The iah-cad-czm.net website:
a tool to share and make available information on coastal aquifers

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Targets

The IAH-CAD-CZM website aims to collect and share information on coastal aquifers from all over the world, to let them available for researchers, professionals, and stakeholders. In order to:

- Increase the awareness of society regarding coastal aquifer's common problems, and regarding the importance of founding of scientific investigations on these issues
- Understand better the specific hydrological process dynamics in coastal areas and the development of tools for improving the assessment and development of effective long-term water management strategies of water resources, endangered by saltwater intrusion

Methods

The IAH-CAD-CZM website presents data and information on coastal aquifers in the form of a brief *questionnaire*. The questionnaire includes information on any aquifer main characteristics, and on the most relevant subjects concerning saltwater intrusion affecting them.

IAH network on "Coastal aquifer dynamics and coastal zone management"

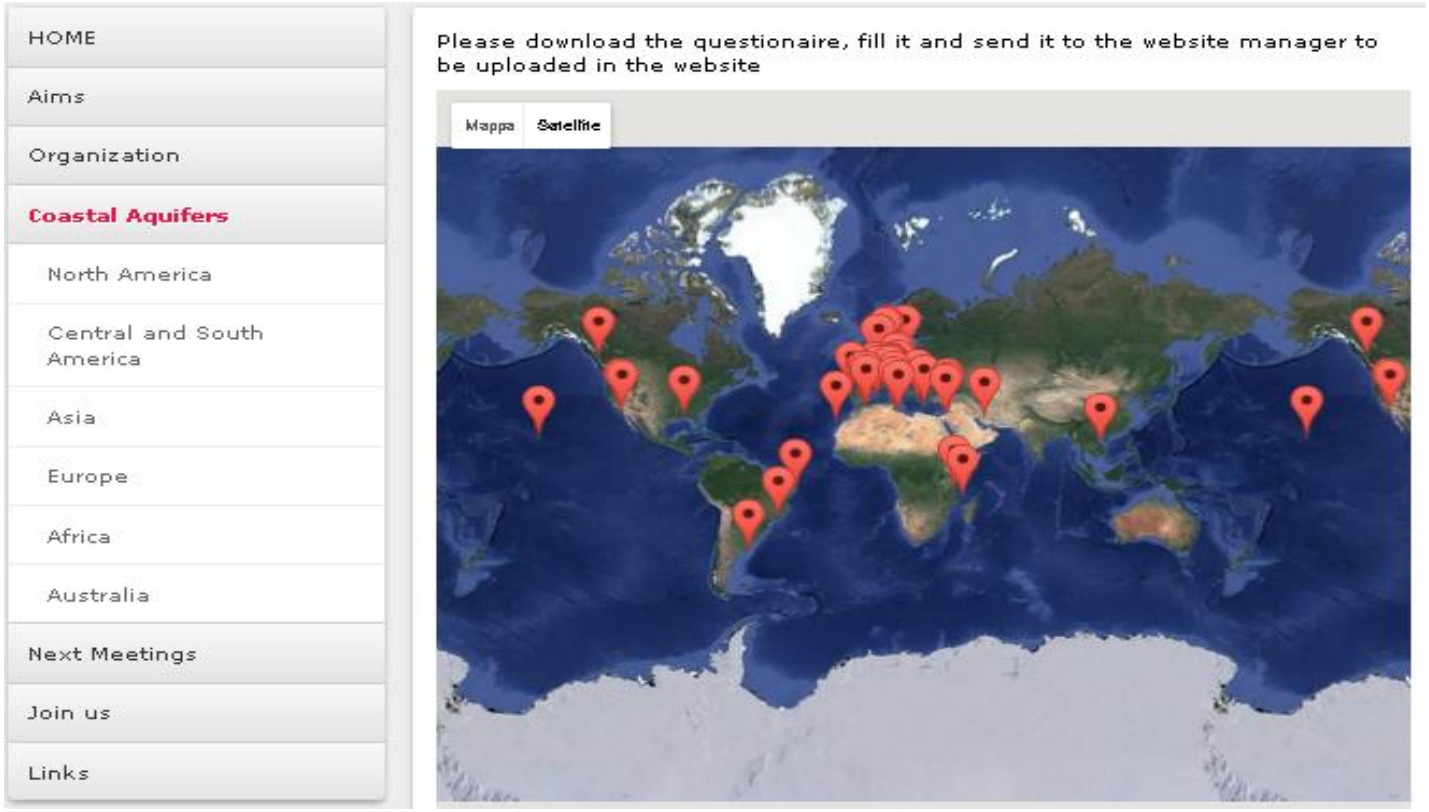
QUESTIONNAIRE

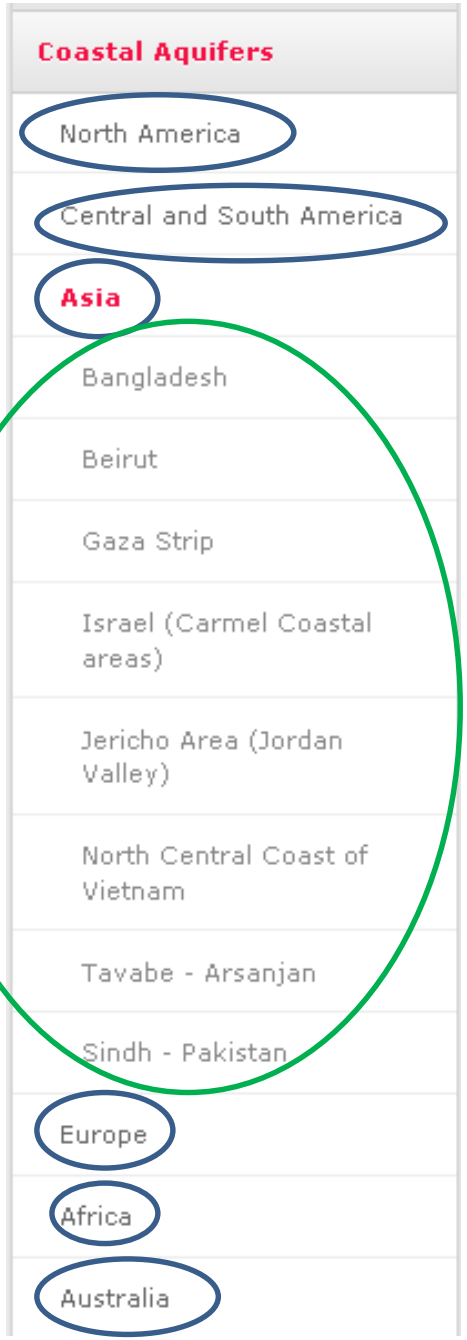
IAH national committees, IAH members and non members from all around the world involved in SWI and SGD research and management are kindly asked to fill in the questionnaire in this page with as many details as possible.
A world database will be set up and made available, with basic coastal aquifer main characteristics.
We expect to gather standard and comparable information on the knowledge level and hopefully the state of the art of the

1)	Location of aquifer (country, more specific location):	
2)	Reported by:	
3)	Type of medium (karst, porous, fracture)	
4)	**Type of aquifer (phreatic or confined)**	
5)	**Main lithology - (e.g. gravel, sand and clay)**	
6)	Hydrochemistry: fresh or saline	
7)	Saltwater intrusion: lateral from sea or lakes - upconing	
8)	**Aquifer geometry: hydraulic characteristics**	
9)	Aquifer parameters: storage - annual water pumping - (in MCMA - millions cubic meters, annually)	
10)	Depth of aquifer (water level and bottom) - water level 5- 30 m - aquifer depth - 50-200 m	
11)	**Major chemistry (anions - ?; Cations - ?):**	
12)	Major salinity sources:	
13)	**Population:**	
14)	Aquifer status: special features - e.g. thermal springs, major faults,...	
15)	**Investigation methods - e.g. water level measurements, EC (electrical conductivity profiles), TDEM (geophysical),**	
16)	Numerical hydrological modeling, chemical and isotopic methods, age determination, IR survey, seepage meters (for Submarine Groundwater Discharge,	
17)	**Monitoring methods applied and duration - water level measurements, EC (electrical conductivity profiles - seasonal)**	

Methods

Through the website's homepage, it is possible to access a section named “Coastal Aquifers”, where who have taken part to studies and research concerning coastal aquifers can contribute to developing the information network, sharing their knowledge about the main characteristics of the specific aquifer that they have been studying.





The information structure of the website is gerarchical, organized, now, in six pages, referring to the six macro-geographical regions: Northern and Central America, Europe, Asia, Latin America, Africa and Oceania. Each page, now, contains a list of coastal aquifers, referring to they have been filled questionnaires, by authors of studies about them.

Each page has also a Google Map window, through which the users can navigate to a particular coastal area: then, once the coastal zone of interest has been found, it is possible to download, if present, through the link included in the icon, the specific questionnaire of interest.

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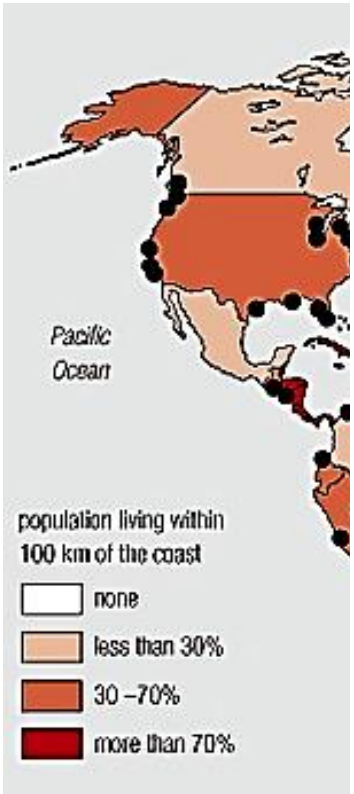
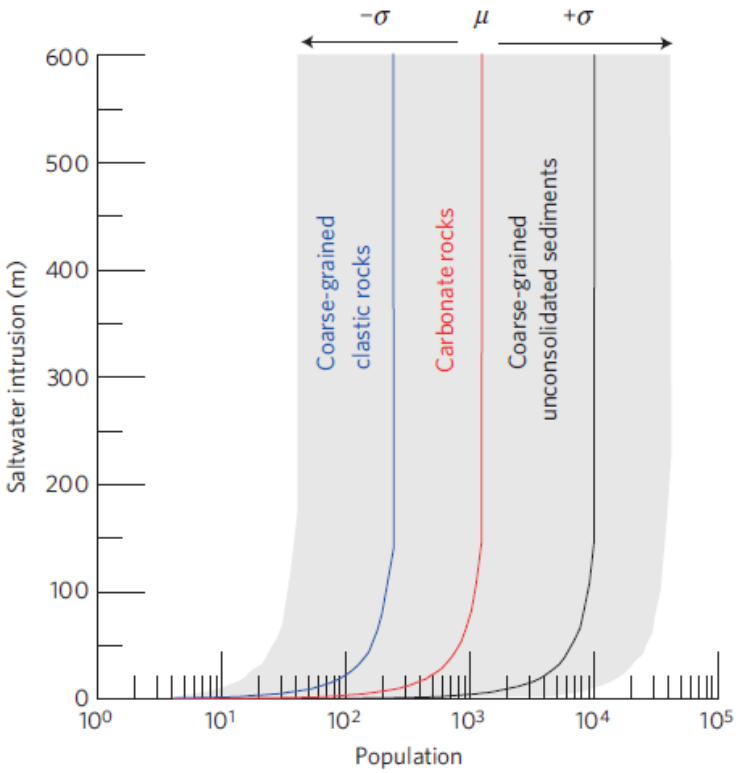
Besides information on the specific hydrogeological characteristics of coastal aquifer, they were collected data about population, living in coastal areas, all over the world, starting from the most recent census of population, as the percentage of people living in coastal areas, compared to all world people represents an important indicator of pressure on coastal ecosystems.





Distribution of people living within 100 km from coastal line all over the world (www.unep.org, 2010)

G. Ferguson and T. Gleeson, 2012. Vulnerability of coastal aquifers to groundwater use and climate change.

Database Implementation

The iah-cad.czm.net website lends itself to multiples implementations of information.

To enhance the information about the coastal aquifers, a possible idea was to **characterize the coastal aquifers** (that we have analyzed to fill the questionnaires) from a **geological and lithostratigraphic point of view.**

It has been created geological cards for different sites which contain a geological and lithostratigraphic description of the aquifer and a geologic map.

Example of implementation of geological data: *Geological information about the coastal aquifer in Barcelona (Spain)*

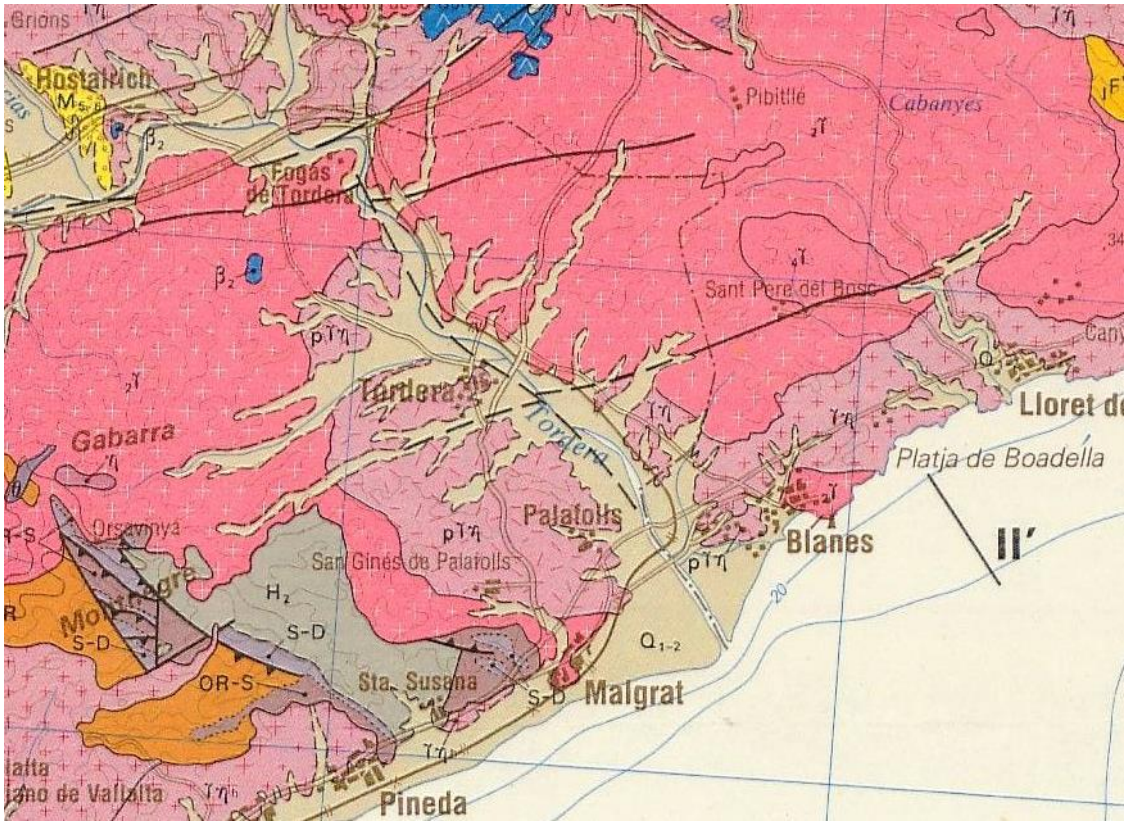
The Baixa Tordera alluvial aquifer system is located in the northeastern Mediterranean coast of Spain. The Tordera river basin is located 80 km north of Barcelona; the river has a total length of 65 km and it forms a 8 km^2 small delta of Quaternary materials bounded by granitic rocks of Paleozoic age.

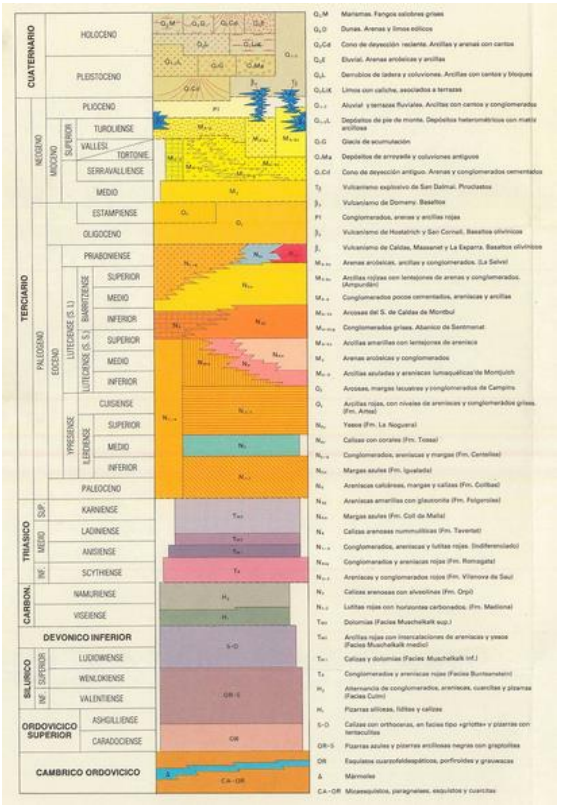
Quaternary sediments are stratigraphically controlled by

1) torrential deposits forming confined terraces,
2) a fluvio-deltaic depositional system with continental to marine facies (Geoservei, 2000).

Both are formed up of detritic materials with wide granulometric variability: silt, clay, fine sands and coarse gravels.

Example of implementation of geological data: *Geological information about the coastal aquifer in Barcelona (Spain)*



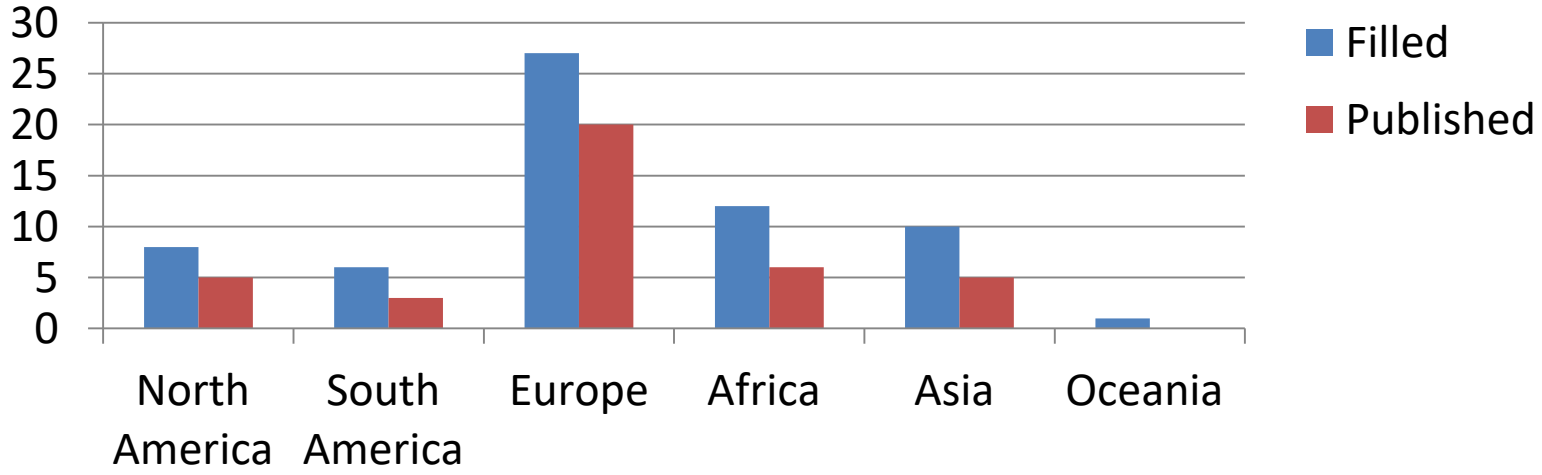


Geological map of study area 1:200.000 . (info.igme.es (Istituto geologico y minero de Espana))

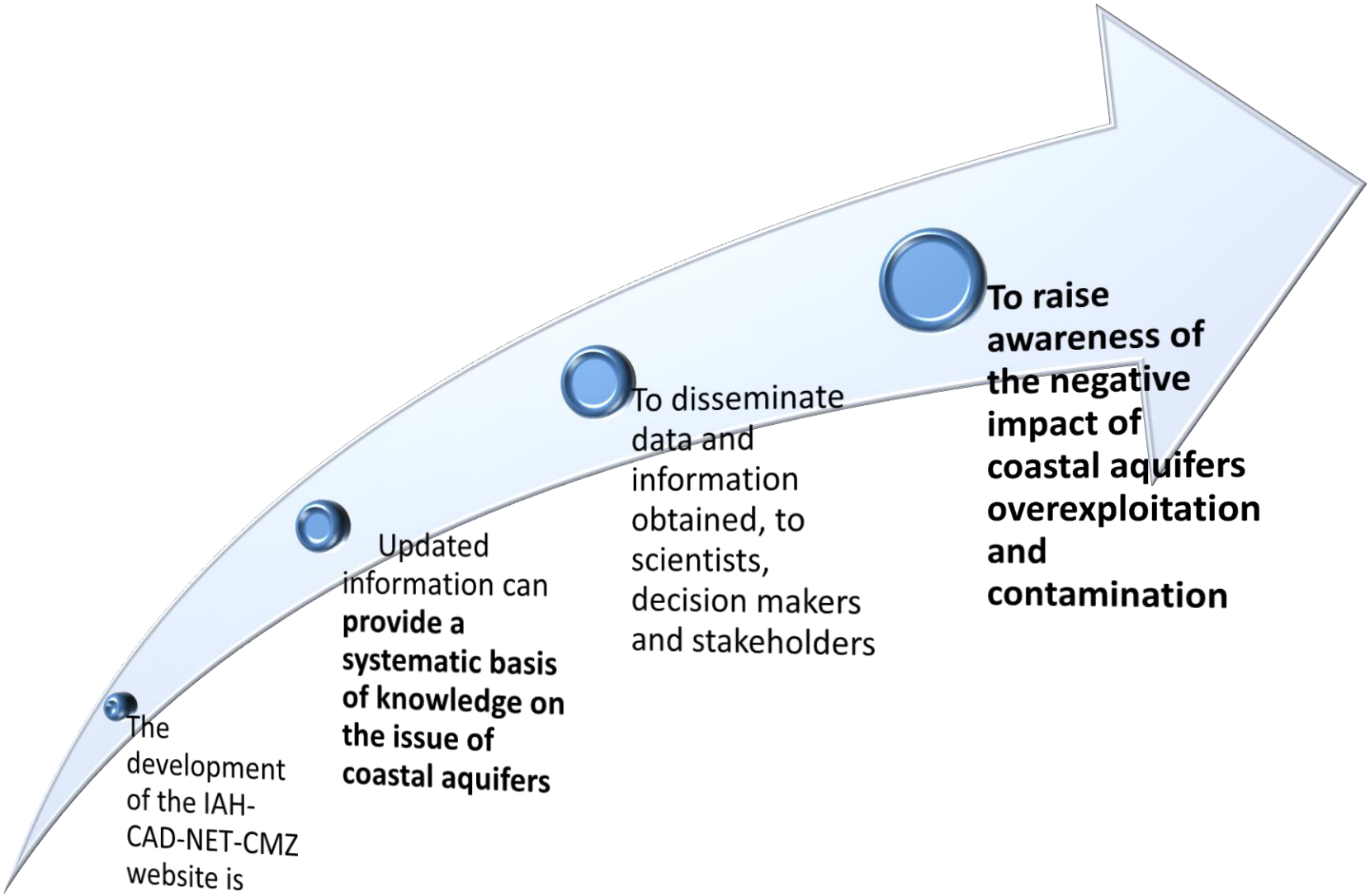
Results

In the following table they are summarized the questionnaires published until now, divided for geographical area as they are organized in the website.

Geographical Area	Number of filled and sent questionnaires	Number of published questionnaires
North America	8	5
South America	6	3
Europe	28	22
Africa	15	9
Asia	12	8
Oceania	1	0
Total number of questionnaires	70	47



Discussion and Conclusions



Conclusions

The activities performed in order to develop the website, allowed us to identify several studies on coastal aquifers from all over the world, and to set up the basis for a comparative study

A first analysis of studies on coastal aquifers carried out in the European continent (27 aquifers), at local level (study area < 100 km^2) shows that seawater intrusion caused by excessive groundwater extraction is the main source of salinization, and another important source is nitrate pollution due to use of fertilizers in agriculture.

Quite a number of coastal studies are carried out in the North Sea, with the aim to identify, and to model, the expected modification of the freshwater and saltwater distribution in coastal aquifers.