



Conférence Parmenides IX – GID-CIHEAM – Bari – octobre 2021 Gestion durable des bassins versants méditerranéens face aux impacts des changements sociétaux et climatiques

Manuel Sapiano Managing a vulnerable groundwater resource - Malta

Summary

Malta's semi-arid Mediterranean climate and geomorphology precludes the development economically exploitable surface water of resources. The islands' groundwater resources, in particular the sea-level main aquifer systems, are therefore the only naturally renewable resource of freshwater present the island. Groundwater within these aquifer on systems in in lateral and vertical contact with sea-water, and hence vulnerable highly to sea-water intrusion in response to abstraction.

Malta's policies for the water sector therefore take into consideration the sustainable of groundwater resources within use а comprehensive management framework based on the conjunctive use of water diversification demand supply and management measures. This strategy aims to enable effective groundwater, the use of protecting its qualitative characteristics and therefore ensuring sustainable its use in the future.

Gestion soutenable des bassins versants méditerranéens face aux impacts des changements sociétaux et cimatiques

> Conference Parménides IX Bari – Italy, 20 October 2021







Manuel Sapiano Energy and Water Agency Malta



TABLES RONDES VULNERABILITES

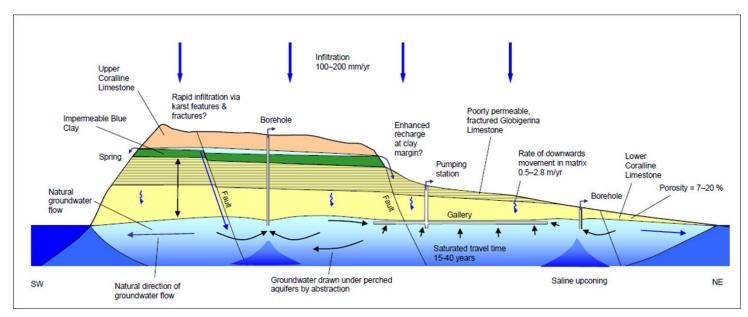
Table ronde 2.1: Qualité des eaux, remontées saliens, alcalinisation Round table 2.1: Water quality, saline lifts, alkalization

MANAGING A VULNERABLE GROUNDWATER RESOURCE



Coastal and Island Aquifer Systems:

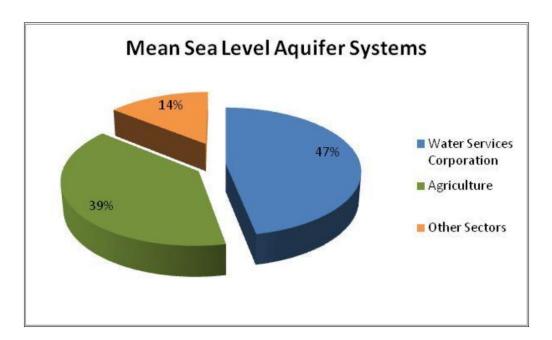
- in vertical and lateral contact with sea-water,
- highly vulnerable to sea-water intrusion in response to abstraction,
- regional intrusion facilitates localized intrusion of sea-water.

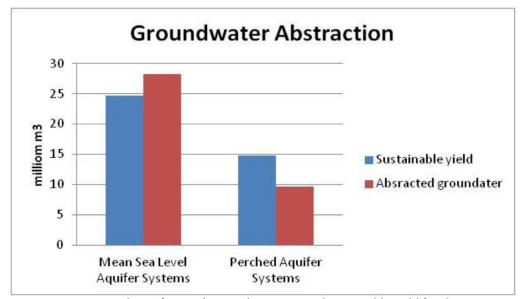


Malta

Relevance to Malta:

- Mean sea-level aquifer systems are the main resource of naturally renewable freshwater.
- Overabstraction (including historic overabstraction) has resulted in sea-water intrusion.

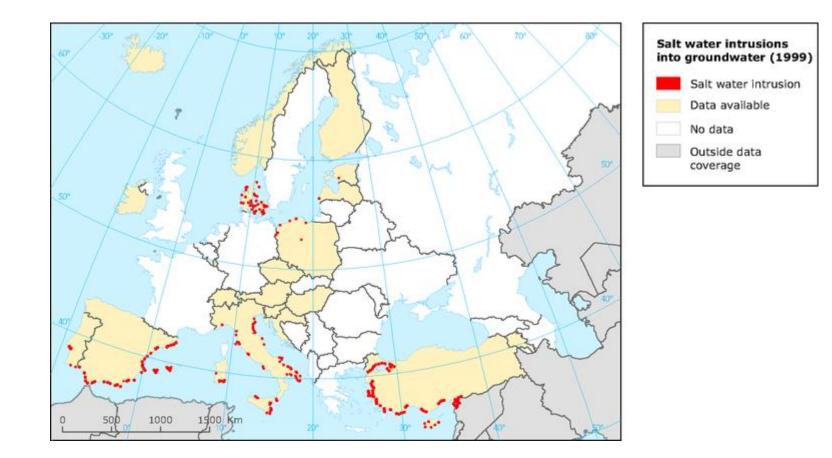




Mediterranean

Sea-water intrusion is highly relevant for all Mediterranean coastal aquifers.

Impact arises due to high water demands – urban hotspots and agriculture.



Climate Change

Arctic

Temperature rise much larger than global average Decrease in Arctic sea ice coverage Decrease in Greenland ice sheet Decrease in permafrost areas Increasing risk of biodiversity loss Intensified shipping and exploitation of oil and gas resources

Coastal zones and regional seas Sea-level rise

Increase in sea surface temperatures Increase in ocean acidity Northward expansion of fish and plankton species Changes in phytoplankton communities Increasing risk for fish stocks

North-western Europe

ncrease in winter precipitation Increase in river flow Northward movement of species Decrease in energy demand for heating Increasing risk of river and coastal flooding

Mediterranean region Temperature rise larger than European average Decrease in annual precipitation Decrease in annual river flow Increasing risk of biodiversity loss Increasing risk of desertification Increasing water demand for agriculture Decrease in crop yields Increasing risk of forest fire Increase in mortality from heat waves Expansion of habitats for southern disease vectors Decrease in hydropower potential Decrease in summer tourism and potential increase in other seasons

Northern Europe Temperature rise much larger than global average Decrease in snow, lake and river ice cover Increase in river flows Northward movement of species Increase in crop yields Decrease in energy demand for heating Increase in hydropower potential Increasing damage risk from winter storms Increase in summer tourism

Mountain areas

Mountain areas Temperature rise larger than European average Decrease in glacier extent and volume Decrease in mountain permafrost areas Upward shift of plant and animal species High risk of species extinction in Alpine regions Increasing risk of soil erosion Decrease in ski tourism

European Environment Agency

Central and eastern Europe Increase in warm temperature extremes Decrease in summer precipitation

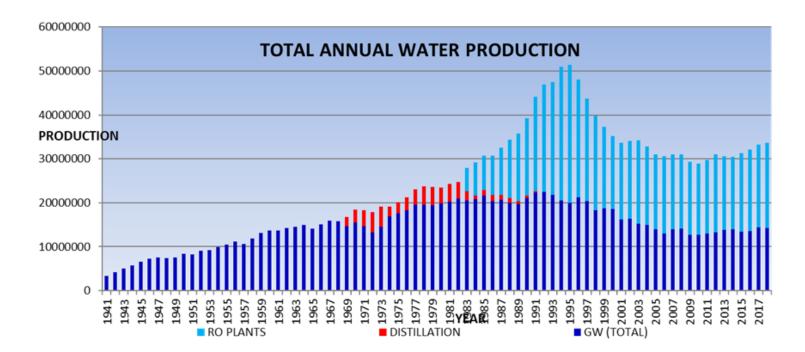
Increase in water temperature Increasing risk of forest fire Decrease in economic value of forests - Temperature Rise (increased losses by evapotranspiration).

- Decreased Precipitation.

- Increasing water demand for agriculture.
- Increased occurrence of extreme events.

Malta's water story

Up to 1997: Water policies based on supply augmentation Production increases not sufficient to meet national water demand Aquifers under stress leading to salinity increases in abstracted groundwater.



Malta's water story

It became increasingly clear that water supply augmentation measures alone could not address Malta's water challenge.

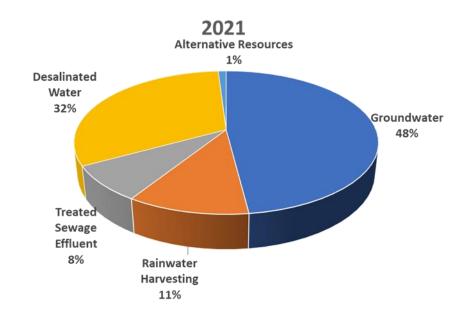
Water supply augmentation measures had to be accompanied by water demand management measures.

Factors such as:

- Supply Diversification (Non Conventional Water Resources)
- Water Efficiency (National and User Level)
- Energy Efficiency

gained increasing importance in the water management framework.

And this approach still forms the basis of Malta's water policy today.



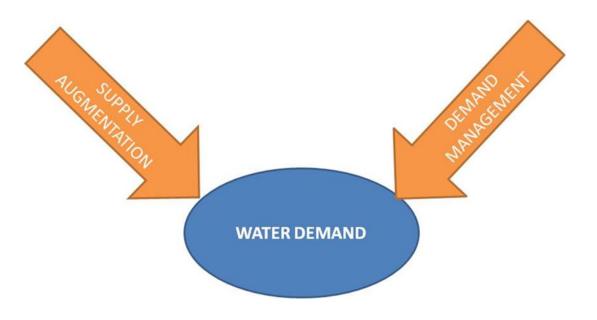


Policy Approach

Under these circumstances, development of a water management framework needs to starts with acknowledging reality.

Even if water demands are kept at highly efficient levels, there is insufficient natural freshwater resources to sustainably meet national demand.

Malta's water management framework is based on a two-pronged strategy to achieve water security: meeting water demand through the conjunctive use of water supply augmentation and water demand management measures, in an increasingly sustainable manner.



Optimizing Management

Optimizing the management of coastal groundwater systems.

(i) Understanding better the groundwater system

- Regulating groundwater abstraction
- Defining sustainable yields
- (ii) Optimizing the use of water
 - Lowering water demands

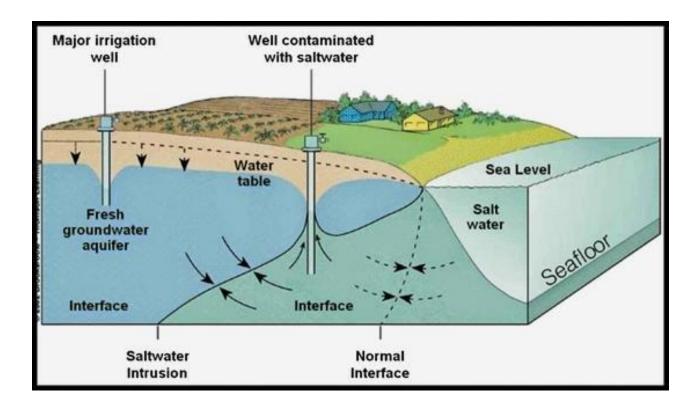
Improved Understanding

Monitoring the development of the freshwater-saltwater interface.

Improved monitoring systems:

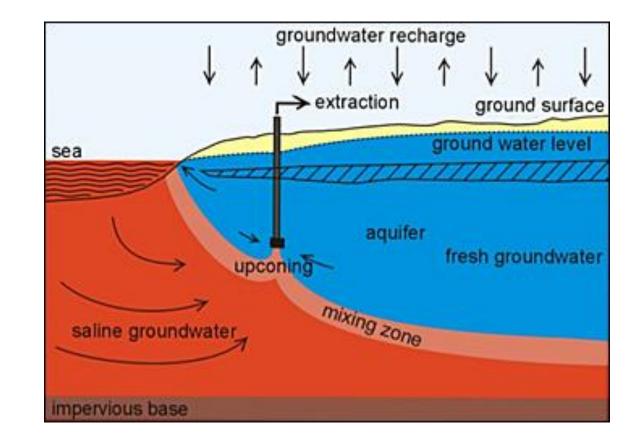
- Water level
- Interface (transition zone) variations
- Multi-level sampling or profiling

Numerical modelling and scenario testing.



Optimizing Management

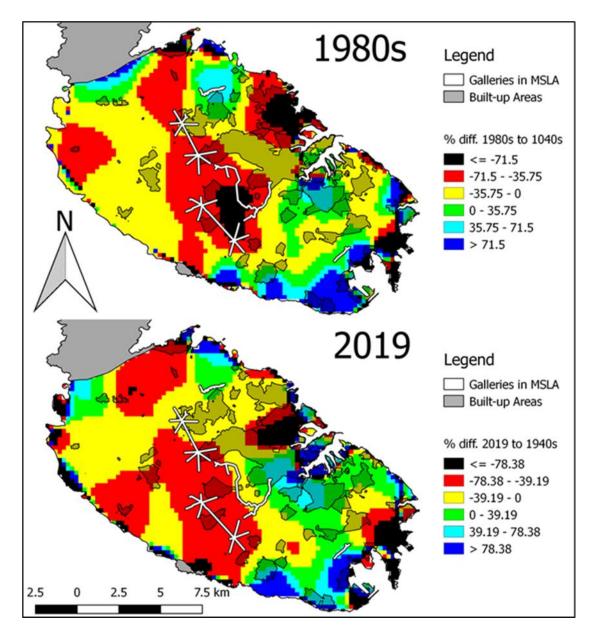
- (i) Regulating the construction of groundwater abstraction sources (well depth, location,).
- (ii) Regulating abstraction ratesfrom stations.
- (iii) Spreading abstraction sources over the whole area of the aquifer system.



Conclusion

"Groundwater cannot be protected in isolation" but within a comprehensive water management framework.

But, in coastal aquifers specific (and unconventional) abstraction management techniques are important to limit the onset of seawater intrusion.



Thank-you for your attention

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