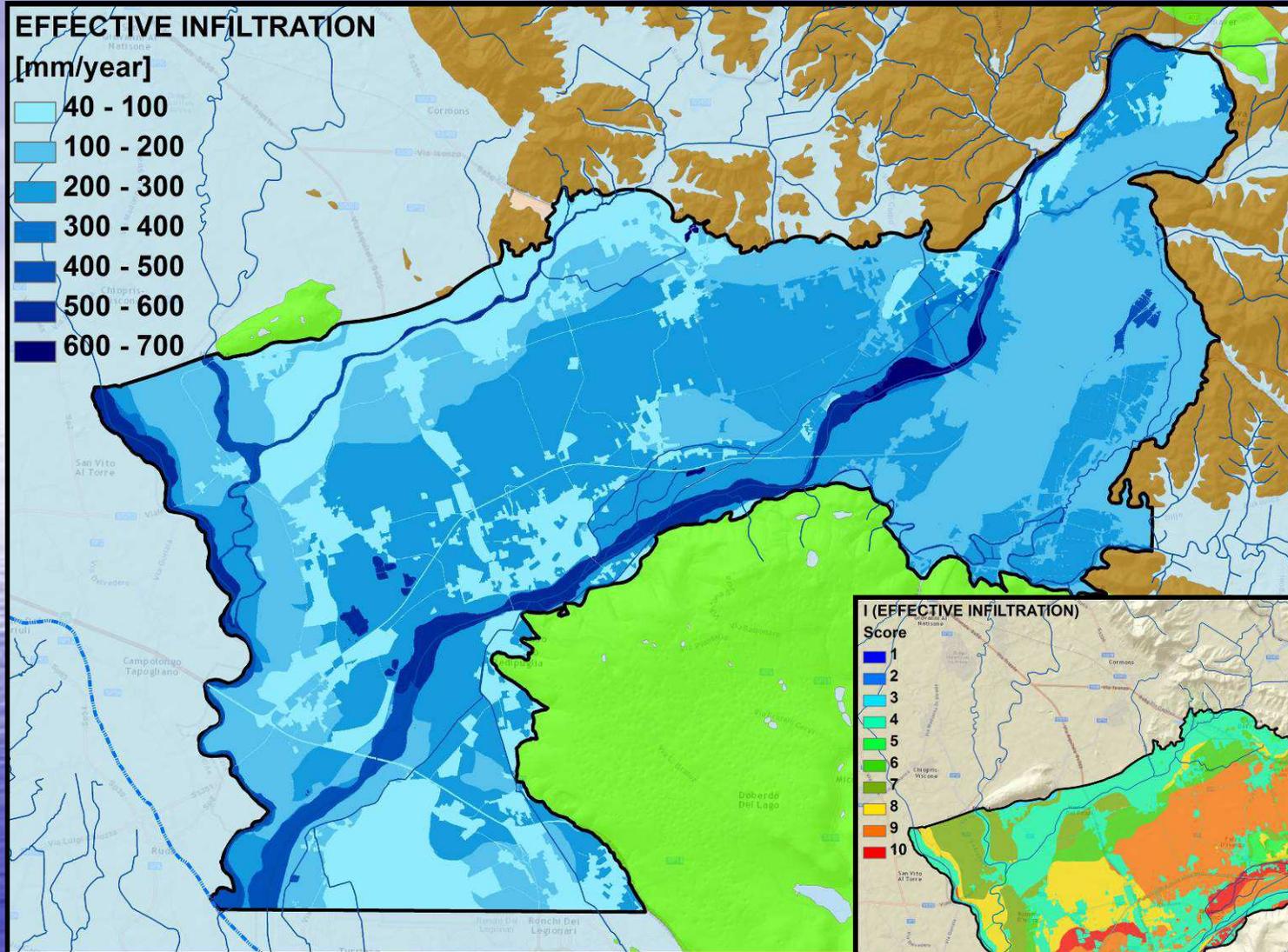


Effective infiltration coefficients map



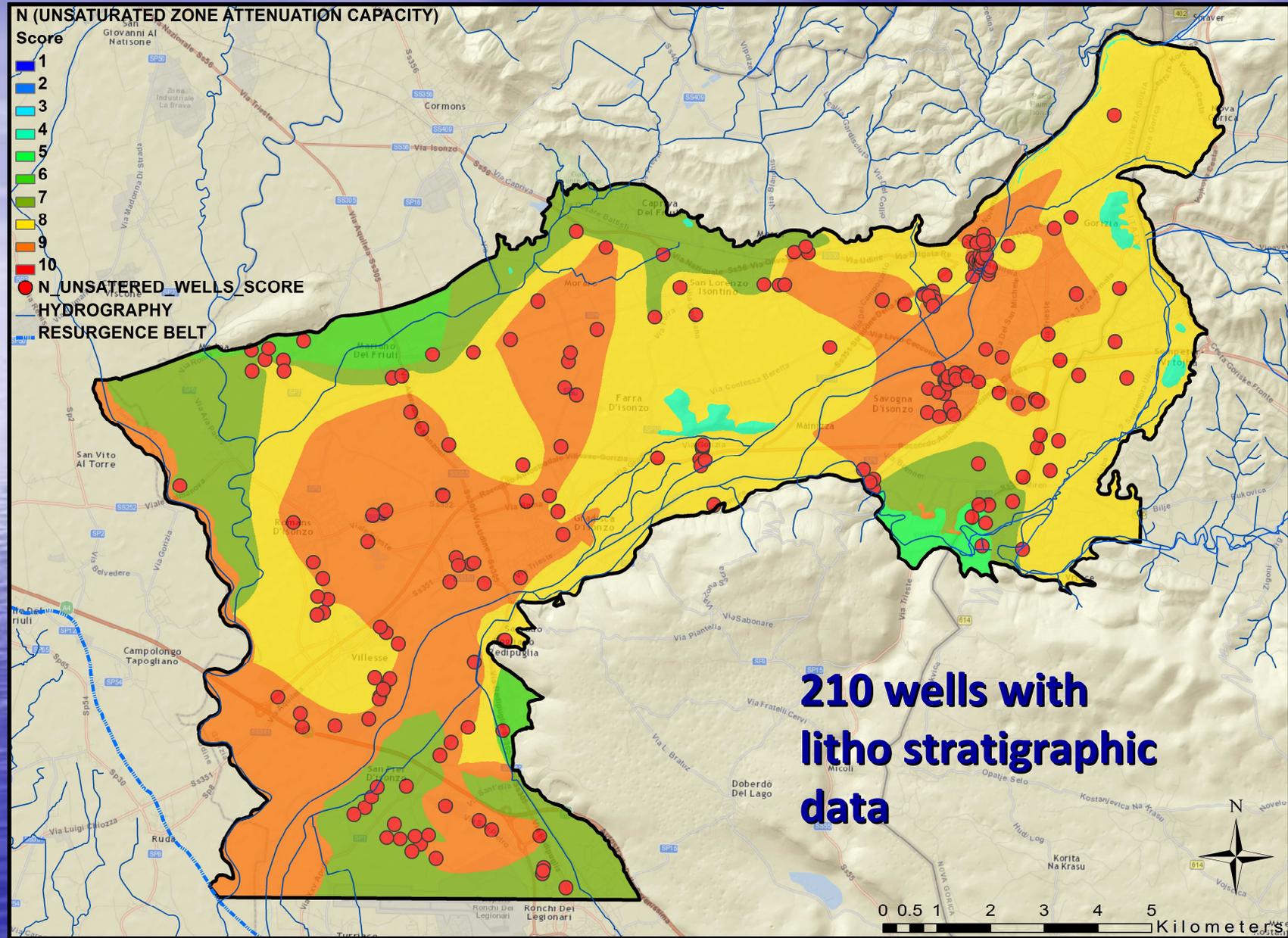
EFFECTIVE INFILTRATION

Effective infiltration



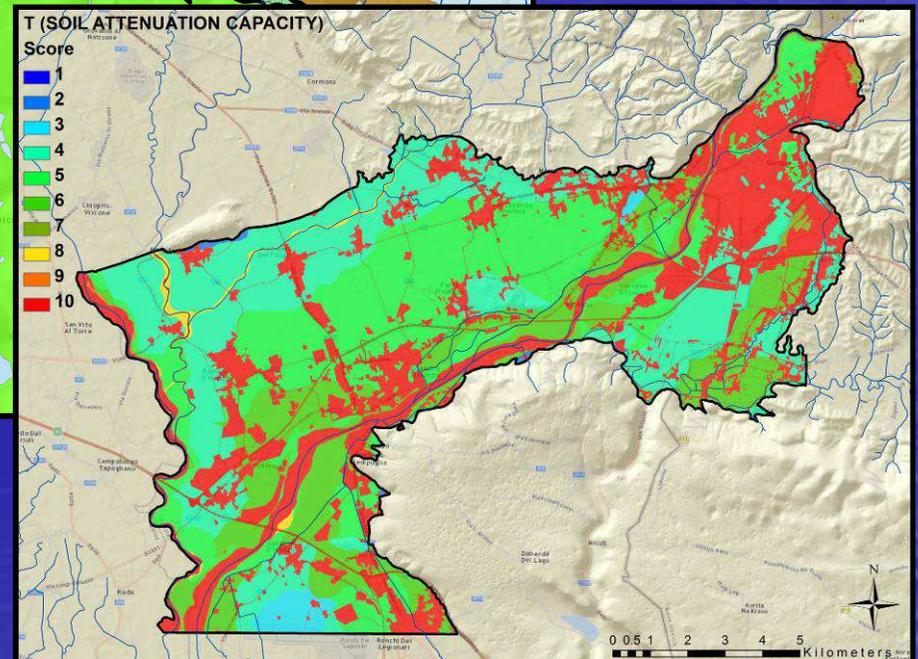
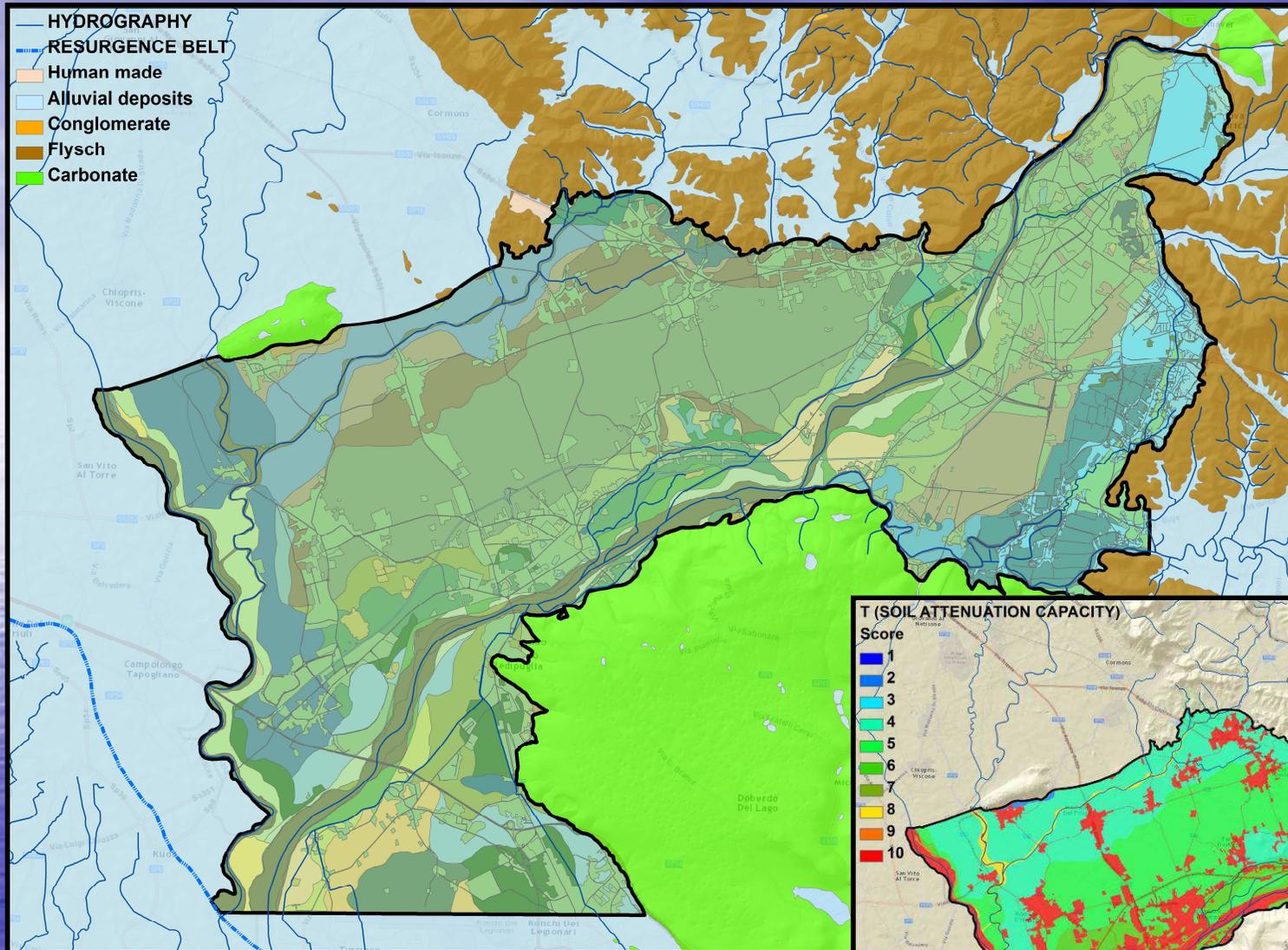
! score

N UNSATURATED ZONE ATTENUATION CAPACITY

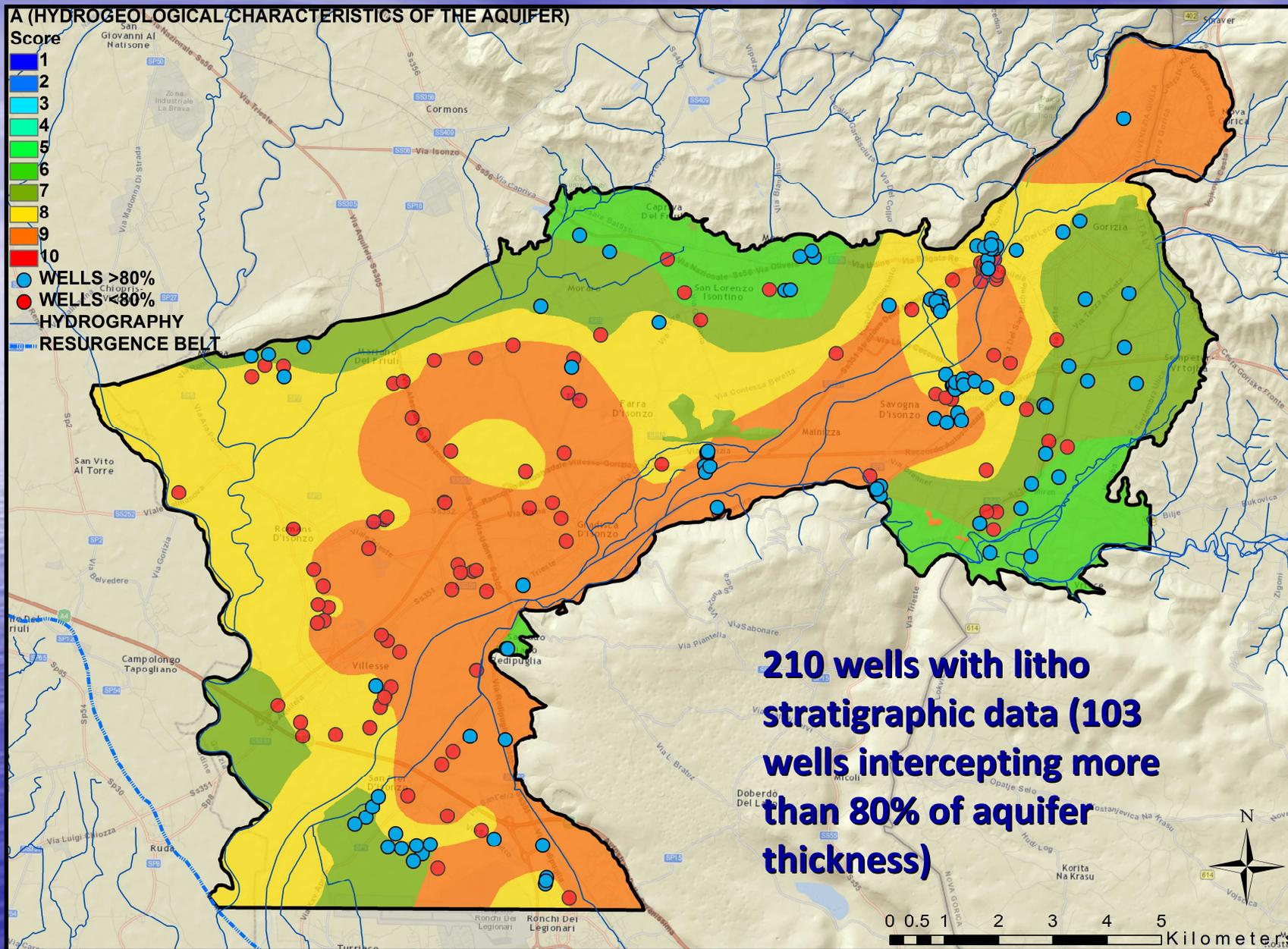


T SOIL ATTENUATION CAPACITY

Soil map and
land use map



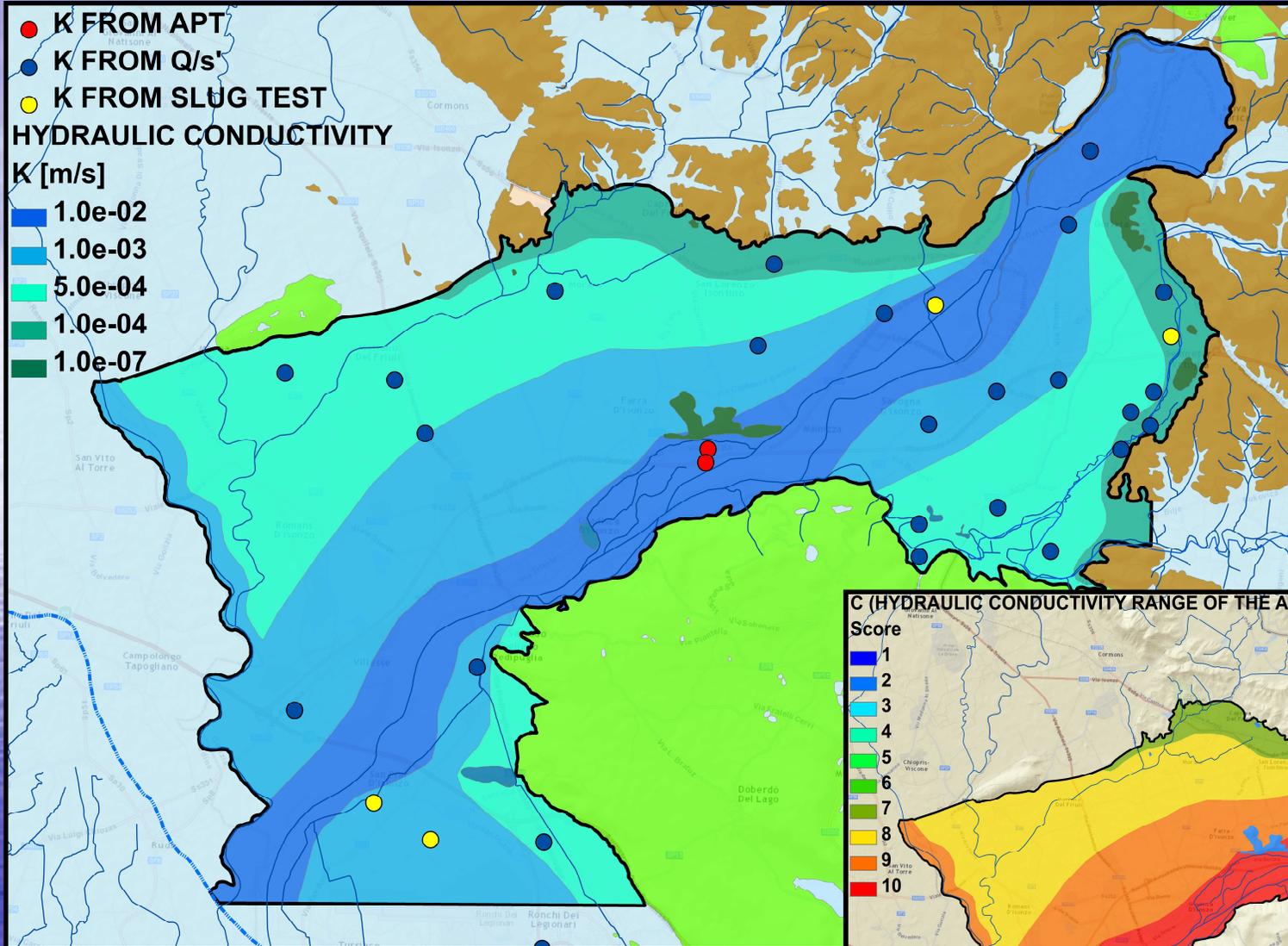
A HYDROGEOLOGICAL CHARACTERISTICS OF THE AQUIFER



C HYDRAULIC CONDUCTIVITY OF THE AQUIFER

- K FROM APT
 - K FROM Q/s'
 - K FROM SLUG TEST
- HYDRAULIC CONDUCTIVITY**
K [m/s]

- 1.0e-02
- 1.0e-03
- 5.0e-04
- 1.0e-04
- 1.0e-07

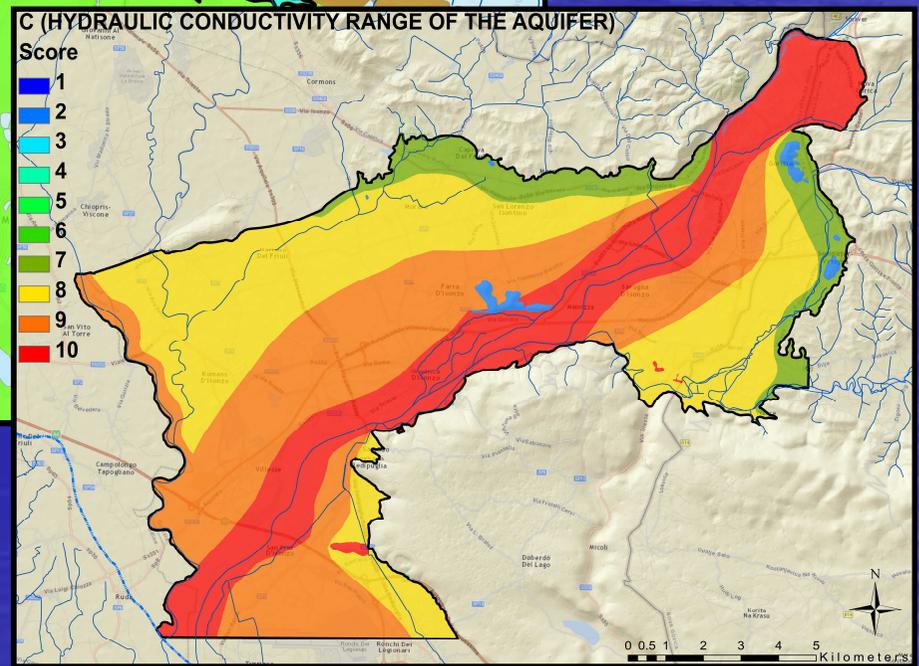


Hydraulic conductivity K

3 values from APT

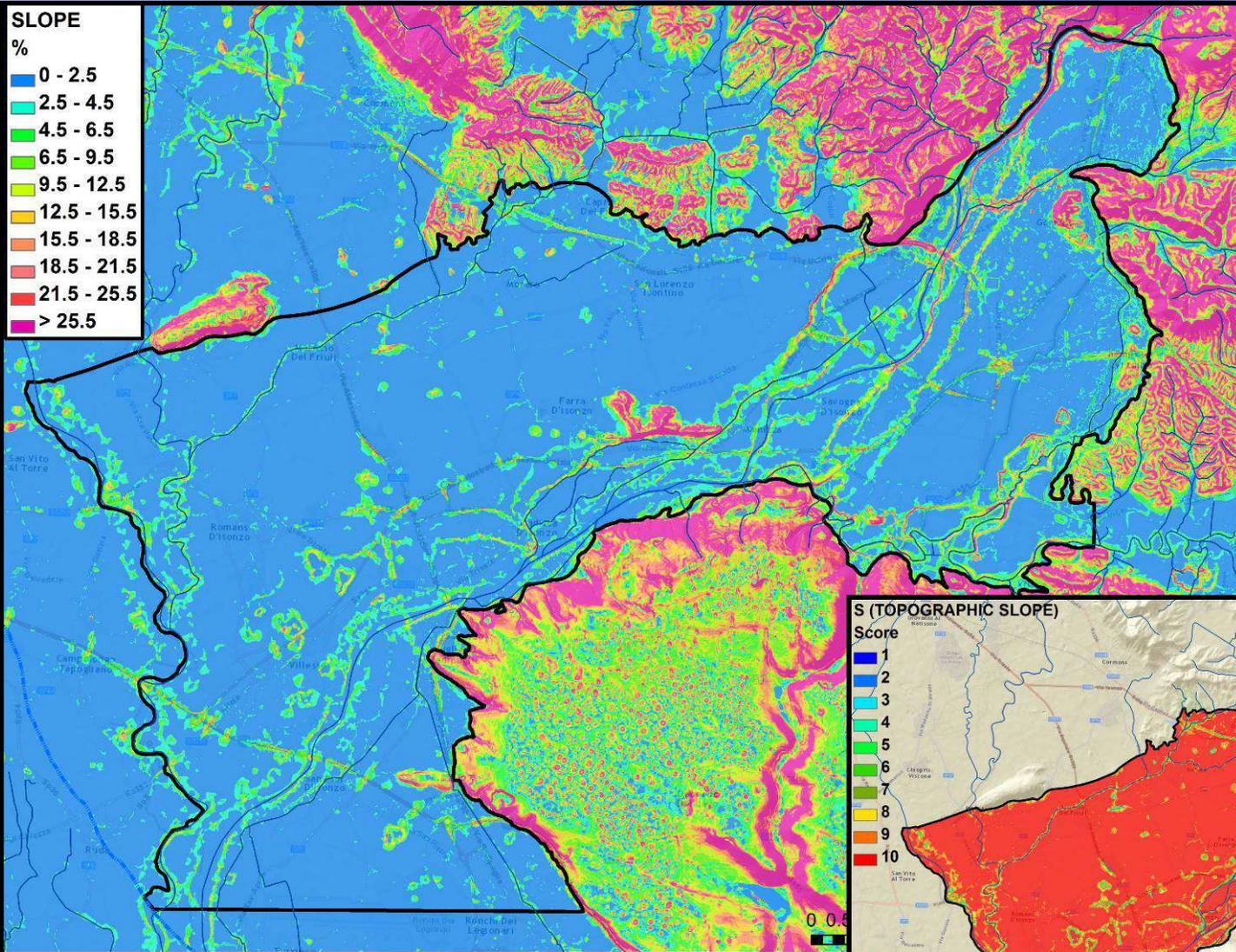
24 values from Q/s' method

4 values from SLUG TEST

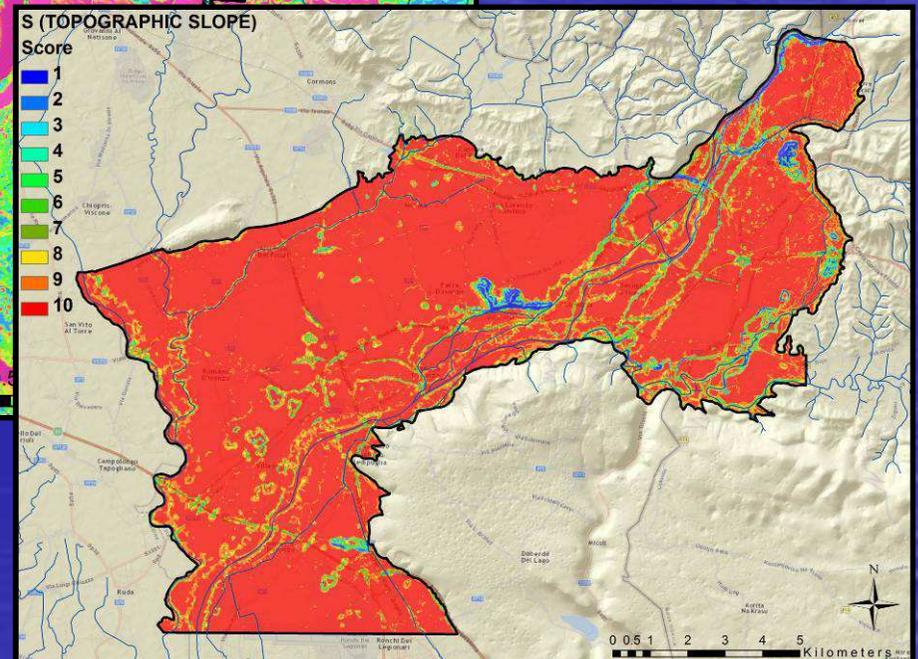


C score

S TOPOGRAPHICAL SLOPE

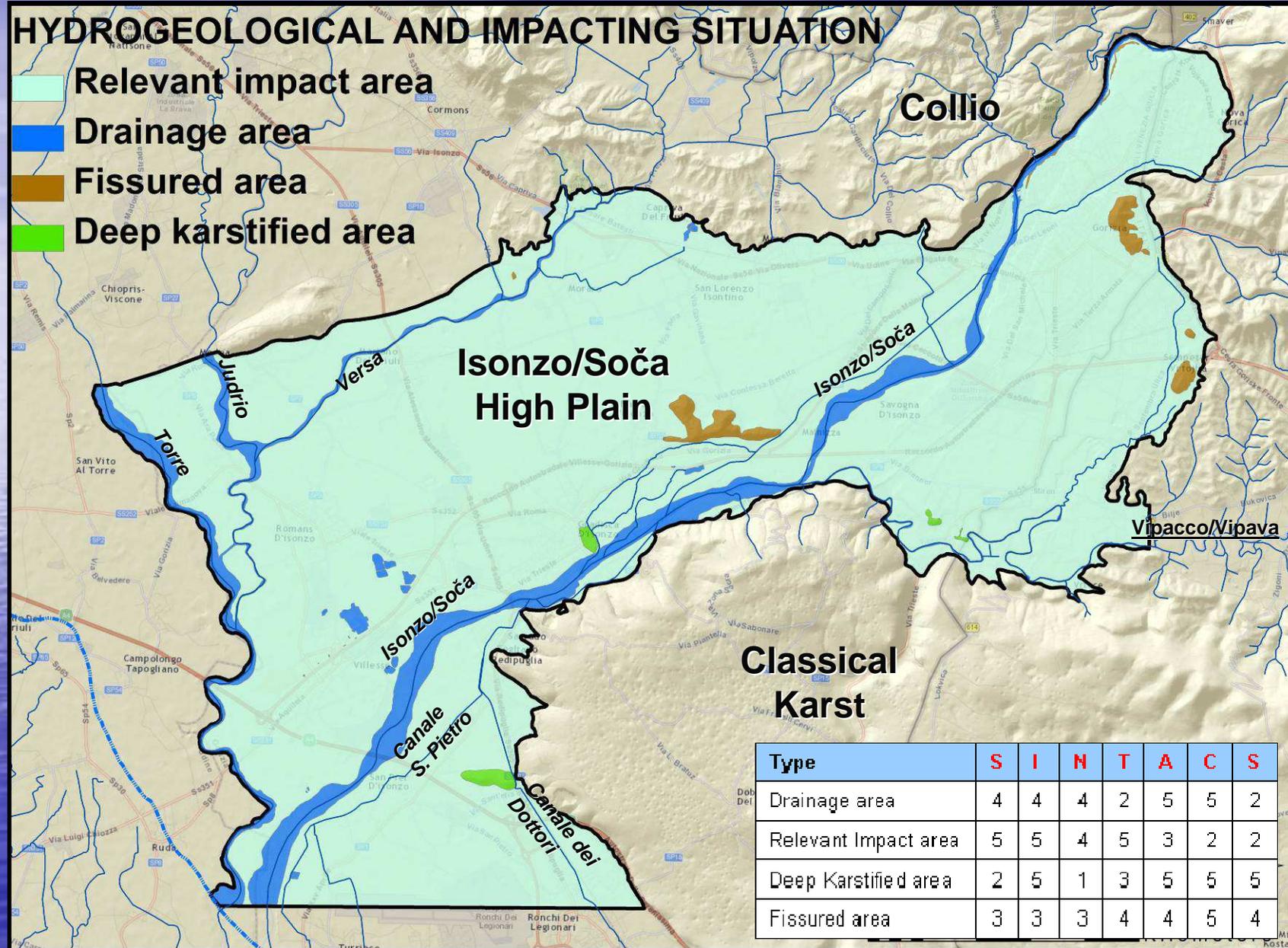


Slope as %
(from
D.E.M.
10x10m)

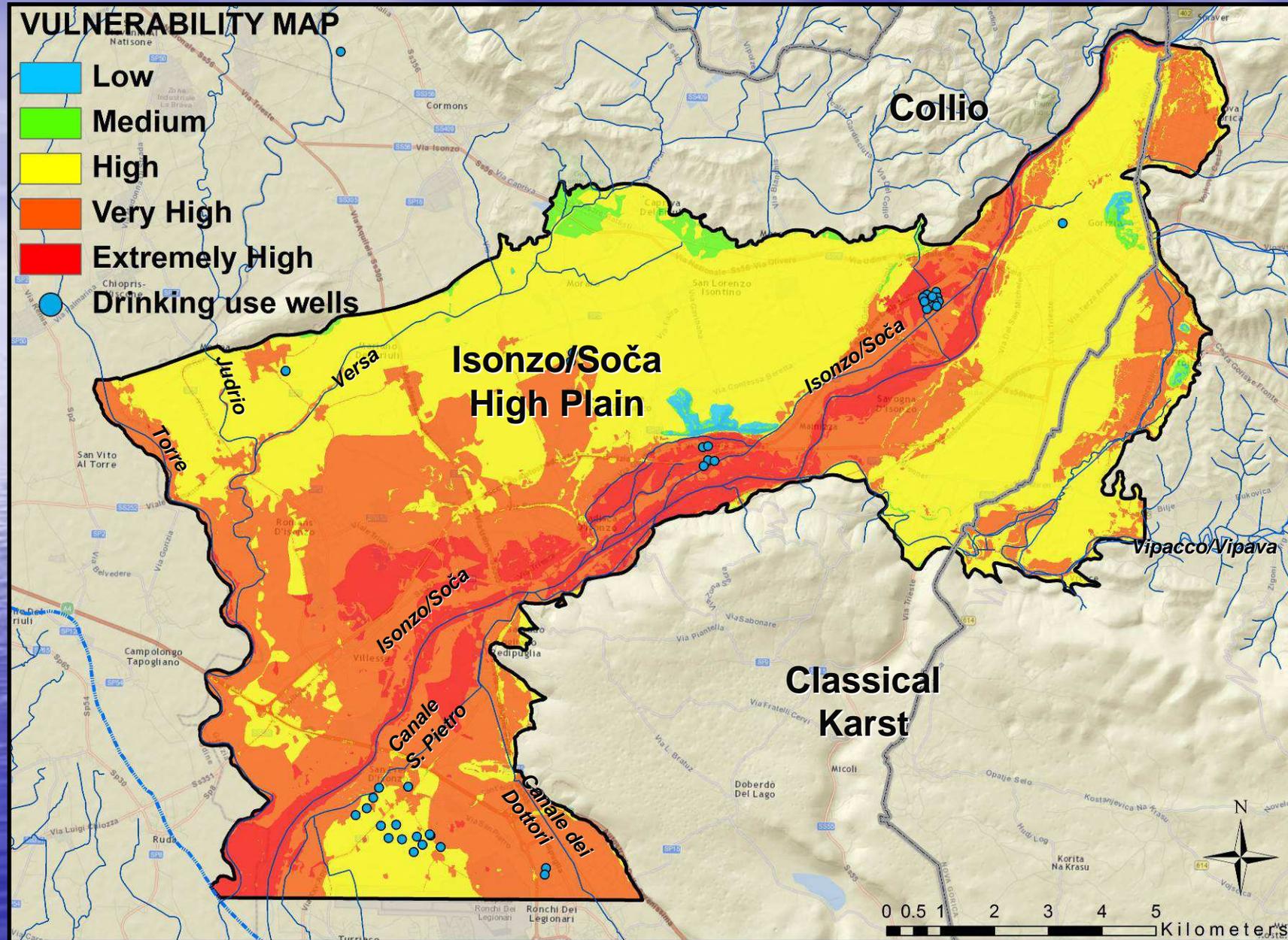


S score

HYDROGEOLOGICAL AND IMPACTING SITUATION



THE INTRINSIC VULNERABILITY MAP





***Thanks for your
attention!***