

D3.2.1. Template for Survey



1506
UNIVERSITÀ
DEGLI STUDI
DI URBINO
CARLO BO



COMUNE
DI FANO



INSTITUT ZA JADRANSKE KULTURE
I MELIORACIJU KRŠA SPLIT



UŠTANOVA
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Author (s)	Simone Galeotti (UNIURB) Giorgio Spada (UNIURB) Gaia Galassi (UNIURB) Luca Lanci
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1. INTRODUCTION

Salinization of coastal aquifers can occur from multiple directions: from above due to inundation or storm surge, laterally due to encroachment of the freshwater/saltwater interface, and from below due to upcoming of saline groundwater due to pumping (Klassen, and Allen, 2016).

The hydrogeological assortment of the systems involved, together with the number of forcing factors, subtends, therefore, a complex analysis, which requires a wealth of data and information to be acquired on different fronts. Similarly, important is the uniformity of the methods and data when applied to different case studies. The goal of this activity is to achieve such a uniform approach for all the partners based on sharing ideas, expertise and needs as funded by the actions subtended in activity 3.1.

2. METHODOLOGICAL BACKGROUND

The assessment of risk of salinization has to simultaneously consider vulnerability (that embeds also the probability of occurrence) and the potential loss (defined as economic consequences due to the contamination of groundwater supply, impacts on human health if a well is contaminated, or various consequences on ecological systems).

According to Simpson et al. (2014), the equation of risk assessments reads:

$$\text{Risk } (R_H) = \text{Vulnerability } (V_H) * \text{Loss } (L)$$

where the vulnerability includes is defined as aquifer susceptibility and hazard threat, and the probability of occurrence is attributed to each hazard threats and where

$$\text{Vulnerability } (V_H) = \text{Aquifer susceptibility } (S_A) * \text{hazard threat } (T_H)$$

Activity 3.2 is finalized to identify and map territorial hazards.

Klassen and Allen (2016) identified hazard threats in coastal hazard and pumping. Two coastal hazards are defined:

- 1) flooding, which is associated with sea level rise, tidal fluctuations and storm surge, and
- 2) coastal morphology.

Information on pumping is based on distribution of wells. Two main category of wells are identified: (i) wells for drinking water and (ii) wells for other uses. To map the hazards, a “wells density” will be constructed based on the distribution and dimension of wells. The grid dimension will be defined on the basis of the distribution of wells: as a first hypothesis a 2km square grid is proposed. For the dimension, a relative rank will be attributed based on the withdrawal capacity or, as an alternative, to the number of water supply systems connected (to verified which information is commonly available).

Considering the touristic vocation of the Adriatic Basin, in order to identify possible criticality (as exploitation of wells at the maximum capacity or over for a defined period of time) specific touristic location with severe increment of population will be identified.

Since salt ingressions is influenced by flood, survey will investigate the historic flood episodes. The risk of flood will be analysed in the following step of the project (i.e. associated to a sea-level rise map). In this phase is important to identify the historical trend of flood (storm surges). Finally, morphological aspect (height of the coast to investigate the susceptibility to floods) will be analysed based on existing maps: thus, this information will not be included in the survey.

3. FIRST PROPOSAL OF INFORMATION TO COLLECT THROUGH THE SURVEY

Activity 3.2 indicates that information on the territorial hazard will be collected by the LP based on a survey to the scientific partners. Based on the introduction above, the following information need to be gathered with the survey:

- Wells distribution and capacity (and/or number of water supply systems connected): identification of existing catalogues or other data sources (specifying drinking water for other uses wells)

- Situations of overexploitation
- Locations (served by wells) characterised by high touristic pressure (with the indication of increment in population)
- Location and intensity of flood events (storm surges) from 1950 to present.

When the scientific partners are not the depository of the information needed, the survey will be used to identify the existence of data and the source of information.

4. OPEN QUESTIONS

Territorial limit:

- 1) The project refers to a “Adriatic” map for the hazards. Thought the survey information can be obtained for the Croatian coast and for the two Italian regions where Italian partners are located (Marche and Emilia Romagna). Do partners think that an investigation (by LP) on availability of data from other regions to complete the map at Adriatic level, would be needed?
- 2) Also the distance from the coast to which expand the investigation (and the mapping) of hazards has to be defined: 5 km would be appropriate? Consider that different publication set a limit to 400 m (see, e.g., Ericsson et al, 2018)

overexploitation:

- 1) A definition as to be defined in order to collect homogeneous information

These points will be discussed with partners within the survey.

Bibliographic notes

Klassen, J., and D. M. Allen (2016). "Risk of saltwater intrusion in coastal bedrock aquifers: Gulf islands, bc." Department of Earth Sciences, Simon Fraser University.

Simpson, W.M., Allen, D.M. and Journeay, M.M. (2014) Assessing risk to groundwater quality using an integrated risk framework. Environmental Earth Science Journal 71 (11), 4939-4956.

Eriksson, Marcus, Karin Ebert, and Jerker Jarsjö. "Well Salinization Risk and Effects of Baltic Sea Level Rise on the Groundwater-Dependent Island of Öland, Sweden." Water 10.2 (2018): 141.

ANNEX: Survey template

SECTION 1 - OPEN QUESTIONS

Q.1.1 Do partners considers useful/necessary a further investigation on availability of data from Adriatic regions not covered by partners to complete the map at Adriatic level?

- Yes
- No

Q.1.2 Which distance from the coast (and as a consequence, which dimension of the cell) is more appropriate to analysed the variables and to create the map?

- 5 km
- 2 km
- 1 km
- 500 m
- other (please, specify)

Q.1.3: Which is a definition of overexploitation that you consider appropriate for the analysis of hazards at regional scale?

SECTION 2 - INFORMATION ABOUT WELLS

Q.2.1 - Are you depositary of information on wells?

- Yes
- No

Q.2.1.a) If yes, please specify the information available:

- Localisation (x,y coordinates)
- capacity (as maximum capacity authorised)
- number of water supply systems connected
- uses (drinking water, agriculture, other)

Q.2.1.b) If not, are you aware of the existence of repositories or catalogues with the information above?

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SECTION 3 - INFORMATION ON OVEREXPLOITATION

Q.3.1 - Are you aware of situations of overexploitation of wells?

- Yes
- No

Q.3.1.a) If yes, please specify the related information (including the localisation of wells)

Q.3.1.b) If not, are you aware of the existence of databases of such information?

SECTION 4 - INFORMATION ON EXTREME EVENTS

Q.4.1 Are you depository of information on storm surges?

- Yes
- No

Q.4.1.a) If yes, please specify the information available:

- Geographical distribution of information
- Time range of information
- Specific information on single events

Q.4.1.b) If not, are you aware of the existence of repositories or catalogues with the information above?