GOVERNMENT OF MALTA
MINISTRY FOR THE ENVIRONMENT, ENERGY AND ENTERPRISE
MINISTRY FOR THE ECONOMY, EUROPEAN FUNDS AND LANDS
PARLIAMENTARY SECRETARIAT FOR EUROPEAN FUNDS

WATER BE THE CHANGE

EU funds for Malta 2014-2020

Consultation Process on the 3rd River Basin Management Plan

Friday 7th October 2022

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1. Executive Summary

The Consultation Process on the 3rd River Basin Management Plan took place on Friday 7th October 2022. The conference highlighted the main challenges for the achievement of good status for Malta's water resources and the measures which need to be implemented.

The conference was held at the Phoenicia, Valletta, Malta which is a central location for such an event.

Attendees were able to sign up for the conference through https://water.org.mt/join-the-drops/conference/ website, where they could fill in a form, by calling +356 2777 2777 or by sending an email to info@emcs.com.mt to register.

Parking was available at MCP car park, and its perfect location facilitated the attendance of several participants. A standing lunch was organised for all attendees. A welcome coffee was organised while a coffee break during the conference provided attendees with a short break.

In total, 79 people attended this conference. The attendees were made up of private and public individuals, NGOs, different ministerial representatives and University lecturers. All attendees registered their attendance at the registration desk. The conference was open to all, and walk-ins were also accepted on the day.

The conference lasted till the afternoon and was hosted by Claire Agius Ordway, a well-known TV presenter. The conference consisted of 8 presentations delivered by different experts in the sector as well as three panel discussions. Throughout the report, you will find the presentations that were used by the various speakers, as well as the key points of each presentation.

A number of different exhibition stands were set up inside the conference halls. Various merchandise items including pencils, pens, notebooks and sticky notes were displayed at the registration desk and handed out to all participants upon registration. The agenda, a small note pad and a pencil were also placed on the seat of each individual.

2. Conference Agenda

Date: October 7, 2022

Venue: The Phoenicia, Valletta, Malta

Time	
09:00	**Registration & Welcome Coffee**
09:30	**Opening Session** Chief Executive Officer, Energy and Water Agency | Manuel Sapiano Active Chief Executive Officer, Environment and Resources Authority | Kevin Mercieca Chief Policy Water, Energy and Water Agency | Michael Schembri Minister for Environment, Energy and Enterprise | Miriam Dalli
10:00	**Coffee Break**
10:30	**Session 1 – Measures for the achievement of good status in other European river basin districts** River Basin Management Planning: The Hungarian Experience | Peter Kovács The challenges of implementing the hydrological plans for the 3rd planning cycle | Marc García Manzana
11:00	**Session 2 – Groundwater** Qualitative assessment and gaps towards the achievement of good status objectives | Manuel Sapiano Quantitative assessment and a gap assessment towards the achievement of good status objectives | Michael Schembri Panel discussion on the measures necessary to achieve these status objectives
11:45	**Session 3 – Surface Waters** Qualitative status of surface waters and gaps towards achievement of good quality status Quantitative aspect of surface waters in Malta, link with ecological status and gaps towards achievement of good ecological status Panel discussion on the measures necessary to achieve these status objectives
12:30	**Lunch Break**
13:45	**Session 4 - Coastal Waters** Qualitative assessment of coastal waters and gaps towards achievement of good chemical status Ecological status assessment of coastal waters and gaps towards achievement of good ecological status Panel discussion on the measures necessary to achieve these status objectives
14:00	General Synthesis and Conclusion

3. Detailed report of conference proceedings

3.1 Opening Session

MANUEL SAPIANO, CEO, ENERGY AND WATER AGENCY

Mr Sapiano addressed the audience and introduced the consultation exercises of the 3rd River Basin Management Plan. He informed the audience that the Energy and Water Agency (EWA) are seeking an open discussion, whereby relevant stakeholders can give their input and perceptions over the coming months.

Mr Sapiano informed the attendees that the sessions will consist of both a technical report as well as practical aspects that affect our daily lives. He stressed that EWA's aim is to receive feedback, and constructive criticism which will help the different entities work together and provide a basis for a more sustainable future.

Manuel Sapiano, CEO of the Energy and Water Agency emphasised the importance that everyone works together and that all stakeholders are key in recognising the main challenges and gaps towards the achievement of good status conditions for our groundwater, inland surface, transitional waters, and coastal waters. All water resources are important and need to be safeguarded. Sapiano added that the feedback of all stakeholders is significant and invited all the meeting participants to openly provide all their feedback during the panel discussion session to enable us to develop a plan with realistic measures.

KEVIN MERCIECA, ACTIVE CEO, ENVIRONMENT AND RESOURCES AUTHORITY

At the start of his speech, Mr Mercieca highlighted that Malta is an island that does not have lakes and rivers, unlike other European countries. The Maltese Islands' water resources are limited to small streams with important ecosystems. Kevin Mercieca's address added that all relevant sectors can help in safeguarding our water resource and ensure its sustainable use to secure its availability of natural water in the long term to address not only Malta's water demand, but also to support our natural heritage.

Lastly, Mr Mercieca highlighted the importance of the River Basin Management Plan (RBMP) and its role in managing the Maltese Islands' water resources. He noted that the plan also addresses the ecological concerns of our ecosystems. The 3rd RBMP is a continuation of the previous plans with a special focus on engaging all stakeholders.

MICHAEL SCHEMBRI, CHIEF POLICY WATER, ENERGY AND WATER AGENCY

Dr Schembri highlighted the main aim of the 3rd RBMP which is to improve the overall status of our waters. He addressed the notion that objectives can be set however in doing so we are to keep in mind the Maltese Islands' natural resources and the socio-economic settings.

The process of developing management plans is a continuous learning experience, past projects provided substantial knowledge which must not be discarded but utilised to learn, adjust and do improvements for a successful future plan.

Mr Schembri concluded by thanking his colleagues at EWA and ERA for all the hard work and input towards the River Basin Management Plan.

MIRIAM DALLI, MINISTER FOR ENVIRONMENT, ENERGY AND ENTERPRISE

During her speech, Minister for the Environment, Energy and Enterprise, Miriam Dalli addressed the attendees and emphasised the benefits water has on our quality of life. The Minister discussed that water is an important resource that is overlooked and taken for granted. She went on to say that Malta needs to conserve water as well as sustain the demand. The Minister spoke about the progress Malta has made throughout the past years, in terms of technology and in becoming compliant with the EU Management Plans.

The Minister discussed the RBMP and the role it plays in ensuring our waters are kept clean and in optimum condition. She acknowledged the fact that a number of players are involved in the implementation and success of these plans.

Lastly, she congratulated the implementation of the 'Water be the Change' campaign which contributed heavily towards water saving measures through the water kits which were distributed to all households and throughout the Maltese Islands. She concluded by thanking all the participants who have been and are still working hard to see this project through successfully.

3.2 Session 1

PETER KOVÁCS, WATER DIRECTOR OF HUNGARY, MINISTRY OF INTERIOR

TITLE: RIVER BASIN MANAGEMENT PLANNING – HUNGARIAN EXPERIENCE

Mr Kovács began his presentation by giving a brief overview of the situation in Hungary, highlighting the fact that water is also an important topic in his home country. Hungary currently has a national strategy in place, this 20-to-30-year plan was designed to tackle the issues they face regarding water.

Mr Kovács went onto discuss groundwater in Hungary, noting the following aspects:

1. 95% of drinking water comes from groundwater
2. There are other significant water uses (e. g. irrigation, thermal water uses)
3. It provides baseflow for surface waters and groundwater-dependent ecosystems
4. It ensures local water balance
5. There is growing concern due to climate change

Mr Kovacs continued to focus on the vulnerability of shallow groundwater resources in Hungary a repercussion of climate change and irrigation. He also discussed several issues and solutions for climate change, water scarcity and drought.

In 2021, Hungary carried out an online public consultation. followed by a review on the 2nd RBMP. This review shed light on:

- The different water body typologies
- The status of these water bodies
- The application of Article 4. (4), (5), (6), (7) of the Water Framework Directive
- The necessity to update our current understanding on the existing and upcoming Anthropogenic pressures
- The new inventory for emission
- The revised list of priority substances

Mr Kovacs closed off by asking important water management questions and addressing the main challenges the world now faces.

MARC GARCÍA MANZANA, THE WATER COMMISSIONER OF THE JÚCAR HYDROGRAPHIC CONFEDERATION

TITLE: THE GREAT CHALLENGE: THE EXECUTION OF THE HYDROLOGICAL PLANS OF THE THIRD PLANNING CYCLE

Mr Manzana started his delivery by giving the audience a brief understanding of Spain and its regions. He explained that it is made up of 70 regions; however, if there is an issue in one water basin then all of Spain has issues. He went on to discuss that the agency is in the Mediterranean area and that they have nine (9) rivers in the basin. Spain has a 3,800m^3 inflow and there is a total water demand of 3,200m^3 every year. He argued that although this seems balanced it is not the case. This is due to the fact that there is not enough water since agricultural demands are as high as 80% whereas 20% is used by households).

He described the hierarchy of the river basin agency, where several technical individuals manage the works lead by the Water Commissioner. Mr Manzana is responsible for the execution of the plans, and he said the two main issues they face are water scarcity and the quality of groundwater.

The speaker went on to discuss the desalination of coastal waters and how this is just used for agricultural purposes. He also mentioned that they often need to combine different water sources from different origins.

In the south of the Spanish basin, natural resources are limited, while they have more uses, so it is important to maintain control of the pumping of water. There are 65 agents responsible for monitoring the misuse however it is still difficult to control all pumping. He mentioned that satellites are also used to monitor this matter.

Another problem is also the quality standards that need to be maintained to be able to reuse water since desalination is only used by people. Another challenge they face is the price of energy. Desalination uses high amounts of energy, so the greatest challenge is to make PV plants to produce this energy and mitigate high prices. Huge efforts are being made to restore the river and to maintain the quality of the water.

The speaker concluded that they are promoting the reuse of water, sanitation, dam removals, making protocols and placing sediment. The problems are many, but the objective is to concentrate on the few main ones. He suggested that generally, we should choose to focus on the quality not the quantity of the problems.

3.3 SESSION 2

MANUEL SAPIANO, CEO, ENERGY AND WATER AGENCY

TITLE: ASSESSING GROUNDWATER QUALITATIVE STATUS

Manuel Sapiano explained that during his presentation he would be discussing water quality and the importance of data and monitoring. He explained that the Maltese Islands have a total of 42 monitoring points that cover all the typologies of groundwater bodies present in the Malta and such monitoring setup offers a very high spatial representation.

When analysing the data resulting from this monitoring network, EWA groups water bodies based on similar hydrogeological and anthropic pressure conditions. This allows the monitoring of our groundwater bodies to be done more effectively and to at least have 1 monitoring point per groundwater body.

The type of monitoring that occurs is two-fold:

1. Surveillance Monitoring: Once every 6 years
2. Operational Monitoring: Once every 6 months

Malta has a high spatial representativity of monitoring network. in fact, it is the highest in the EU. This is because of the size of the islands and the number of groundwater bodies. The system is not perfect; however, updates are currently being carried out to the monitoring setup to further improve its relevance and monitoring capabilities. The two main challenges being faced are that: the water being monitored is taken from the upper horizon, so it is not representative of the entire groundwater body; and the monitoring of groundwater from perched groundwater bodies is carried out through springs which are not always fully representative.

Due to the long percolation time, most of the Maltese Island's groundwater is from the 1960s and 1980s, which is an important element when interpreting results since this reflects what happened in the last decades and not weeks.

Mr Sapiano addressed that all, barring 2 groundwater bodies, failed to achieve good qualitative status conditions during the 2nd implementation cycle of the river basin management plan. The main status failing parameters were **saline intrusions** and **nitrate contamination**. Mr Sapiano went on to discuss each result in more detail.

The main conclusions drawn from these results were:

1. Two groundwater bodies can be classified as being in good Qualitative Status (down from three at the start of 2nd RBMP).

2. Saline intrusion and nitrate contamination continue to be the principal problems of concern.

3. In some monitoring stations and some groundwater bodies, new parameters are being detected (possibly a result of extended and more detailed monitoring)

4. Threshold Values might need to be revised during throughout the life cycle of the 3rd River Basin Management Plan to account for the natural background conditions

5. The third RBMP's operational monitoring will now include newly discovered parameters, such as a longer list of PFAS, as part of the routine monitoring exercises.

6. The third RBMP will include specific groundwater investigations to help establish the origin of certain parameters, especially those connected to a geogenic origin.

MICHAEL SCHEMBRI, CHIEF POLICY OFFICER, ENERGY AND WATER AGENCY

TITLE: QUANTITATIVE ASSESSMENT OF MALTA'S GROUNDWATER BODIES

The speaker began by explaining that the main measure of quality status is assessed through groundwater levels. Measuring the water level in our groundwater bodies, in particular the mean sea level groundwater bodies, allows to assess their status..

He went on to mention that several stations have been in place for around 40 to 50 years. However, when looking at the past 20 years, depending on the data available, one can

statistically analyse the occurrence of trends at each of the monitoring stations. At the moment, most of the stations do not show any upward or downward trends. In the coming years, EWA is looking to upgrade the monitor structures, increase the number of stations and automate the process of groundwater level monitoring.

When looking at the long-term trends in our groundwater bodies, the water level measurements indicated if a water body is given sufficient time to recover.

Michael Schembri went on to discuss the updated conceptual models for our groundwater bodies in order to assess their quantitative status and touched upon the following points:

- Additional knowledge of how the groundwater body is functioning is allowing to better understand and determine assumptions which need to be factored in such models

- Springs function like a sponge and unless supplied with additional rainfall and runoff which slowly percolate through the rock they will eventually dry out as water flows aways further downstream. Therefore in springs and perched groundwater bodies it is the flow that needs to measured (where possible) and not the level.

- The situation in Gozo, from a groundwater quantity perspective, is very similar to Malta and in most instances, what applies to Malta is also very much relevant for the island of Gozo. .

- Measuring just water level at the topmost part of a groundwater body might not be the best indicator of the status of the water body. Therefore, currently a new monitoring network is being developed to look into the freshwater and seawater interface of the groundwater body .

The speaker's also focused on why it is important to consider the interface and not only water levels when assessing the status of our groundwater bodies. This is of importance because the level might not fluctuate so much, however there is more fluctuation in the freshwater/saltwater interface. He stressed the importance of measuring the quantitative status as it provides us with a better understanding of our availability of fresh water.

The quantitative status of our groundwater is grouped by the mean sea level and perched groundwater bodies located in Malta and Gozo. Work on the quantitative status is ongoing, and will also look into how we are currently measuring natural recharge. The Maltese Islands are still in a situation where the 2 main groundwater bodies, the Malta and Gozo mean sea level groundwater bodies, are in a poor state, which in essence implies that more water is being extracted than is being naturally or anthropogenically recharged. The ongoing objective of the 3rd RBMP is to improve the overall status of our groundwater bodies, albeit being a difficult taskm by addressing this imbalance.

Mr Schembri concluded his presentation with the following remarks:

- It is important to recognize the natural connection between quantity and quality, paying special attention to transition zone effects.

- It is important to improve the correlation between important components of the water balance, including rainfall depth, runoff, evaporation, and recharge. Such improvements will Increase confidence in the quantification of key parameters in the water balance framework by addressing uncertainties in recharge (inflow) and natural coastal discharge.

- Ongoing work on the conceptual and numerical models of the aquifer system is necessary to make them more dependable.

- It is evident, from the groundwater quantitative status assessment, that the MSLA has hotspots of deterioration.

- The Maltese islands' current and anticipated rising demand for water requires targeted action.

PANEL 1: GROUNDWATER

The below two questions were put forward to the audience for their feedback:

Question 1

The demand for water in Malta exceeds the supply which can be sourced from natural water resources. Today, the gap in demand is still not fully addressed by alternative water resources leading to over abstraction of groundwater resources.

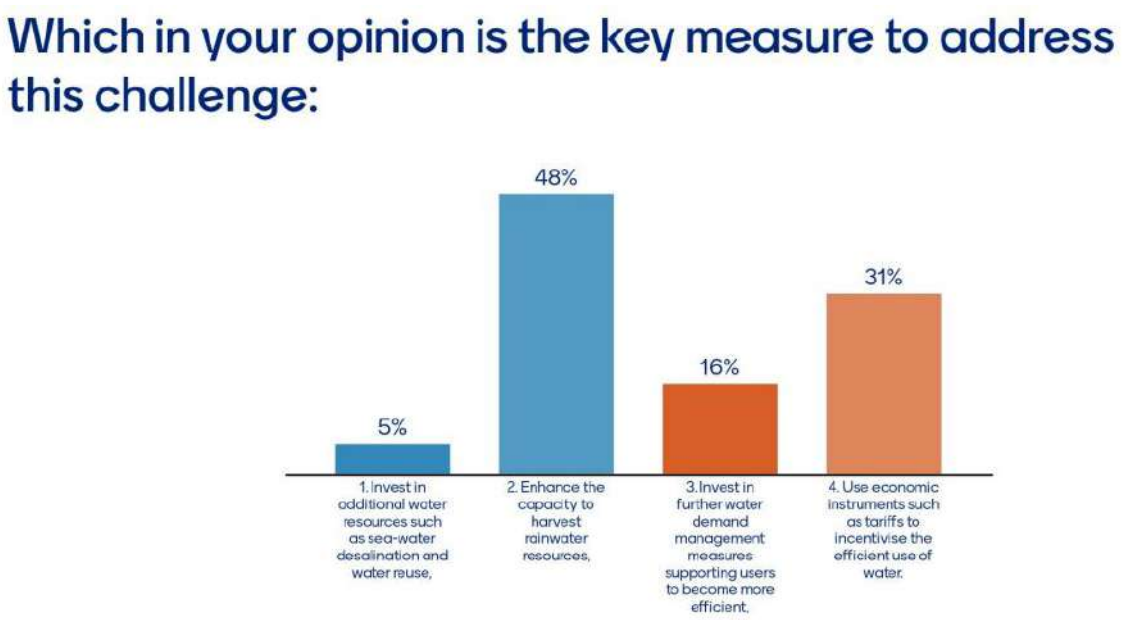
Which in your opinion is the key measure to address this challenge:

(i) Invest in additional water resources such as sea-water desalination and water reuse,

(ii) Enhance the capacity to harvest rainwater resources,

(iii) Invest in further water demand management measures supporting users to become more efficient,

(iv) Use economic instruments such as tariffs to incentivise the efficient use of water.



Question 2

From a qualitative perspective, nitrate remains the main status failing parameter for groundwater in Malta. Studies have shown overfertilization in the agricultural sector as being the main source of nitrate contamination of groundwater.

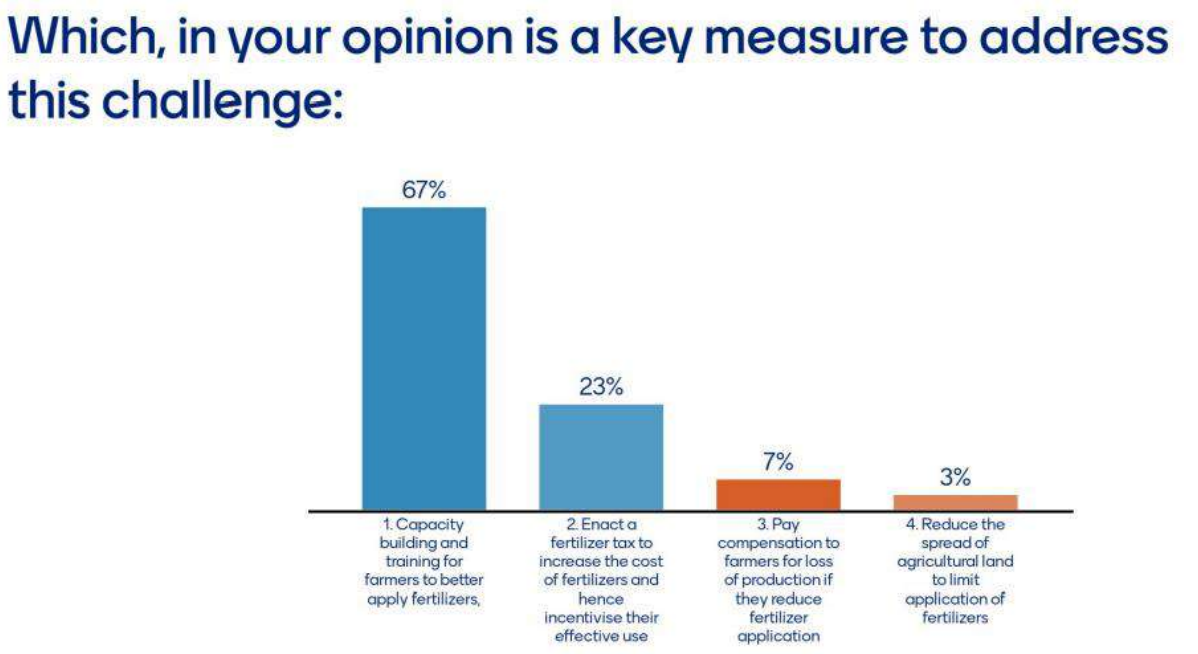
Which, in your opinion is a key measure to address this challenge:

(i) Capacity building and training for farmers to better apply fertilizers,

(ii) Enact a fertilizer tax to increase the cost of fertilizers and hence incentivise their effective use,

(iii) Pay compensation to farmers for loss of production if they reduce fertilizer application,

(iv) Reduce the spread of agricultural land to limit the application of fertilizers



3.4 Session 3

ENVIRONMENT AND RESOURCE AUTHORITY

TITLE: WATER FRAMEWORK DIRECTIVE: INLAND SURFACE & TRANSITIONAL WATERS

The representative from ERA began her presentation by defining Inland Surface Waters in relation to Rivers, Lakes and Transitional Waters, identifying the ones in the Maltese Islands and the issues faced.

The speaker went on to identify the Water Framework Directive objectives. These are:

- Good chemical status
- Good ecological status
- Good ecological potential

When discussing the qualitative status of inland surface and transitional waters three factors were discussed:

1. Physico-Chemical Parameters
2. Chemical Contamination
3. Relevant Pressures

The gaps in achieving good qualitative status depend on:

1. Nutrient levels in watercourses
2. Salinity levels in transitional water bodies
3. Chemical contamination

When reviewing the quantitative aspects and ecological status of inland surface and transitional waters the following was identified:

- Availability of water required to sustain aquatic ecosystems
- Connectivity with groundwater
- The issues include water scarcity, low water / intermittent flows, low freshwater input, historical hydro morphological changes or water diversions.
- The biological quality elements
- The ecological status and relevant pressures

The gaps in achieving good ecological status depend on:

1. Low/fluctuating water levels
2. Non-indigenous species
3. Water quality

PANEL 2: INLAND SURFACE & TRANSITIONAL WATERS

The below questions were put forward to the audience for their feedback:

Question 1

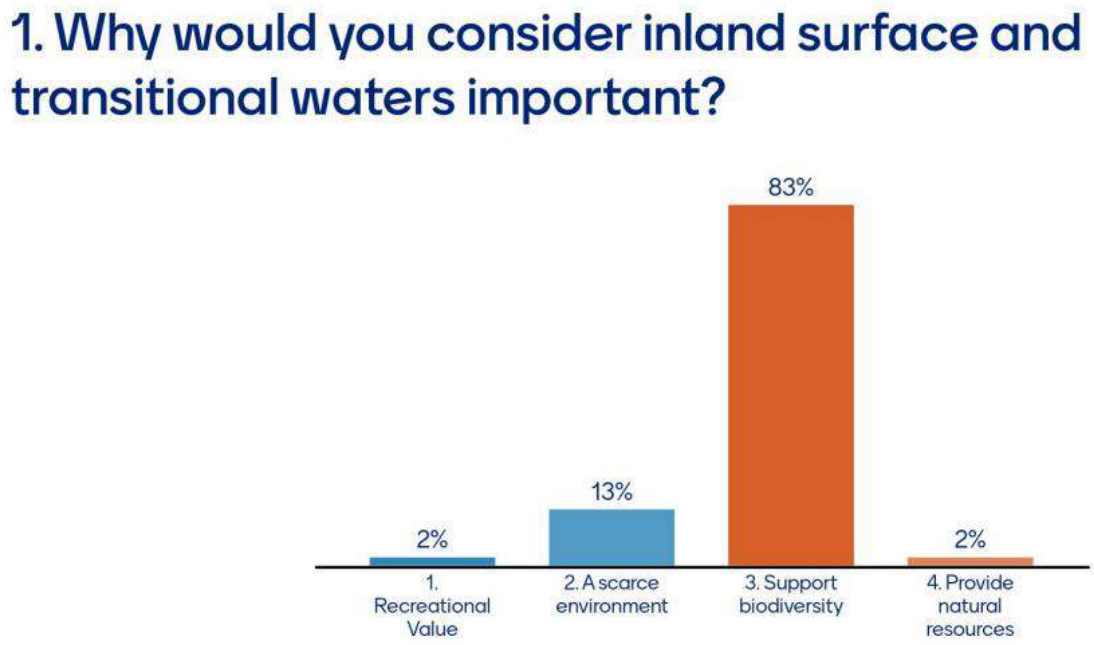
Why would you consider inland surface and transitional waters important?

(i) Recreational Value

(ii) A scarce environment

(iii) Support biodiversity

(iv) Provide natural resources



Question 2

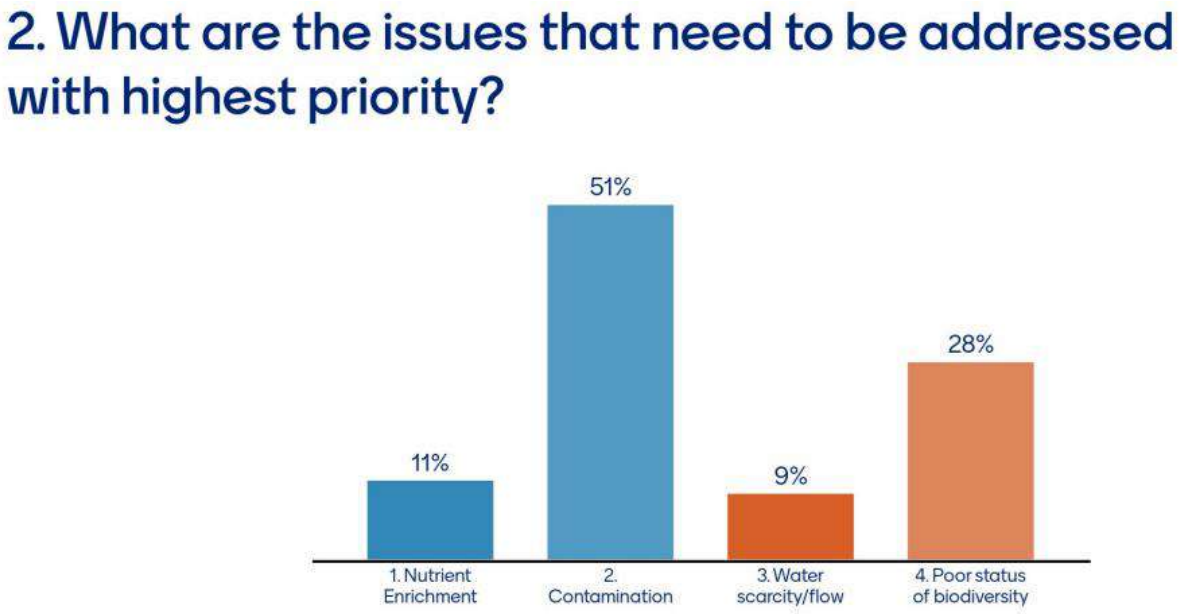
What are the issues that need to be addressed with the highest priority?

(i) Nutrient Enrichment

(ii) Contamination

(iii) Water scarcity/flow

(iv) Poor status of biodiversity



Question 3

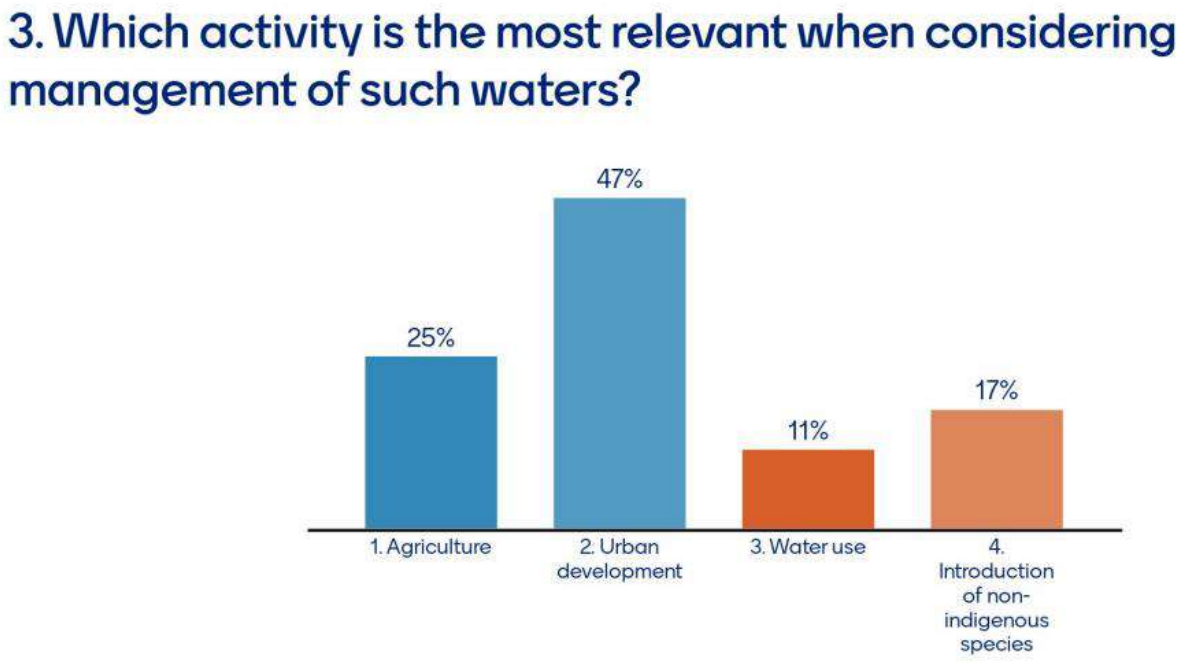
Which activity is the most relevant when considering management of such waters?

(i) Agriculture

(ii) Urban development

(iii) Water use

(iv) Introduction of non-indigenous species



Question 4

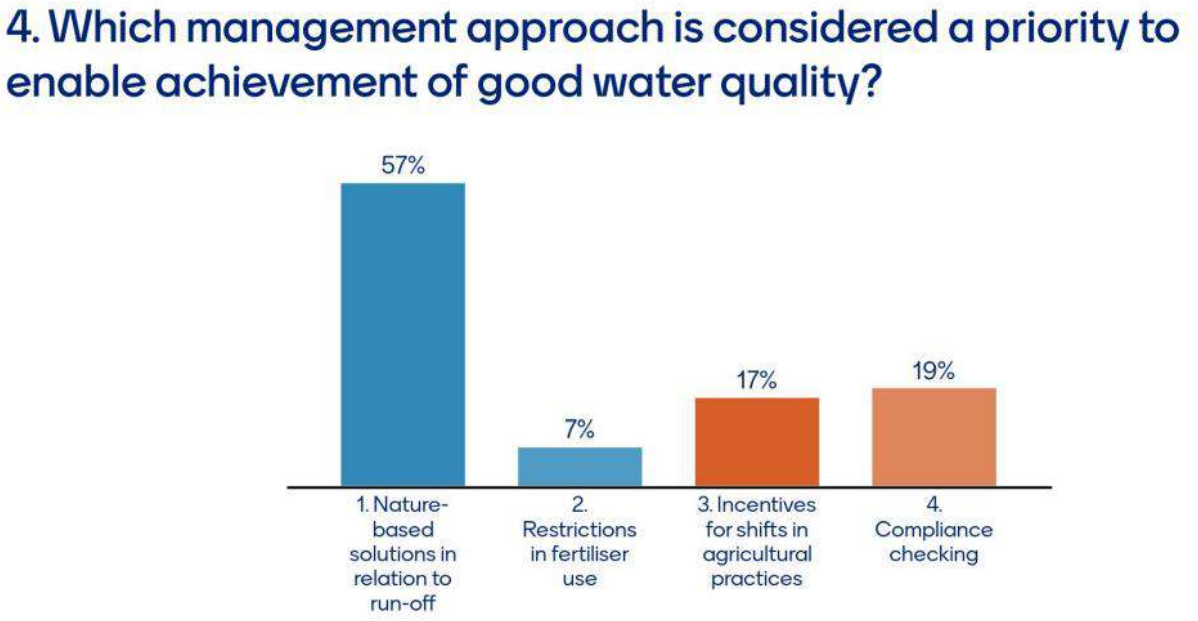
Which management approach is considered a priority to enable achievement of good water quality?

(i) Nature-based solutions in relation to run-off

(ii) Restrictions in fertiliser use

(iii) Incentives for shifts in agricultural practices

(iv) Compliance checking



Question 5

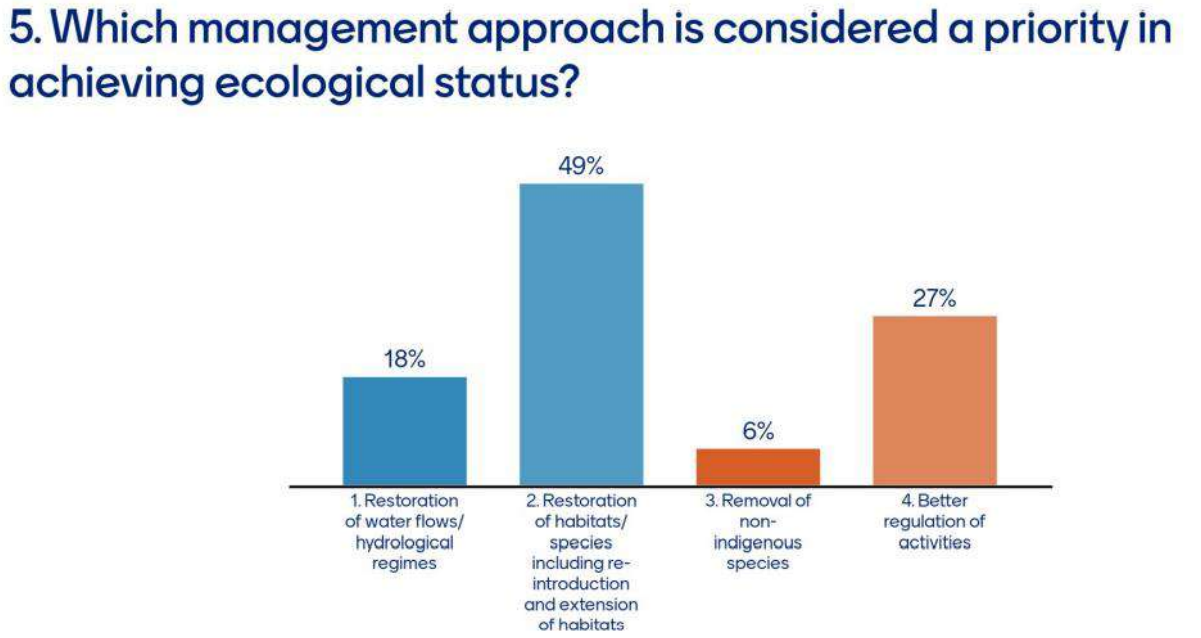
Which management approach is considered a priority in achieving ecological status?

(i) Restoration of water flows/hydrological regimes

(ii) Restoration of habitats/species including re-introduction and extension of habitats

(iii) Removal of non-indigenous species

(iv) Better regulation of activities



Question 6

What is the best approach in engaging relevant stakeholders in management processes?

(i) Consultation throughout policy implementation

(ii) Provisions of incentives to comply with management regimes

(iii) Involvement in implementation of management process

(iv) Compliance checking

3.5 Session 4

ENVIRONMENT AND RESOURCE AUTHORITY

TITLE: WATER FRAMEWORK DIRECTIVE: COASTAL WATERS

The representative from ERA began her presentation by identifying the number of coastal waters we have in the Maltese Islands and the Water Framework Directive objectives. The objectives are:

- Good chemical status
- Good ecological status
- Good ecological potential

When discussing the qualitative status of coastal waters three factors were identified:

1. Physico-Chemical Parameters
2. Chemical Contamination
3. Relevant Pressures

The gaps in achieving good qualitative status depend on:

1. Chemical contamination
2. Emerging issues
3. Harmful algal blooms

When reviewing the ecological status of coastal waters, the following were identified:

- Biological quality elements
- Ecological status
- Ecological status – relevant pressures

The gaps in achieving good ecological status depend on:

1. No gaps towards good ecological status overall
2. Non-indigenous species
3. Links with protected areas

PANEL 3: COASTAL WATERS

The below questions were put forward to the audience for their feedback:

Question 1

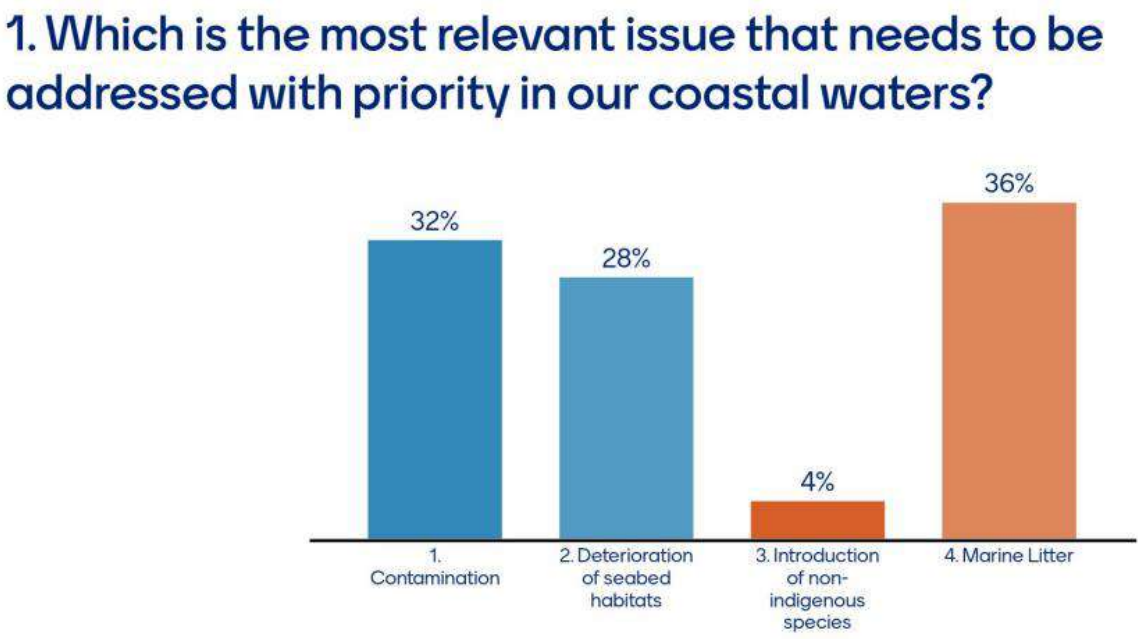
Which is the most relevant issue that needs to be addressed with priority in our coastal waters?

(i) Contamination

(ii) Deterioration of seabed habitats

(iii) Introduction of non-indigenous species

(iv) Marine Litter



Question 2

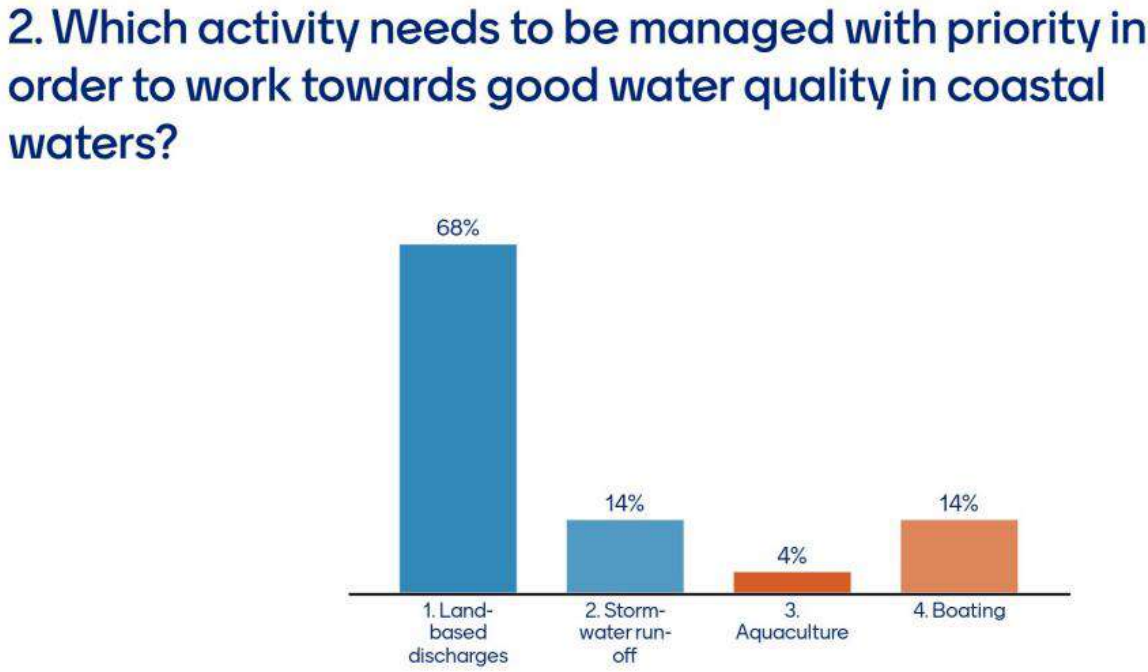
Which activity needs to be managed with priority in order to work towards good water quality in coastal waters?

(i) Land-based discharges

(ii) Storm-water run-off

(iii) Aquaculture

(iv) Boating



Question 3

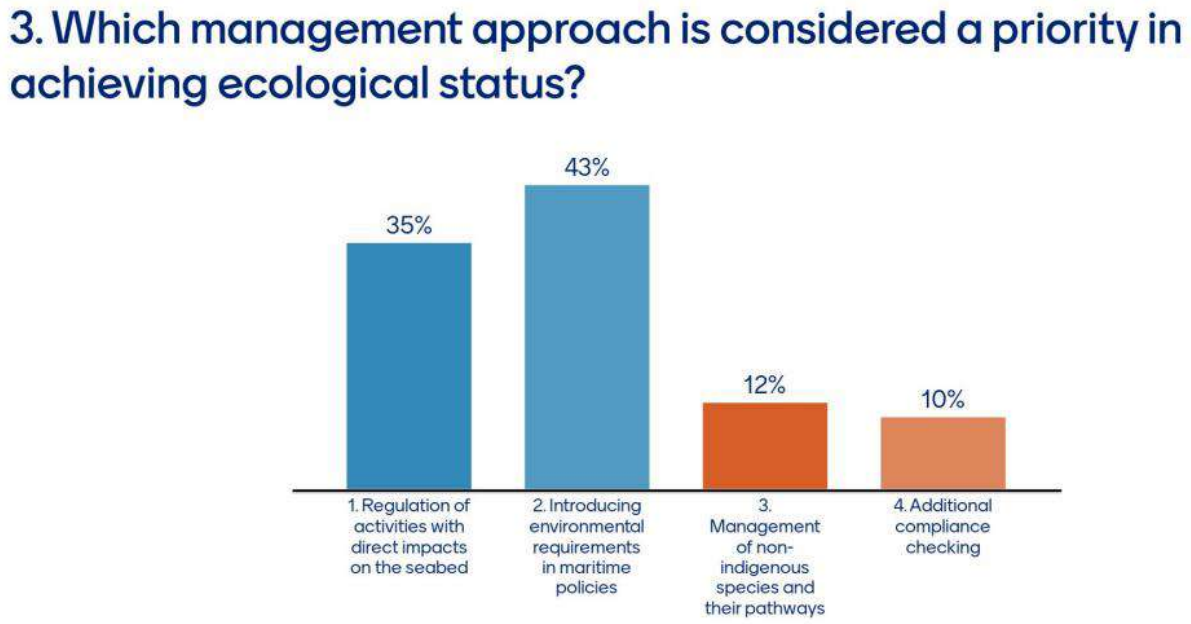
Which management approach is considered a priority in achieving ecological status?

(i) Regulation of activities with direct impacts on the seabed

(ii) Introducing environmental requirements in maritime policies

(iii) Management of non-indigenous species and their pathways

(iv) Additional compliance checking



Question 4

Which is the best approach in engaging relevant stakeholders in management processes?

(i) Consultation throughout policy implementation

(ii) Provisions of incentives to comply with management regimes

(iii) Involvement in implementation of management process

(iv) Compliance checking

4. Presentations

BELÜGYMINISZTÉRIUM

River Basin Management Planning – Hungarian Experience

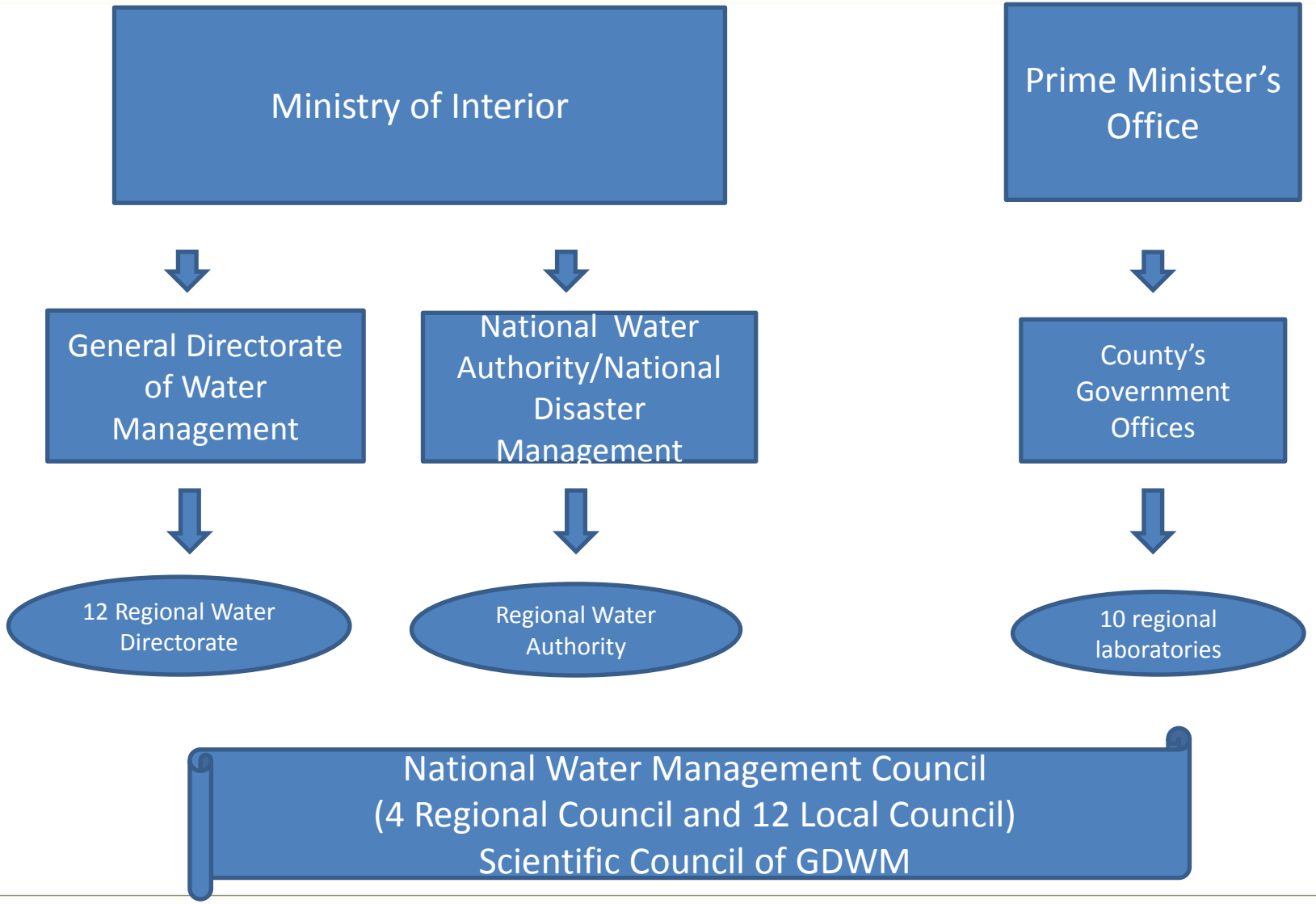
Peter Kovács

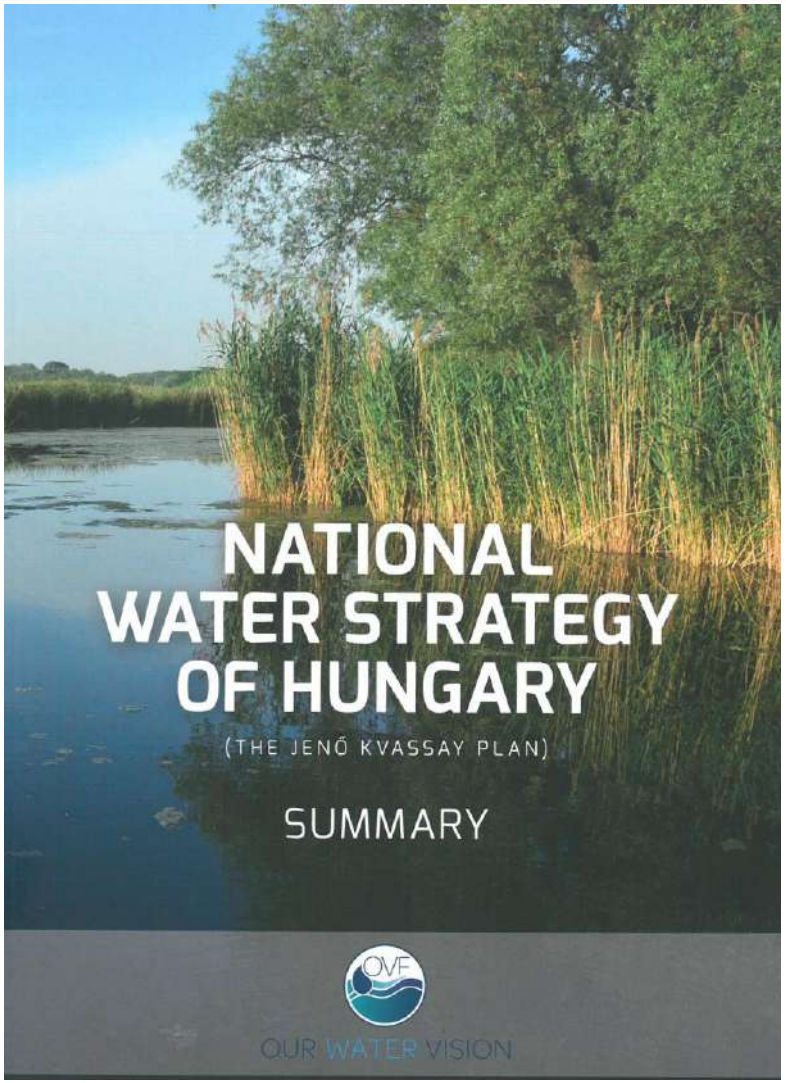
Water Director of Hungary

Ministry of Interior

HUNGARY
IN THE DANUBE BASIN

Danube is the most international river basin
800,000 km^2
19 countries
81 million inh.


Ministry of Interior
Prime Minister's Office
General Directorate of Water Management
National Water Authority/National Disaster Management
County's Government Offices
12 Regional Water Directorate
Regional Water Authority
10 regional laboratories
National Water Management Council
(4 Regional Council and 12 Local Council)
Scientific Council of GDWM



THE NATIONAL WATER STRATEGY OF HUNGARY WAS NAMED AFTER

Jenő Kvassay water engineer

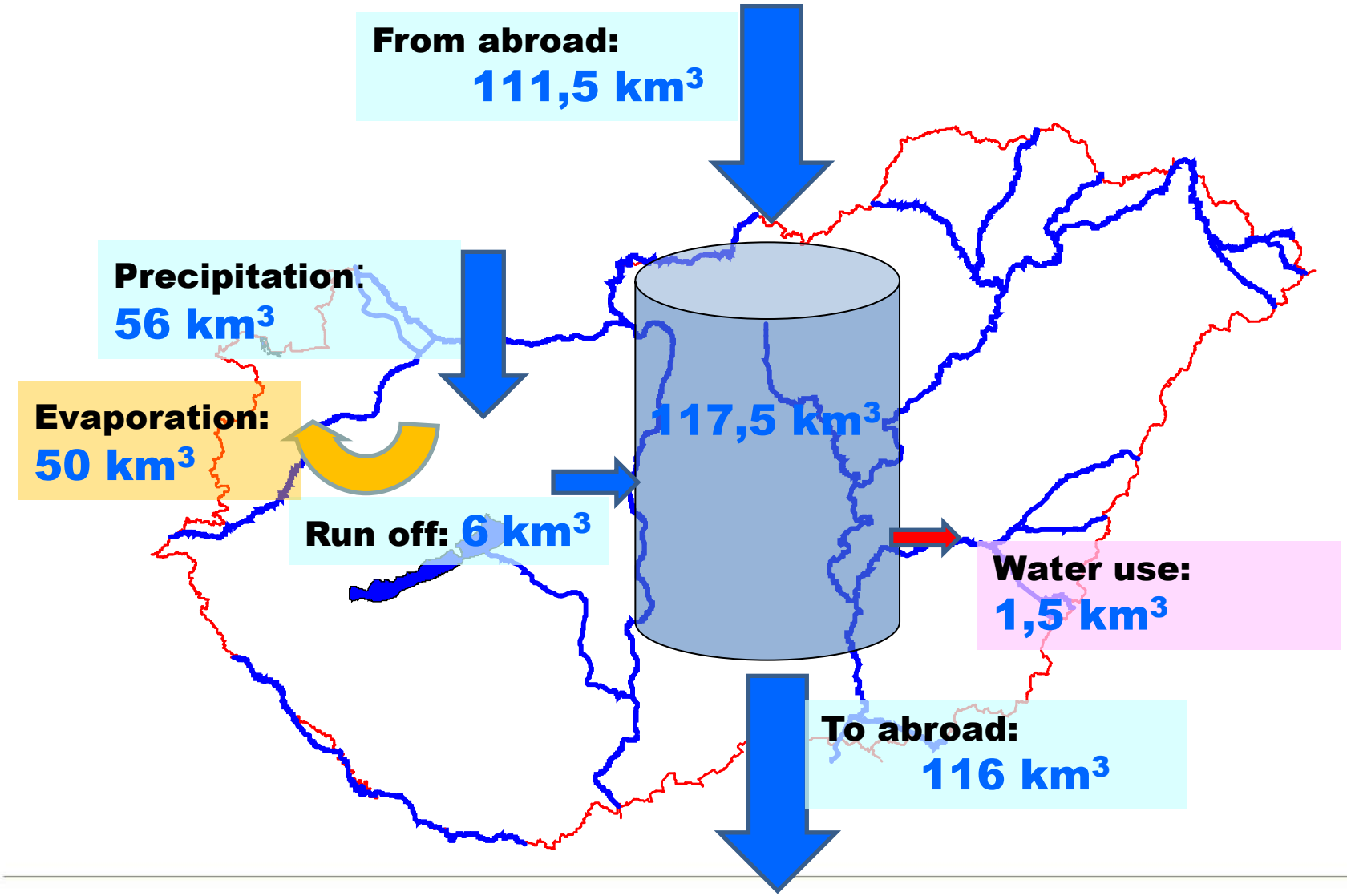
(1850–1919)

He founded and organised the first civil engineering institution in Hungary and was the first head of the National Directorate for Water Construction. He also created the first water legislation of Hungary in 1885). His activities set the frames of a water management that was needed for civic development and launched the first activities towards an integrated water management.

Government Decision no. 1110/2017 (III. 7.) was made on the National Water Strategy and on the acceptance of the relevant implementation plan.

This Government Decision can be found in Hungarian at:
http://njt.hu/cgi_bin/njt_doc.cgi?docid=200914.335971

The full text of the National Water Strategy (the Jenő Kvassay Plan) can be found in Hungarian language at:
http://www.kormany.hu/download/6/55/01000/Nemzeti%20V%C3%ADzstrat%C3%A9gia.pdf#!DocumentBrowse

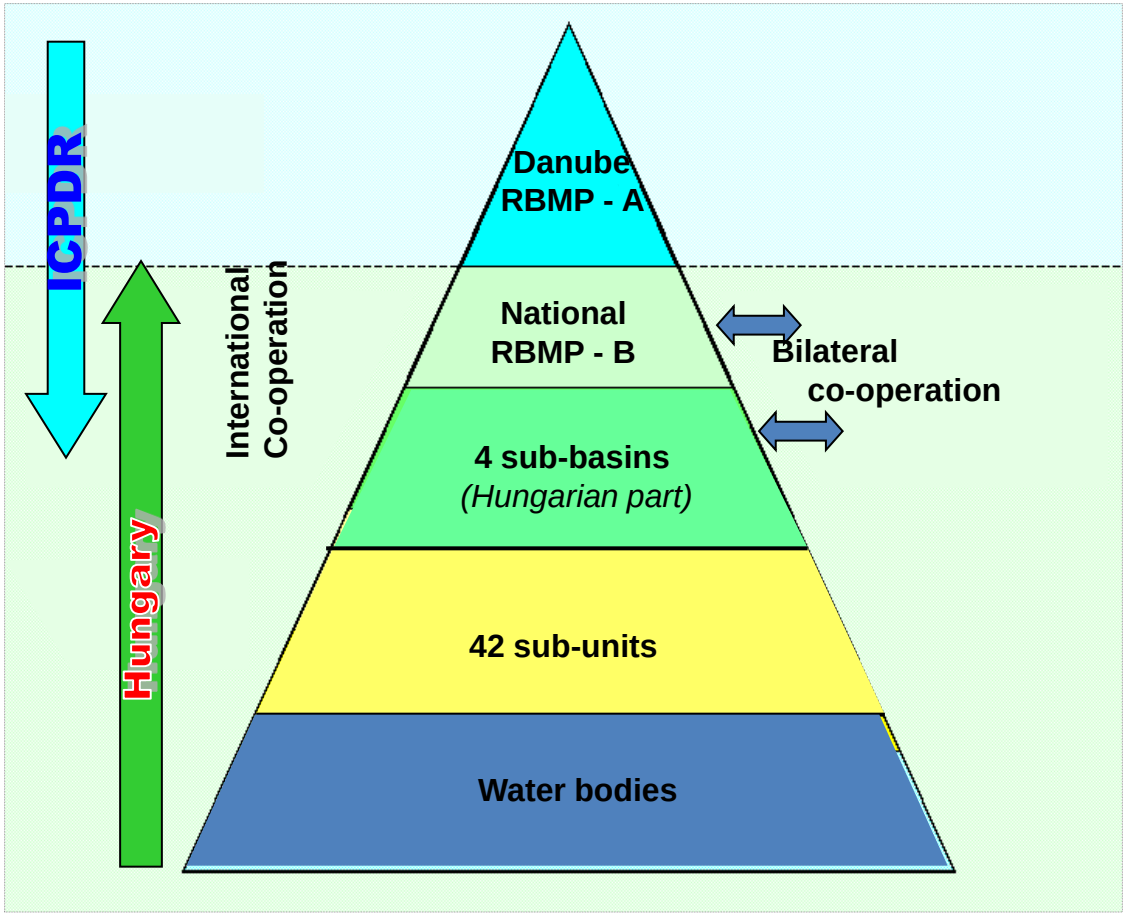

From abroad:
111,5 km³
Precipitation:
56 km³
Evaporation:
50 km³
117,5 km³
Run off: 6 km³
Water use:
1,5 km³
To abroad:
116 km³

The quantity of waters are changeable: sometimes the too much water, sometimes lack of waters can cause damages at the same sites

Water Framework Directive

„Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy”

Main structure of RBMP



Be as specific as needed and as general as possible!!!

Iterative process of „top-down" and „bottom up" approach

Danube River Protection Convention

29 June 1994, Sofia (Bulgaria)

Protection of water & ecological resources

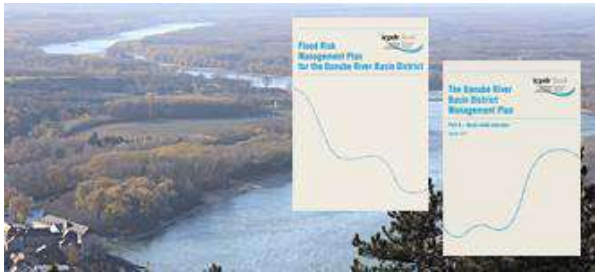
Sustainable use of water

Reduce nutrients & hazardous substances

Manage floods & ice hazards

ICPDR coordinates basin-wide implementation of EU Water Framework Directive & EU Floods Directive

ICPDR co-ordination



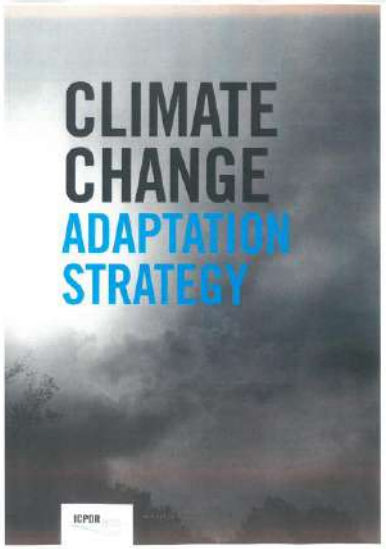
Milestones:

Adoption of 3rd Danube River Basin District Management Plan and 2nd Danube Flood Risk Management Plan in 8 February 2022, during the 4th Danube Ministerial Meeting (on-line) .

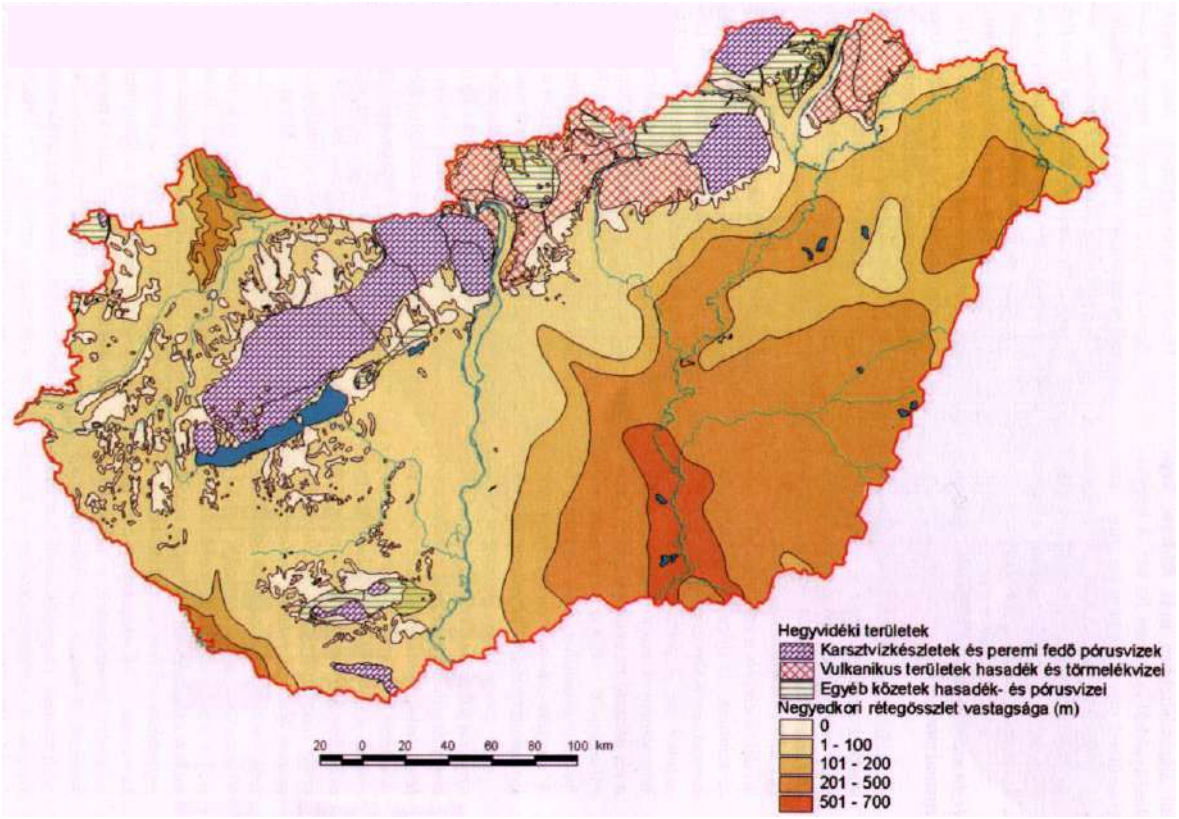
https://www.icpdr.org/main/new-designs-summary-brochures-icpdrs-two-management-plan-updates

Climate Change adaptation Strategy revised in 2019

Climate Chnage Effects (including drought management) become Significant Water Management Issues (2019 HU Presidency of ICPDR)



Main aquifers in HU



Groundwaters in Hungary

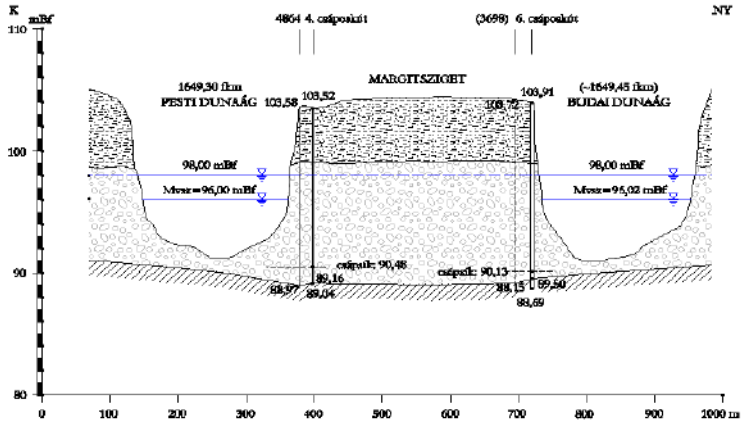
- **95% of drinking water from groundwater**
- other significant water uses (e. g. irrigation, thermal water uses)
- provides baseflow for surface waters and groundwater dependent ecosystems
- ensures local water balance

Growing importance due to climate change!

Drinking water in Hungary

- 95% groundwater
  - bank filtration
  - karst aquifers
  - porous aquifers

- 5 % surface water



- protecting zones around vulnerable drinking water sources
- restrictions on specific activities
- preventive measures to protect water quality and to minimize the level of water treatment (Art. 7 WFD)
- new Drinking Water Directive: risk based approach

Groundwater quality – pollution sources

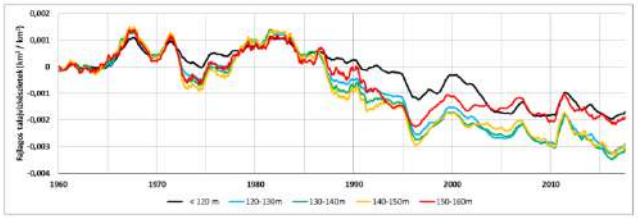
point sources
- landfills
- industrial installations, animal farms
- contaminated sites
- accidents

diffuse sources
- agriculture (fertilizers, pesticides)

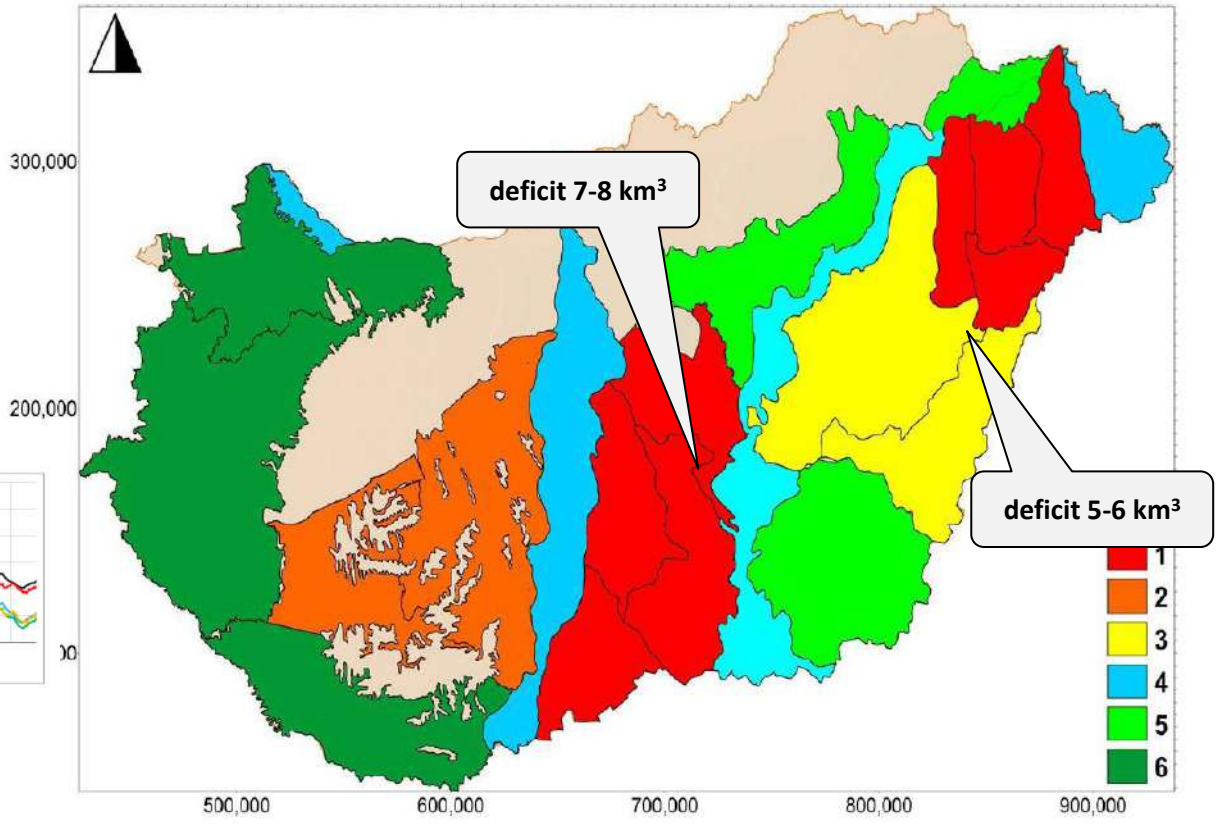
measures
- restrictions, licensing: prohibition of direct discharge and limitation of indirect discharge of pollutants into gw (GWD)
- technical protection
- monitoring, control
- CAP measures, WFD compensation
- education, public awareness raising

Vulnerability of shallow groundwater resources to climate change and irrigation

1. Highly vulnerable (significant water scarcity)
2. Vulnerable (recovery in years with high precipitation, but quick and significant decrease in water scarce periods)
3. Moderately vulnerable (significant climate impacts but mitigation from the surface – excess water. irrigation)
4. Vulnerability mitigated by large rivers
5. Small vulnerability (recharge from mountainous areas)
6. Less vulnerable (much precipitation, no or little extremities)



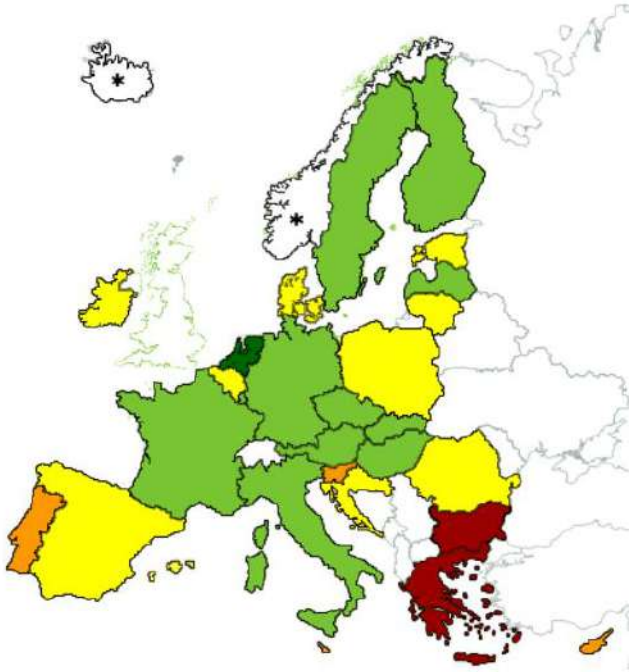
Shallow gw level Nyírség

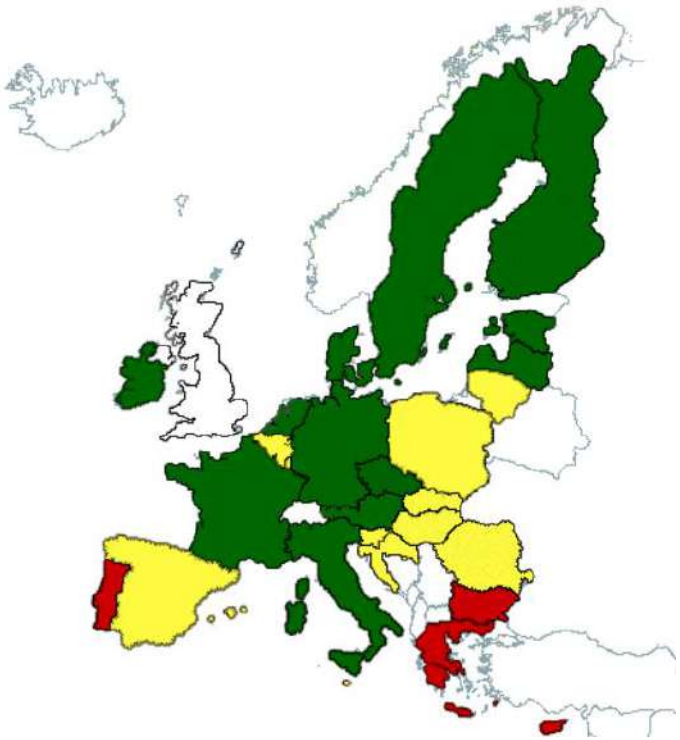


Climate change, water scarcity, drought
Problems - Answers

- Decreasing groundwater levels
- Decreasing water flow in rivers, water courses – degradation of ecosystems, water quality problems
- Increasing drought damage in agriculture
- Increasing competition for water among sectors
- Irrigation from groundwater resources
- …

- Water retention, water storage (reservoirs, rivers, watercourses etc.)
- Increase water use efficiency
  - Water saving techniques
  - Restoration of irrigation systems
  - Farmers' irrigation associations
- Changes in agric. practice (crop type, cultivation methods, land use, etc.)
- (Waste)water reuse
- Protection of groundwater resources, artificial recharge
- Agricultural risk management systems
- Drought monitoring
- Regional water transfer
- …





DARK GREEN – third River Basin Management Plans fully reported to CDR
LIGHT GREEN – third River Basin Management Plans reported
YELLOW – public consultation concluded but third River Basin Management Plans not reported yet
ORANGE – public consultation ongoing
RED – public consultation not yet started

DARK GREEN	– second Flood Risk Management Plans fully reported to CDR
LIGHT GREEN	– second Flood Risk Management Plans reported
YELLOW	– public consultation concluded but second Flood Risk Management Plans not reported yet
ORANGE	– public consultation ongoing
RED	– public consultation not yet started
GRAY	- no info

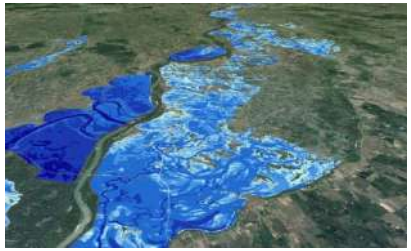
28 April 2022 adoptation by the Government

Review of 1st Flood Risk and Hazard Maps

Establishing evaluation(2016-2018)

Updating preliminary flood risk assessment and calculating hazard maps (2018-2019)

Flood risk assessment, preparation of flood risk maps and making flood risk management(2019-2022)



Review in every 6 years!!

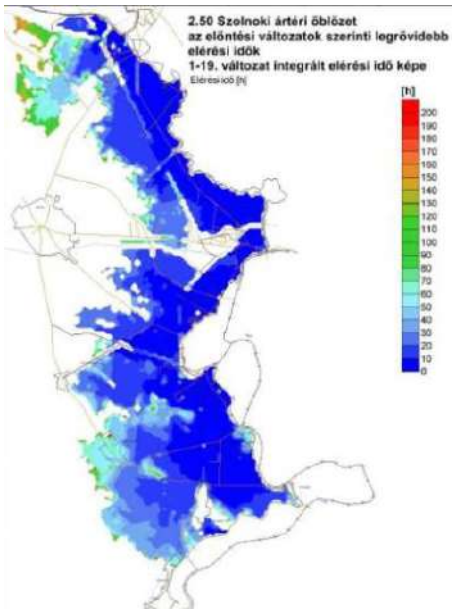
AGENDA/ MAIN DEADLINES	2016	2017		2018		2019		2020		2021	
Revision of the preliminary flood risk assessments	■	■	■								
Revision of the flood hazard and risk maps				■	■	■	■				
Revision of the flood risk managing plans								■	■	■	■

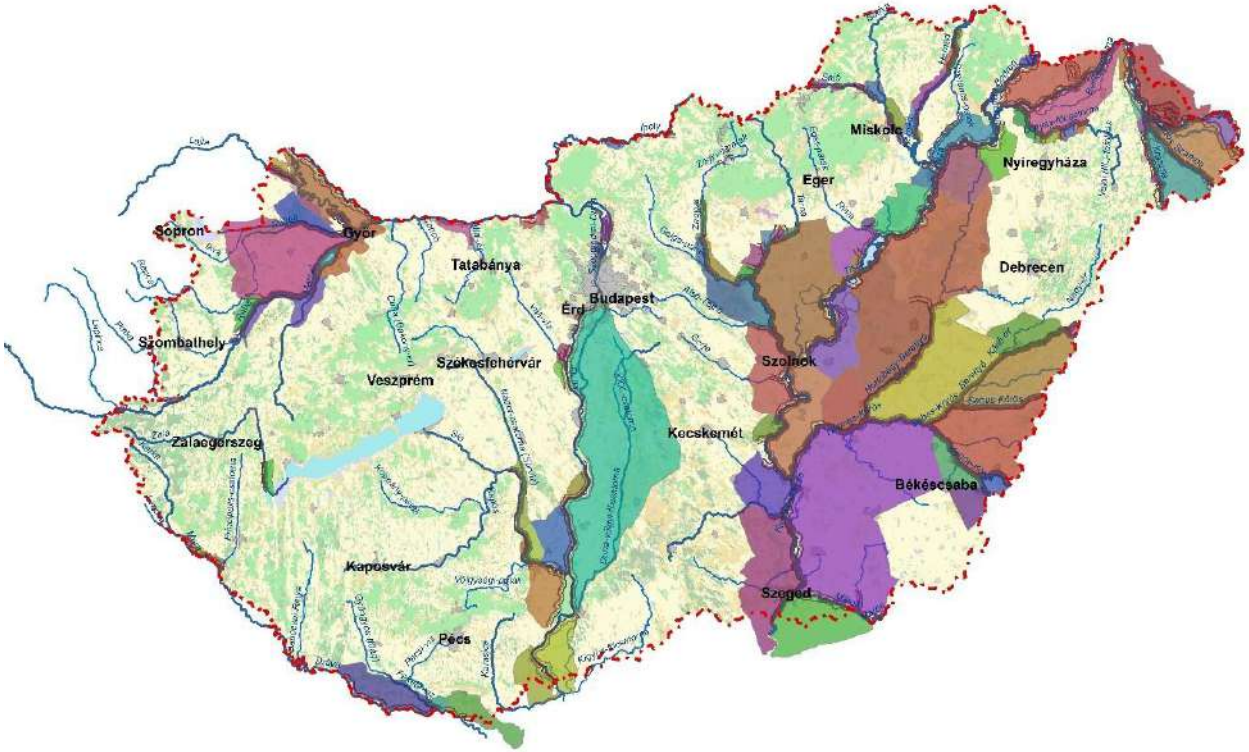
BELÜGYMINISZTÉRIUM

Localization plans

This planning activity aims to be prepared for the dike breaches all around the country. The protected floodplain parts are investigated with detailed 2D modelling where the dike failure sections gave the boundary conditions as flood curves. Those were calculated by the Hungarian ÁKIR software and ÁKK methodology where the effects of climate change are incorporated.

Localization plans were made for 72 flood protection which provide information on emergency, rescue, and evacuation plans for populations in the event of dike braking.



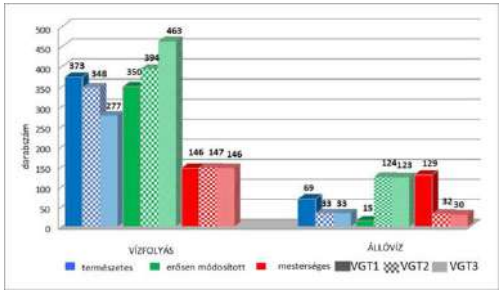


RBMP Public consultation

- **RBMP draft publication 22.12.2021. (2nd Draft) 28.05.2021.**
- **Public consultation 29.05.2021. – 15.09.**
- **101 on-line comments**
- **17 on-line regional and tematic forum: 30.08.2021- 09.09.**
- **A RBMP revision based on comments 30.11.2021**
- **2021. November-December Water Councils**
- **Interministerial consultation January-February 2022.**

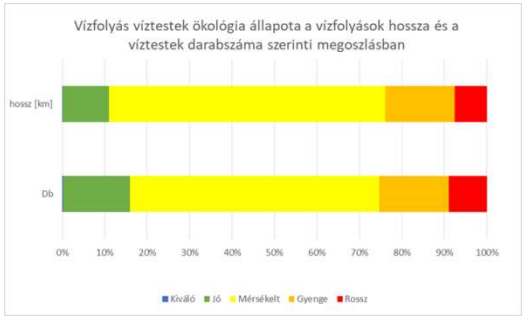
Review of 2nd River Basin Management Plan

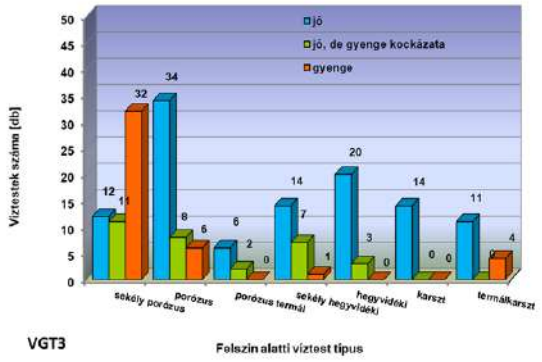
Review of water bodies



Update of Antropogenic pressures
New emission inventory
46 priority substances

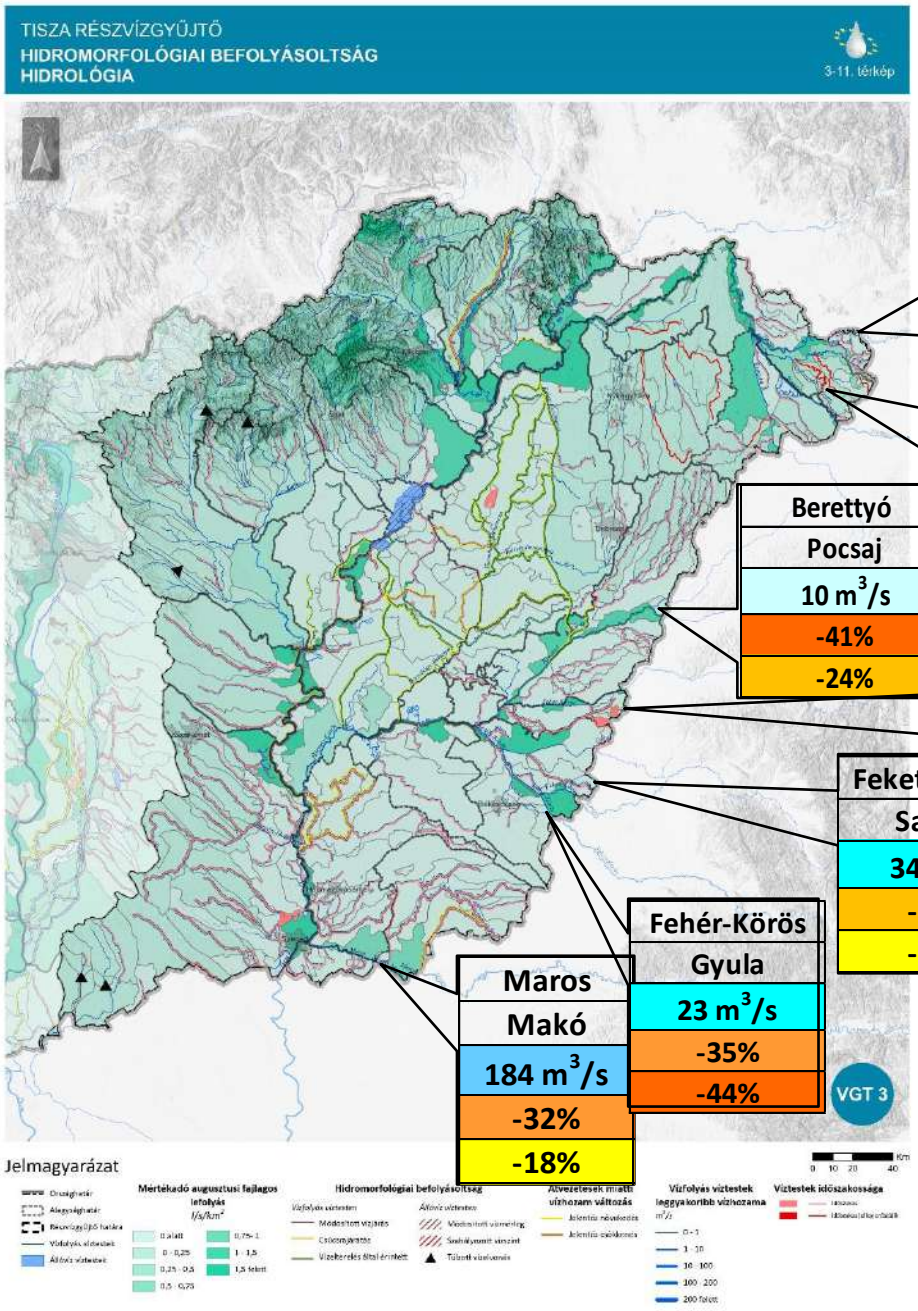
Review of the status of water bodies





Application of Article 4. (4), (5), (6), (7)

Decrease of discharges



Tisza
Tiszabecs
216 m^3/s
-28%
-49%

Szamos
Csenger
131 m^3/s
-34%
-34%

Berettyó
Pocsaj
10 m^3/s
-41%
-24%

Sebes-Körös
Körösszakáll
24 m^3/s
-23%
2%

Fekete-Körös
Sarkad
34 m^3/s
-28%
-11%

Fehér-Körös
Gyula
23 m^3/s
-35%
-44%

Maros
Makó
184 m^3/s
-32%
-18%

vízfolyás név
állomás név
középvízhozam (KÖQ) átlag 1951-2010
KÖQ változás 2011-2020/1951-2010
Q_{aug80} változás 2011-2020/1951-2010

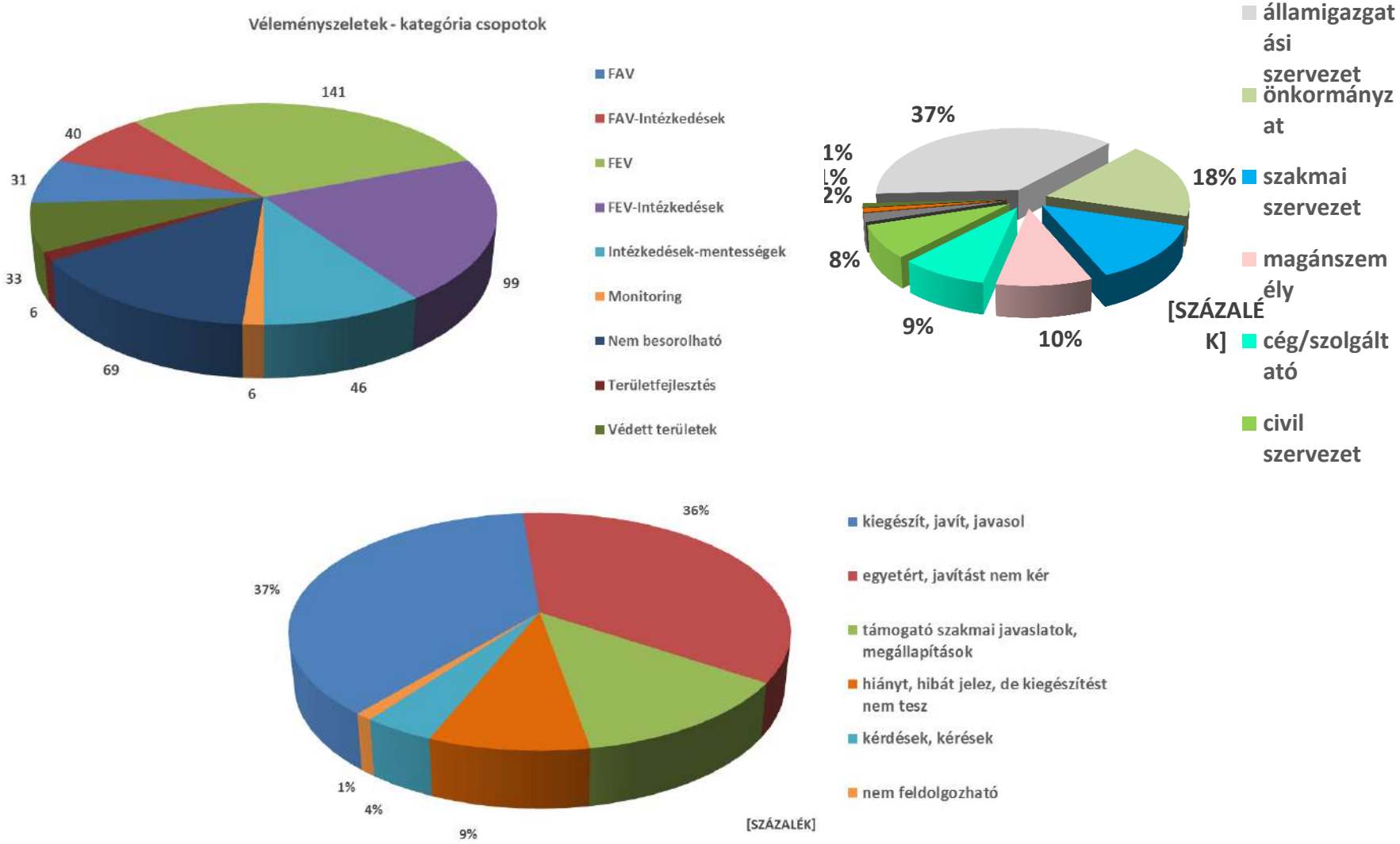
Effect of reservoires

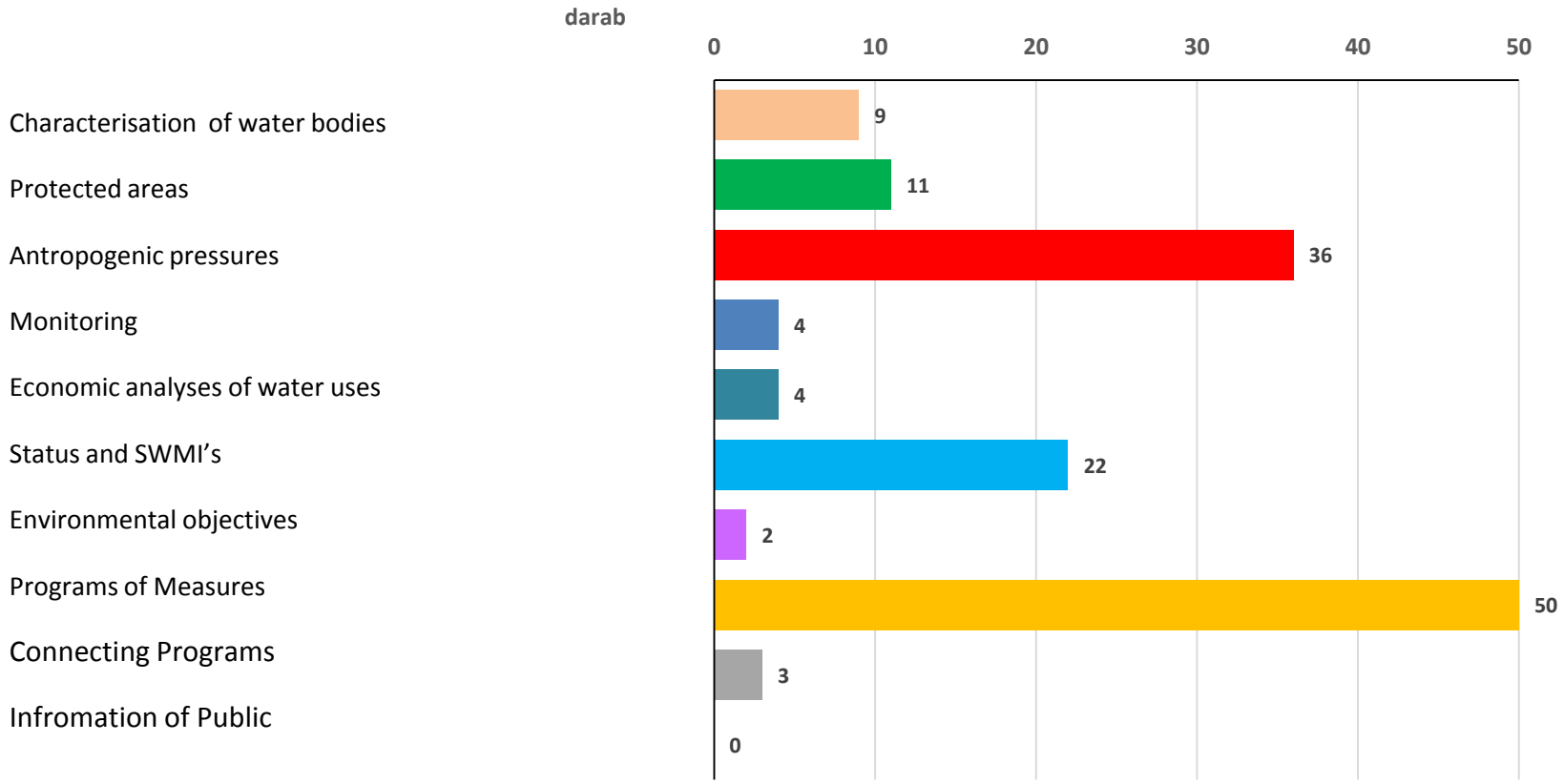
Between 2011-2020 significant loss of water resources.

Tisza River Basin over 20%

WFD 4 (6) application

22


Véleményszeletek - kategória csopotok
141
40
31
33
6
69
6
46
99
FAV
FAV-Intézkedések
FEV
FEV-Intézkedések
Intézkedések-mentességek
Monitoring
Nem besorolható
Területfejlesztés
Védett területek
37%
1%
2%
8%
9%
10%
18%
[SZÁZALÉK]
államigazgatási szervezet
önkormányzat
szakmai szervezet
magánszemély
cég/szolgáltató
civil szervezet
36%
37%
1%
4%
9%
[SZÁZALÉK]
kiegészít, javít, javasol
egyetért, javítást nem kér
támogató szakmai javaslatok, megállapítások
hiányt, hibát jelez, de kiegészítést nem tesz
kérdések, kérések
nem feldolgozható



many opinion related to the measures

too many opinion related to the preassures

Important water management questions

- **Management of a Great Lakes**
- **International cooperation**
- **Shipping, navigation**
- **Renewable energy utilization (thermal waters)**
- **Climate change mitigation**





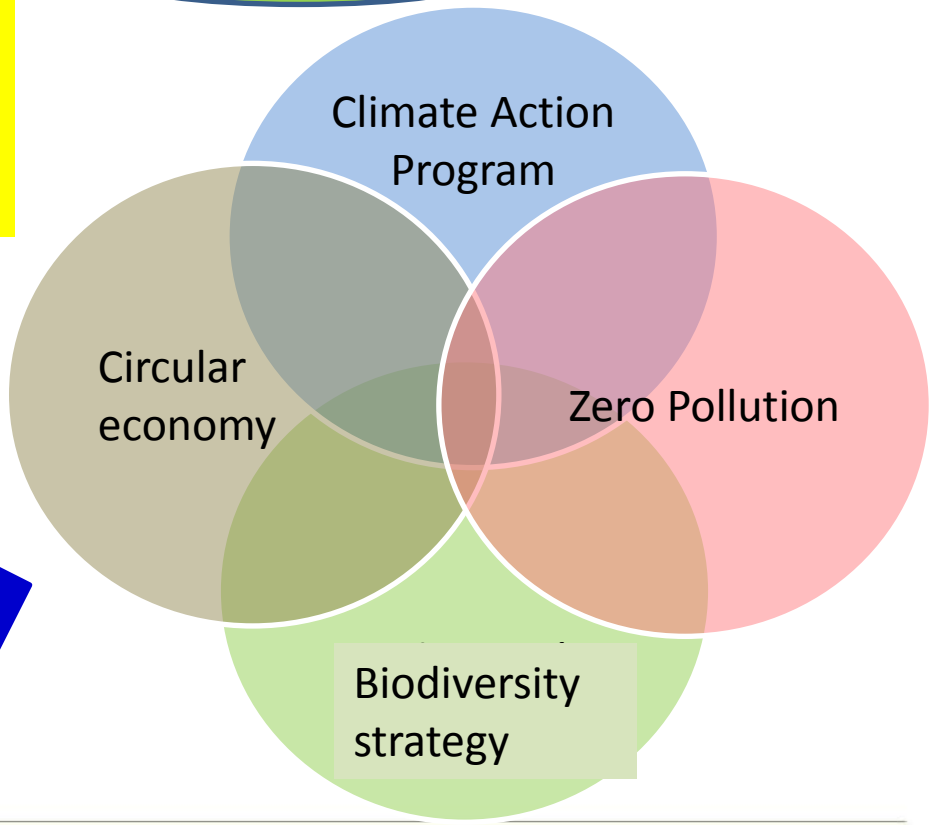

Main Challenges:

- **Climate change**
- **Biodiversity decreasing**
- **Natural resources are depleting**
- **Water pollution**

Integrated Sustainable water management

River Basin Management Plan

„European Green Deal"




Thank you for your kind attention !
peter.kovacs@bm.gov.hu

MINISTERIO
PARA LA TRANSICIÓN ECOLÓGICA
Y EL RETO DEMOGRÁFICO

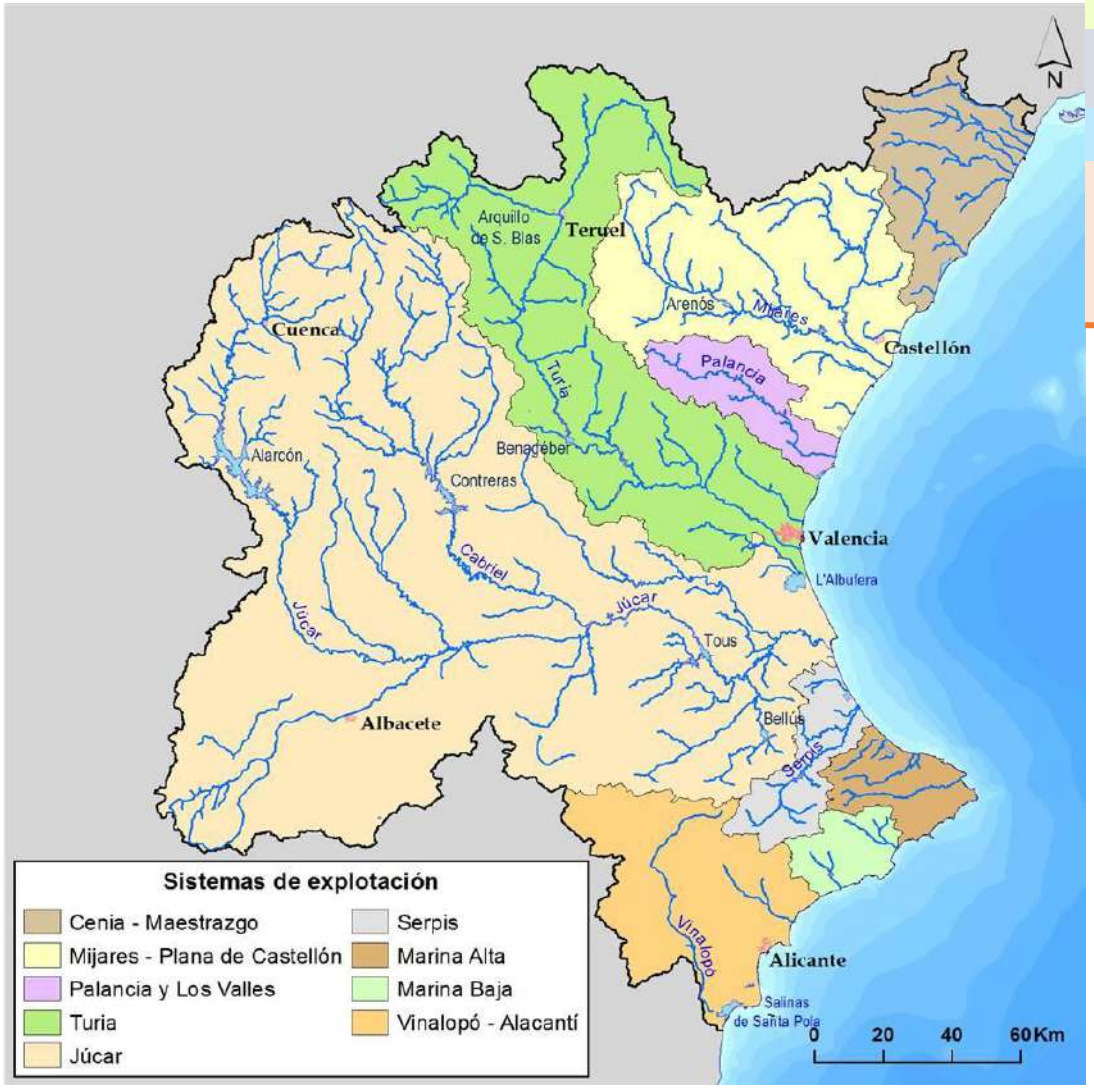
CONFEDERACIÓN
HIDROGRÁFICA
DEL JÚCAR, O. A.

The great challenge: the execution of the hydrological plans of the third planning cycle

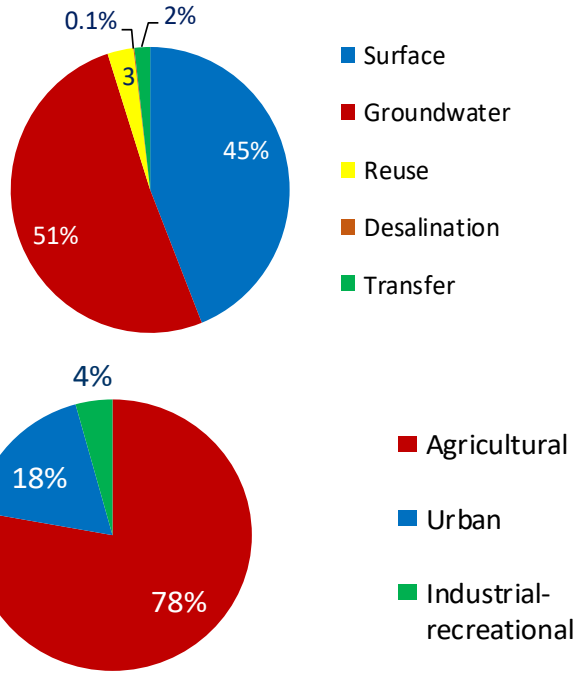
Marc García Manzana
Water Commisariat,
Júcar River Basin. Valencia (Spain)

River Basin Organisations

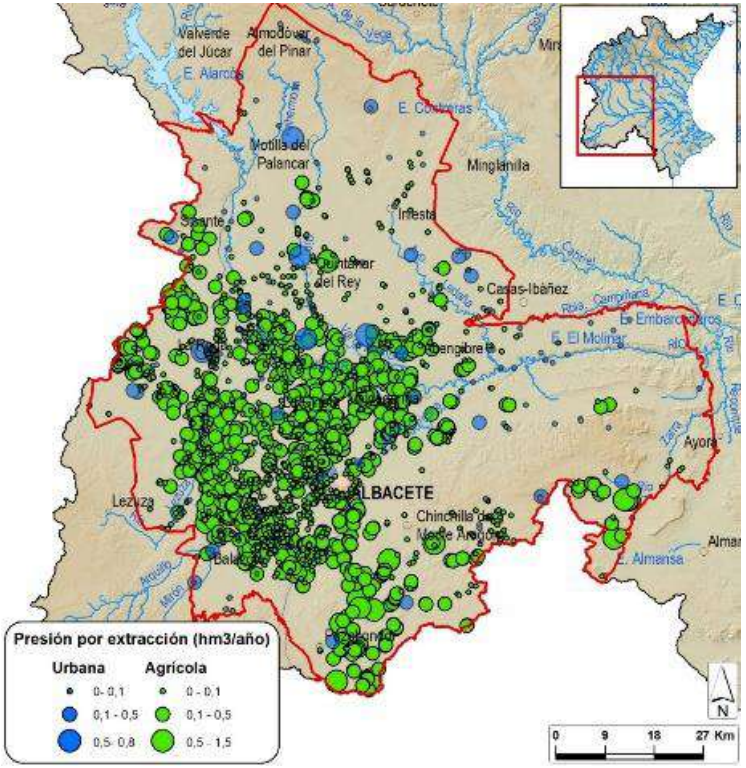
Description of the JRBD

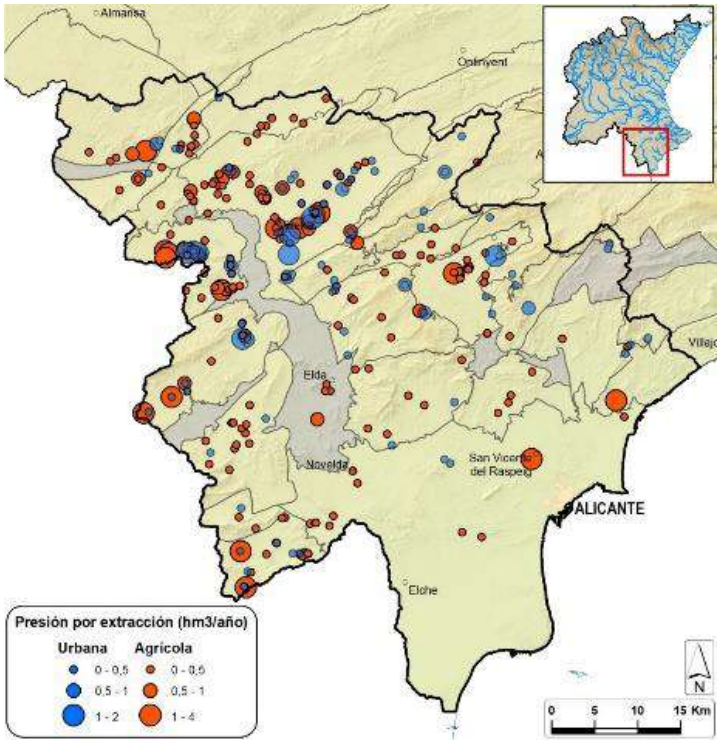


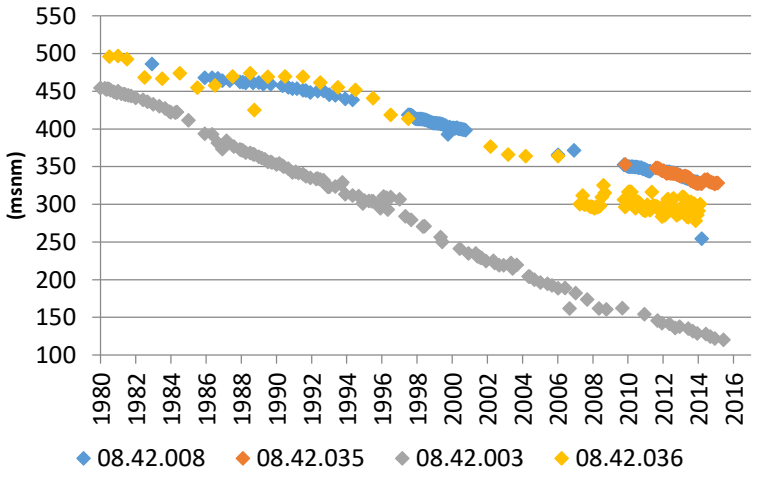
Surface (km^2)	42.756
Permanent population	5.178.000
Irrigated surface (ha)	354.000
Total inflow (hm^3/year)	3.800
Total water demand (hm^3/year)	3.240



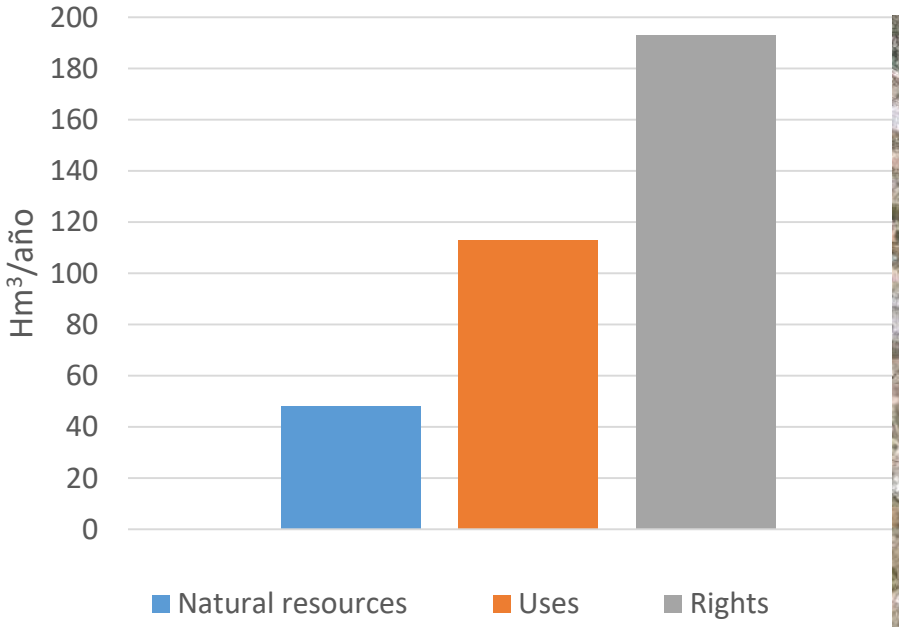
Sustainable management of groundwater







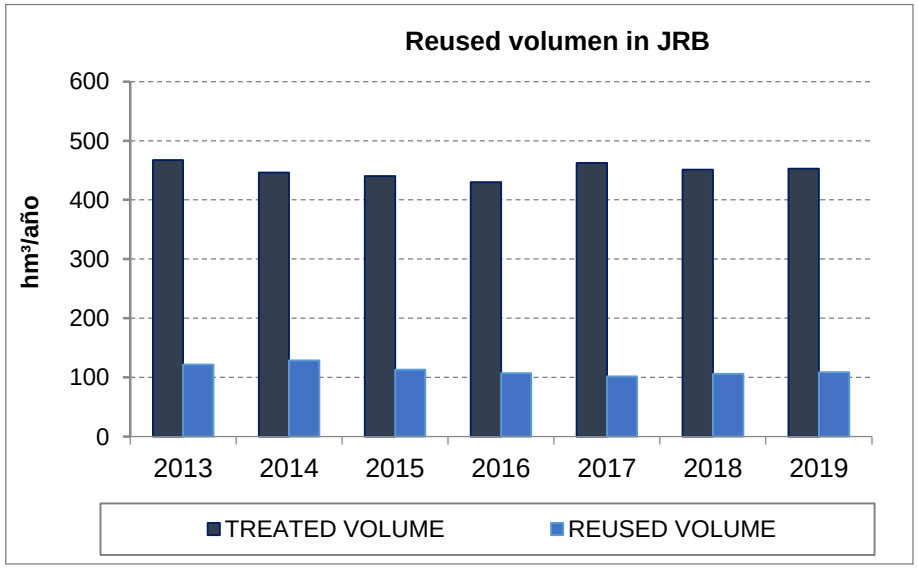
Management and control of the Public Water Domain



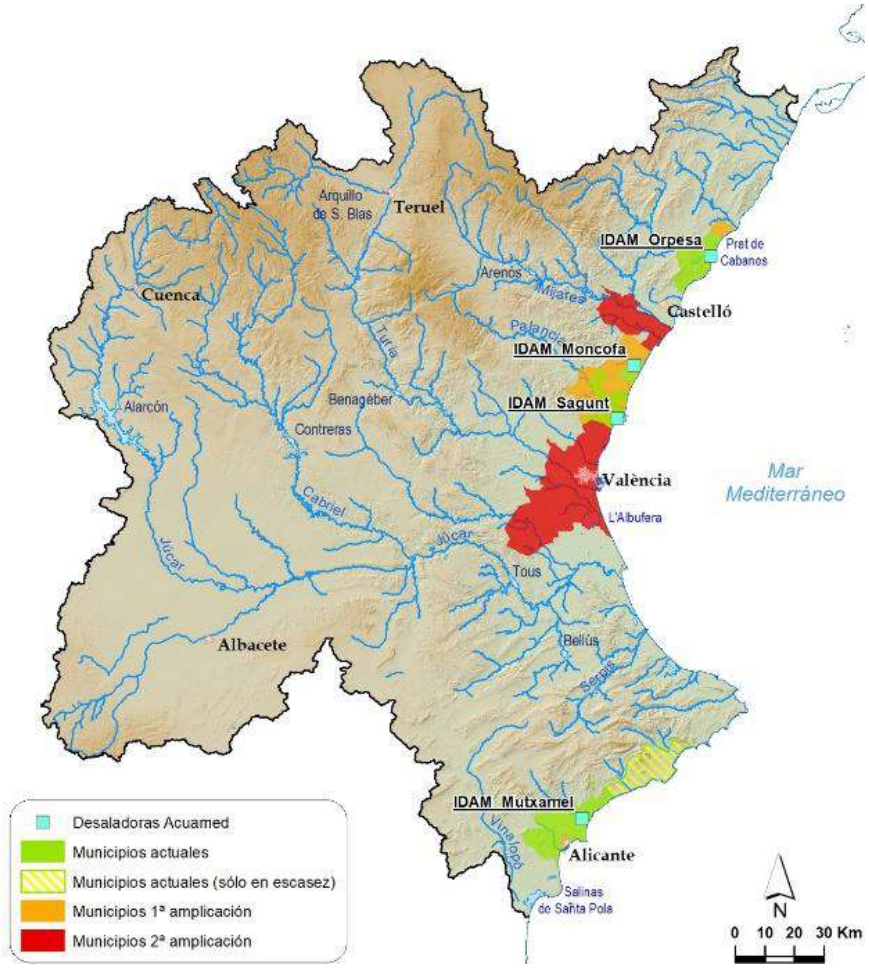
Comparison between resources, uses and rights in the Vinalopó-Alacantí Region

Irrigation of la Vega de València

Optimisation of water resources offer and infrastructure management



Comparison between treated and reused volume



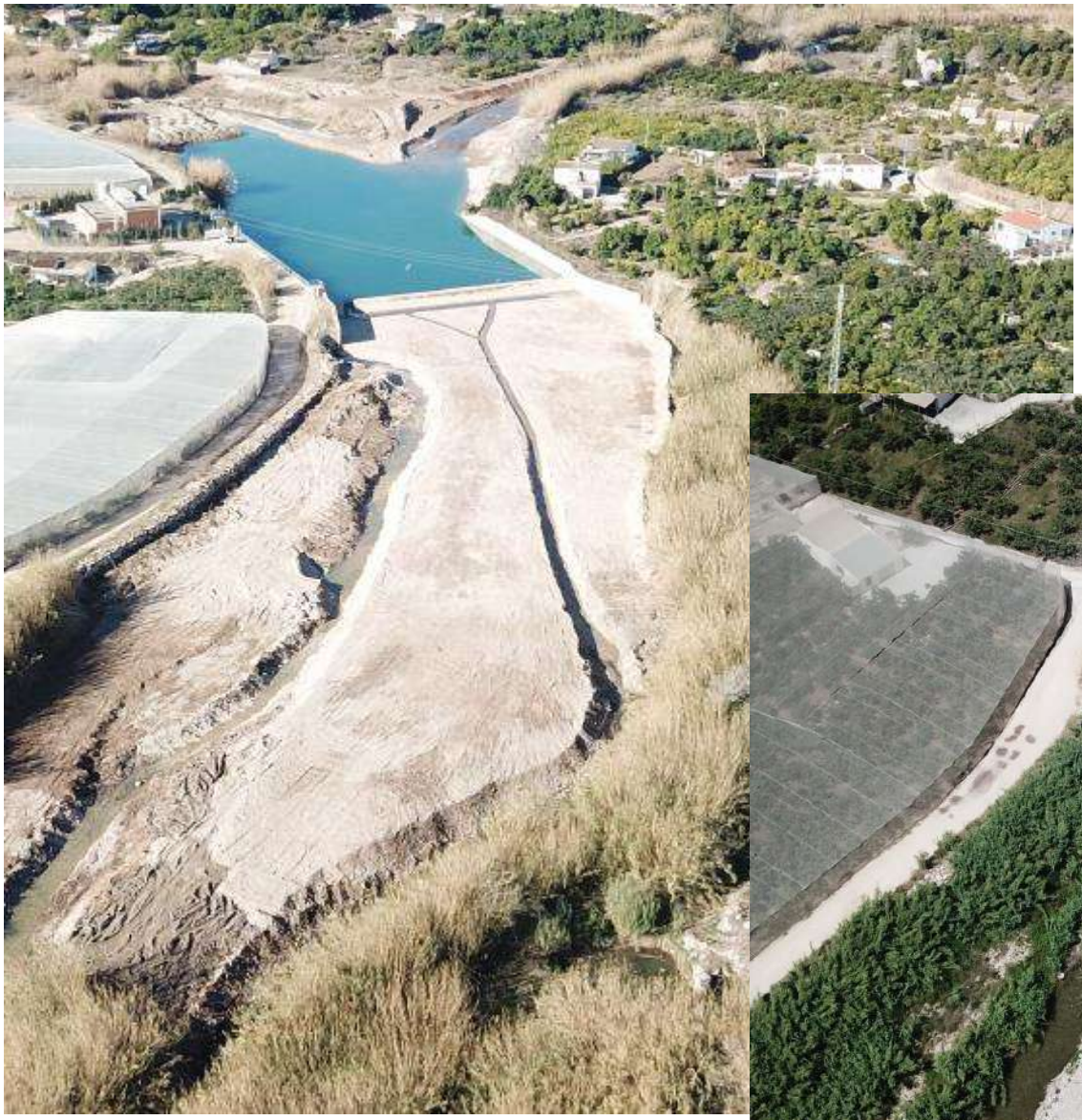
Desalination plants and supplied areas

Hydro-morphological alterations

Riverbank restoration work on the river Albaida, in the municipality of Bellús

Dam removal in Jucar river

Coastal waters: discharges and sediments



Flood risk management

Diffuse pollution: nitrates or phitosanitary products

Urban and industrial pollution

Supply and protection of urban water sources

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Assessing Groundwater Qualitative Status

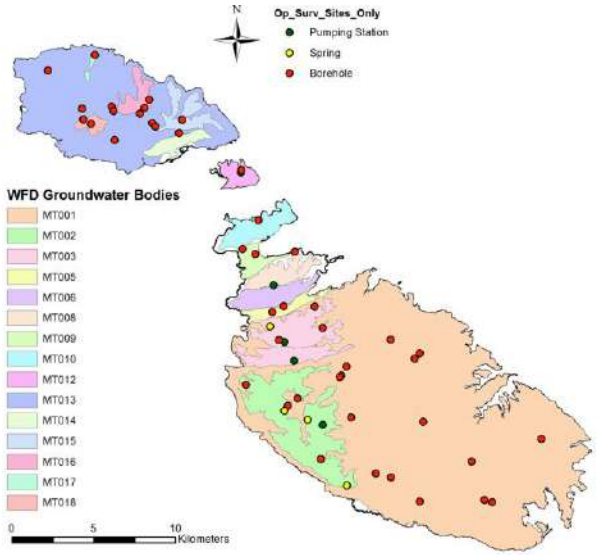
Manuel Sapiano

Energy and Water Agency

Monitoring Network

Code	Groundwater Body	Number of Monitoring Sites
MT001	Malta Mean Sea Level	15
MT002	Rabat Dingli Perched	5
MT003	Mgarr Wardija Perched	4
MT005	Pwales Coastal	1
MT006	Mizieb Mean Sea Level	1
MT008	Mellieha Perched	1
MT009	Mellieha Coastal	1
MT010	Marfa Coastal	1
MT012	Comino Mean Sea Level	1
MT013	Gozo Mean Sea Level	7
MT014	Ghajnsielem Perched	1
MT015	Nadur Perched	1
MT016	Xaghra Perched	1
MT017	Zebbug Perched	1
MT018	Victoria Kercem Perched	2

- 42 Monitoring Points
- Covers all Groundwater Bodies
- High Spatial Representativity
- Different typologies: 25 WSC, 17 Private



Monitoring Network

Groundwater Bodies are grouped for the purpose of Monitoring.

Grouping based on similar hydrogeological and anthropic pressure conditions.

At least 3 monitoring points for each grouping, with a minimum of 1 point for each groundwater body within the group.

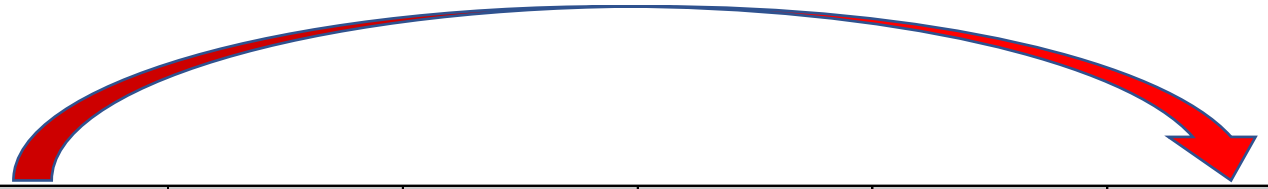
Group Code	GWB Code	Groundwater Bodies
MT0_G01	MT001	Malta MSLA
MT0_G02	MT002	Rabat-Dingli PA
MT0_G03	MT003, MT006, MT014	Mgarr-Wardija PA, Mizieb MSLA, Ghajnsielem PA
MT0_G04	MT005, MT009, MT010	Pwales CA, Mellieha CA, Marfa CA
MT0_G05	MT008, MT015, MT016	Mellieha PA, Nadur PA, Xaghra PA
MT0_G06	MT017, MT018	Zebbug PA, Victoria-Kercem PA
MT0_G07	MT012, MT013	Comino MSLA, Gozo MSLA

Monitoring Network

Two monitoring cycles:

(i) Surveillance Monitoring: Once every 6 years

(ii) Operational Monitoring: Once every 6 months



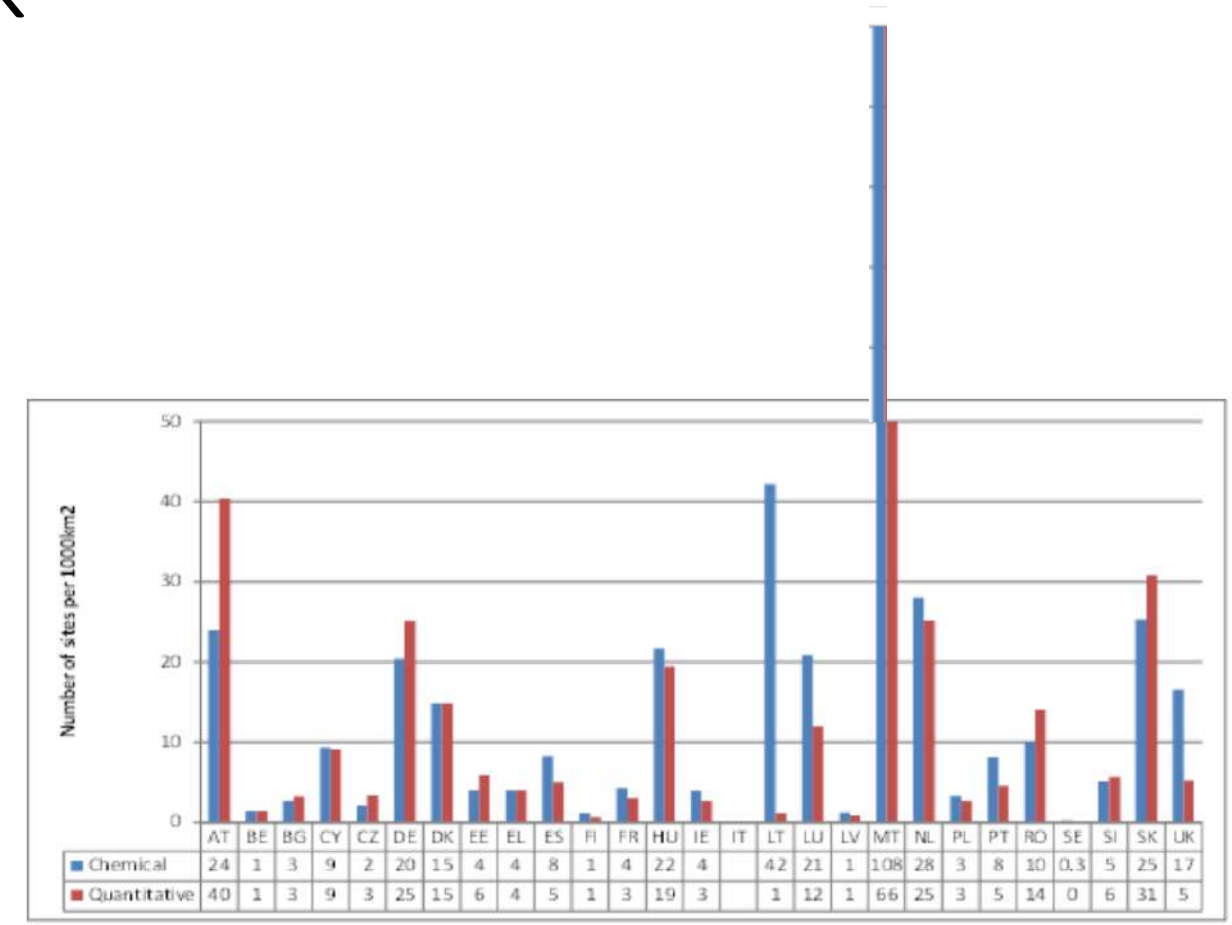
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Operational	Operational	Operational	Operational	Operational	Operational	Operational	Operational
Surveillance					Surveillance		

Monitoring Network

Network Characteristics:
Relatively high density of monitoring stations.

Due to:

Small size of Malta, and
High relative number of groundwater bodies.



	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
Chemical	24	1	3	9	2	20	15	4	4	8	1	4	22	4		42	21	1	108	28	3	8	10	0.3	5	25	17
Quantitative	40	1	3	9	3	25	15	6	4	5	1	3	19	3		1	12	1	66	25	3	5	14	0	6	31	5

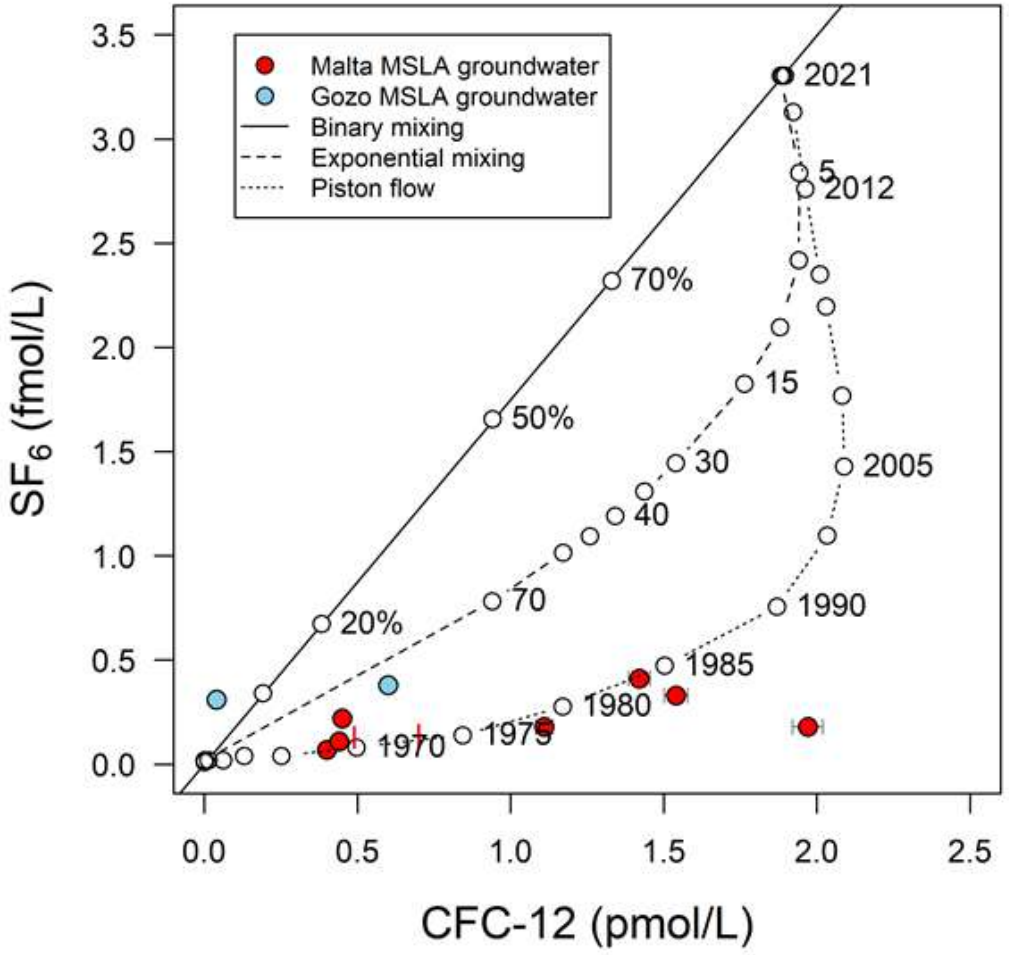
***Figure 8.3.14**: Number of groundwater monitoring sites per 1000km^2 of Member State land area for quantitative and chemical monitoring. Incomplete information reported for IT.*
***Source**: WISE*

Key Challenges

- Groundwater samples are collected (pumped) from the top-most level of groundwater body (MSLAs).

- Groundwater samples collected from the Perched Aquifers reflect primarily the catchment area of spring.

- Groundwater quality is actually representative of older recharge events, and not current recharge (long response time).

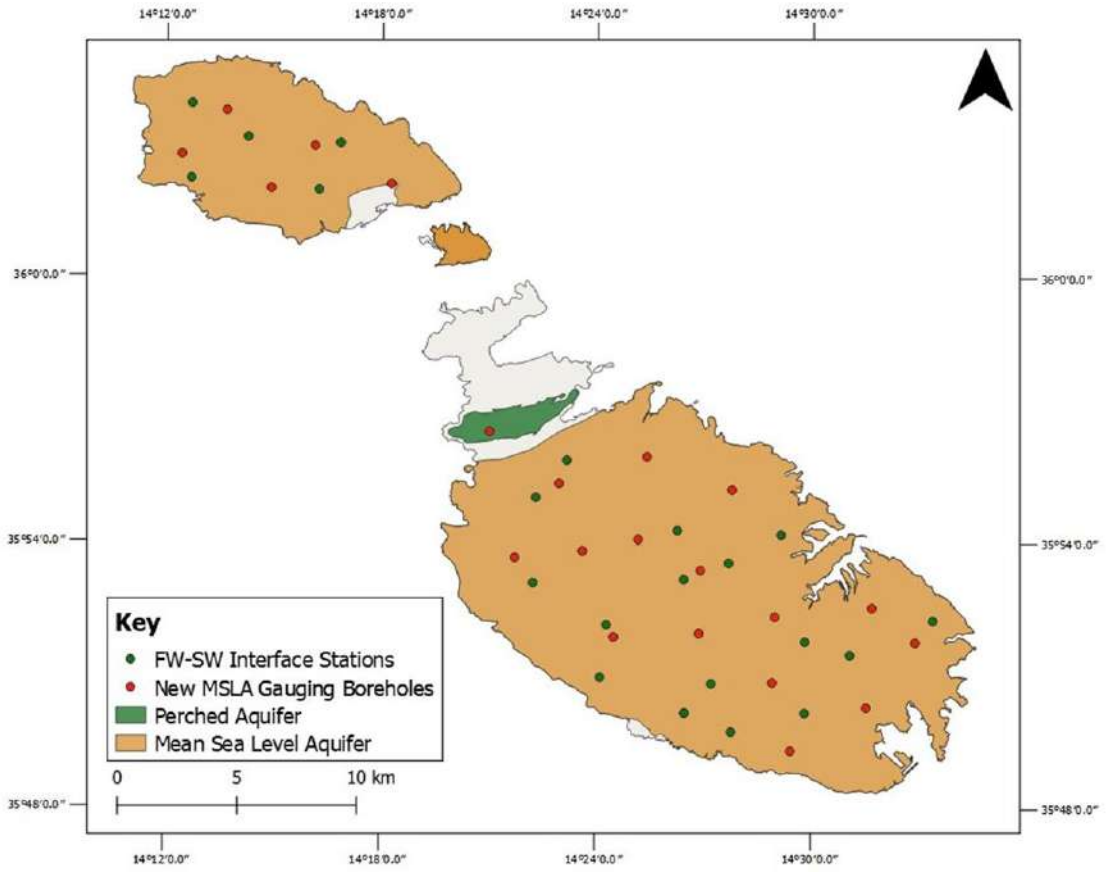


Addressing Challenges

Two supporting monitoring networks:

(i) Deep Monitoring Network, allowing profiling and/or multi-level sampling; and

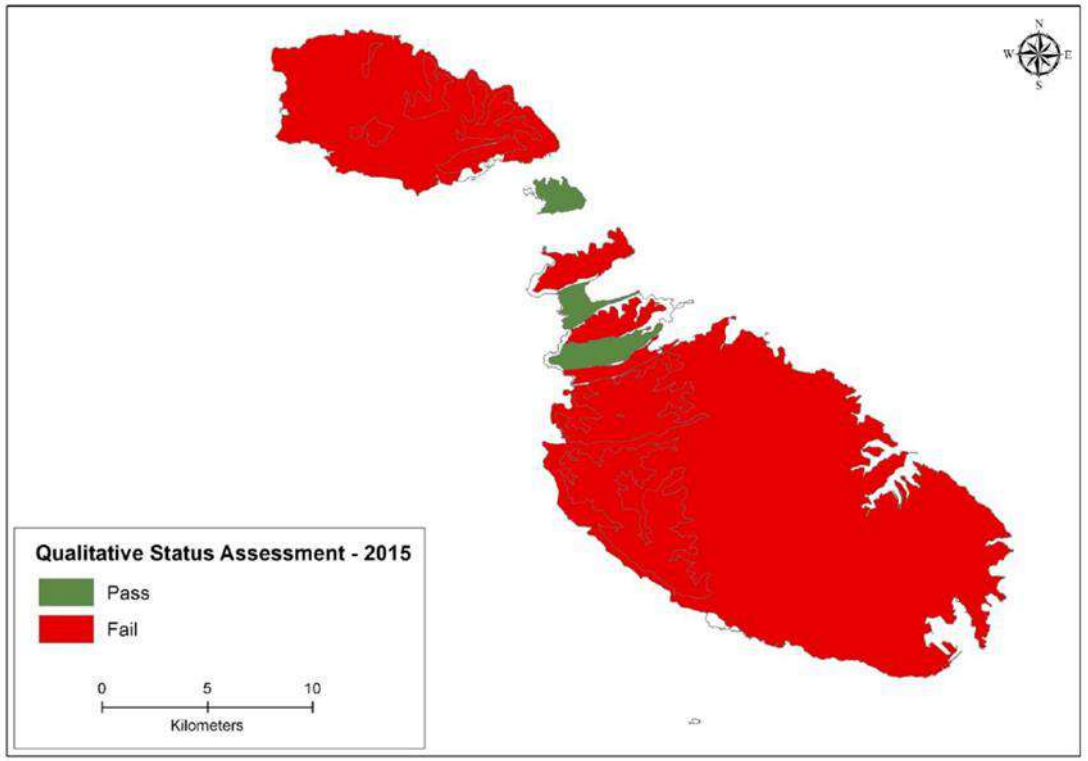
(ii) Unsaturated Zone Monitoring Network, allowing the analysis of annual recharge.



Groundwater Status

Groundwater Qualitative Status:
All groundwater bodies with the exception of:
- Mizieb Mean Sea Level
- Mellieha Coastal
- Comino Mean Sea Level
failed good qualitative status conditions.

Main status failing parameters were Saline Intrusion and Nitrate Contamination.



Groundwater Status

How is Qualitative Status determined?

Defined under the EU Groundwater Directive (2006/118/EC) which establishes:
(i) **Quality Standards** for Nitrates and Pesticides, and
(ii) A minimum list of parameters for which **Threshold Values** (Quality Standards at the level of the River Basin District) are to be established.

ANNEX I

GROUNDWATER QUALITY STANDARDS

1. For the purposes of assessing groundwater chemical status in accordance with Article 4, the following groundwater quality standards will be the quality standards referred to in Table 2.3.2 in Annex V to Directive 2000/60/EC and established in accordance with Article 17 of that Directive.

Pollutant	Quality standards
Nitrates	50 mg/l
Active substances in pesticides, including their relevant metabolites, degradation and reaction products (1)	0,1 µg/l 0,5 µg/l (total) (2)

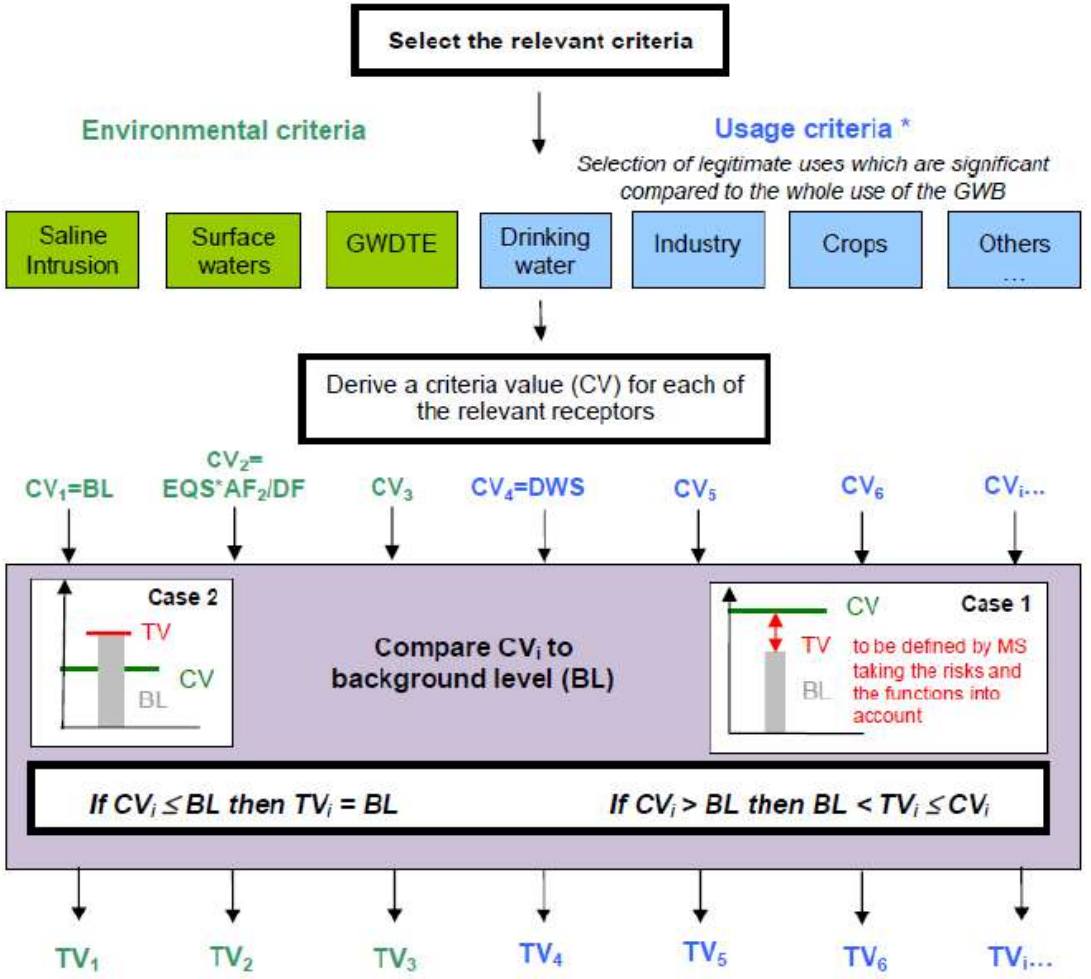
(1) 'Pesticides' means plant protection products and biocidal products as defined in Article 2 of Directive 91/414/EEC and in Article 2 of Directive 98/8/EC, respectively.
(2) 'Total' means the sum of all individual pesticides detected and quantified in the monitoring procedure, including their relevant metabolites, degradation and reaction products.

Groundwater Status

Working towards a “common EU procedure” for the establishment of Threshold Values based on:

- Natural Background Levels, and

- Criteria Values.



Groundwater Status

Threshold Values established for Malta River Basin District under the 2nd River Basin Management Plan.

To be reviewed on the basis of groundwater quality data from the 3rd Surveillance Monitoring Exercise.

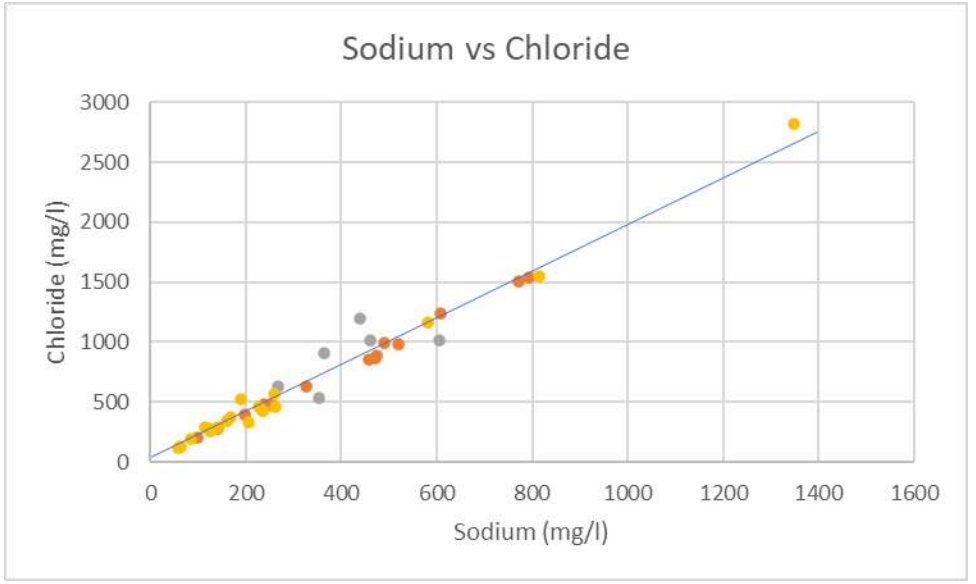
Parameter	Treshold Value		
	MSLA	PA	CA
Chloride	1000mg/l	210mg/l	500mg/l
Sodium	450mg/l	160mg/l	450mg/l
Boron	0.6mg/l	0.5mg/l	1mg/l
Sulphate	475mg/l	190mg/l	475mg/l
Conductivity	4500uS/cm	2000uS/cm	3000uS/cm
Lead	10ug/l	10ug/l	10ug/l
Copper	2mg/l	2mg/l	2mg/l
Zinc	3mg/l	3mg/l	3mg/l
Fluoride	1.5mg/l	1.5mg/l	1.5mg/l
Arsenic	2.75mg/l	2.75mg/l	2.75mg/l
Ammonium	0.25mg/l	0.25mg/l	0.25mg/l
Nitrite	0.25mg/l	0.25mg/l	0.25mg/l
Phosphate	0.03mg/l	0.03mg/l	0.03mg/l

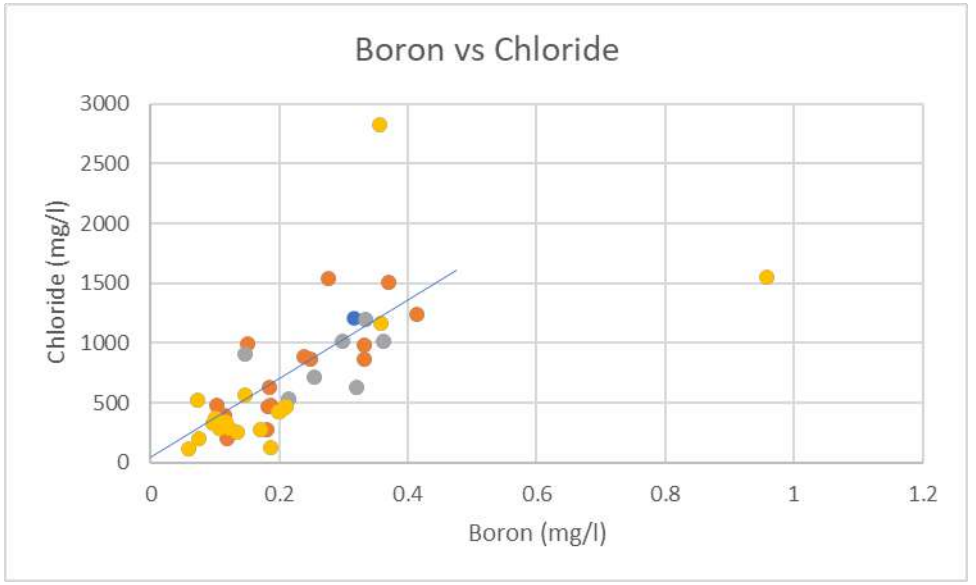
Results – Saline Intrusion

Saline Intrusion is primarily related to the ingress of sea-water.

Clear correlation between the content of sodium and chloride in all groundwater samples indicating one common source to salinity in all groundwater systems.

Similar outcome for parameters such as Boron.



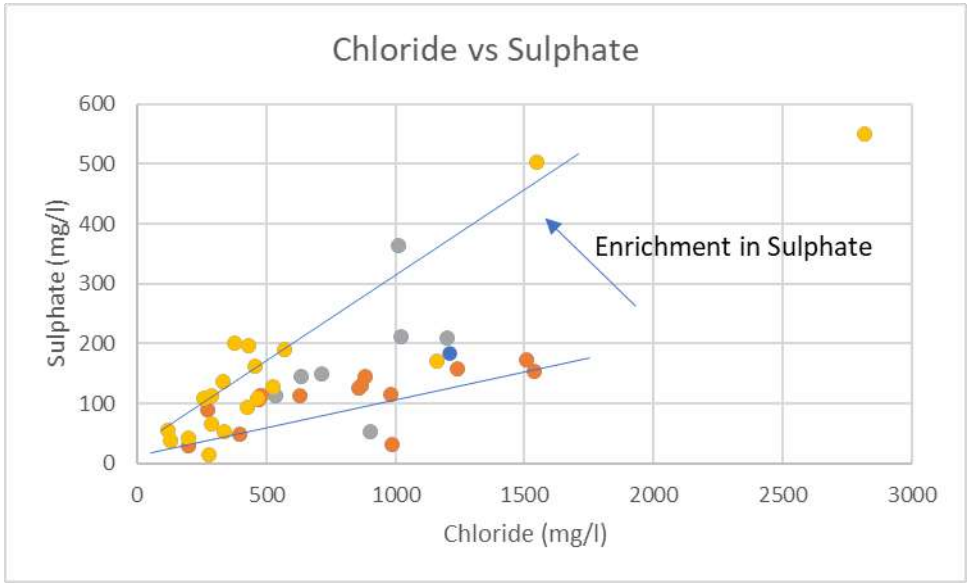


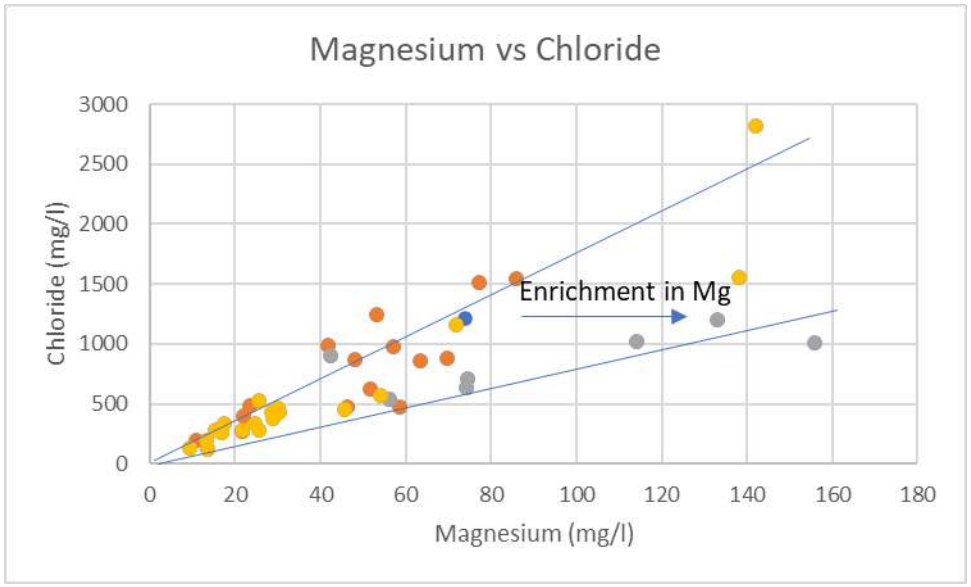
Results – Saline Intrusion

Other sea-water related parameters show a more “broader” correlation, indicating the presence of an additional source (natural or anthropogenic) of the specific parameter.

Enrichment in Sulphate indicates the possible influence of artificial fertilizers. Anthropogenic.

Enrichment in Magnesium indicates the possible influence of longer groundwater residence times. Natural.





Results – Saline Intrusion

- Status defining parameter (only two groundwater bodies qualify for the good status objective.

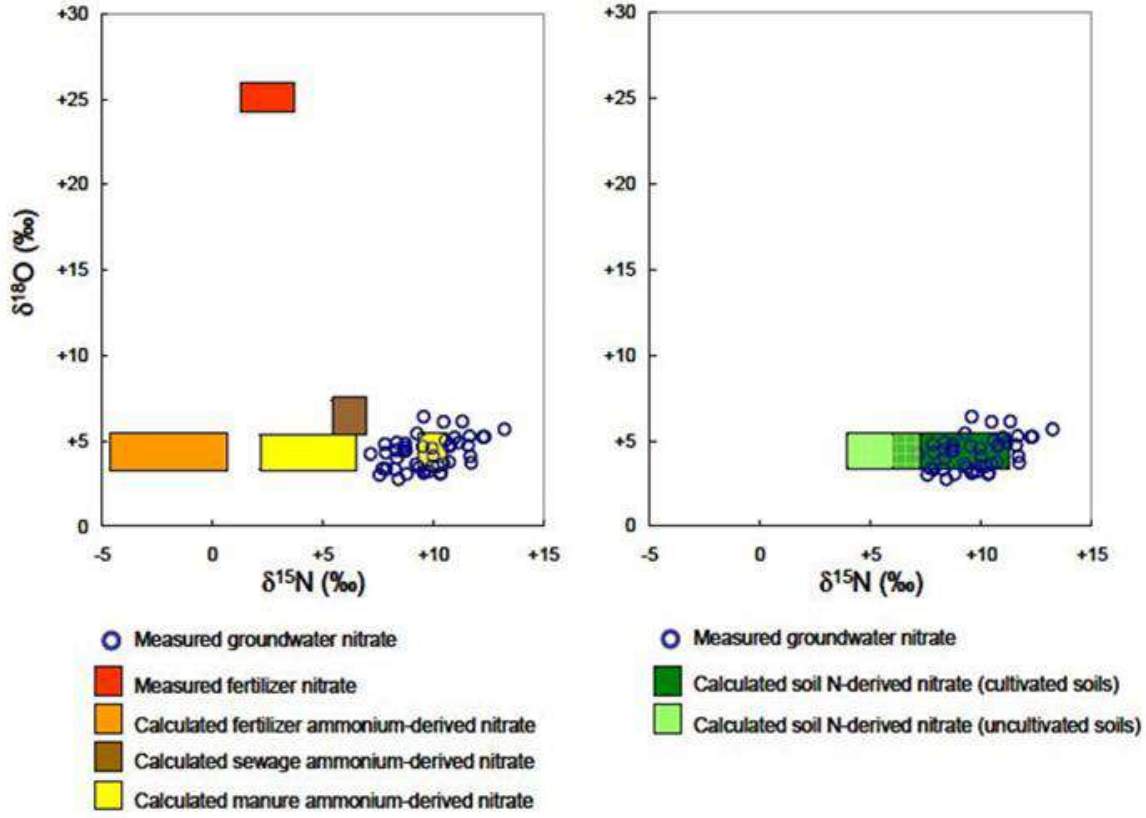
- Concern for Perched Aquifers which are not in direct contact with sea-water but still show exceedances of TVs.

Code	Groundwater Body	% of sites exceeding TV for:				
		Chloride	Sodium	Boron	Sulphate	E Conductivity
MT001	Malta Mean Sea Level	20%	50%	0%	0%	12%
MT002	Rabat Dingli Perched	60%	0%	0%	40%	60%
MT003	Mgarr Wardija Perched	75%	0%	0%	0%	0%
MT005	Pwales Coastal	100%	100%	0%	100%	100%
MT006	Mizieb Mean Sea Level	100%	100%	0%	0%	100%
MT008	Mellieha Perched	100%	0%	0%	0%	0%
MT009	Mellieha Coastal	0%	0%	0%	0%	0%
MT010	Marfa Coastal	100%	100%	0%	100%	100%
MT012	Comino Mean Sea Level	0%	0%	0%	0%	0%
MT013	Gozo Mean Sea Level	50%	50%	0%	0%	0%
MT014	Ghajnsielem Perched	100%	100%	0%	0%	100%
MT015	Nadur Perched	100%	100%	0%	0%	100%
MT016	Xaghra Perched	100%	100%	0%	0%	100%
MT017	Zebbug Perched	100%	100%	0%	0%	0%
MT018	Victoria Kercem Perched	100%	100%	0%	0%	100%

Results - Nitrate

Parameter associated with over-fertilization in arable agricultural practices.

Studies (nitrate isotope fingerprinting exercise) confirm the agricultural origin of nitrate contamination in groundwater.

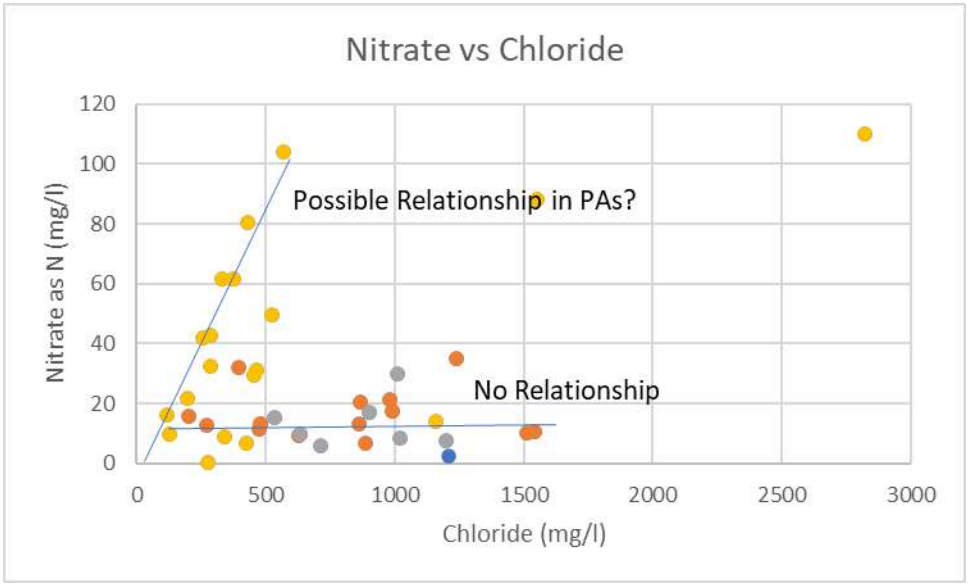


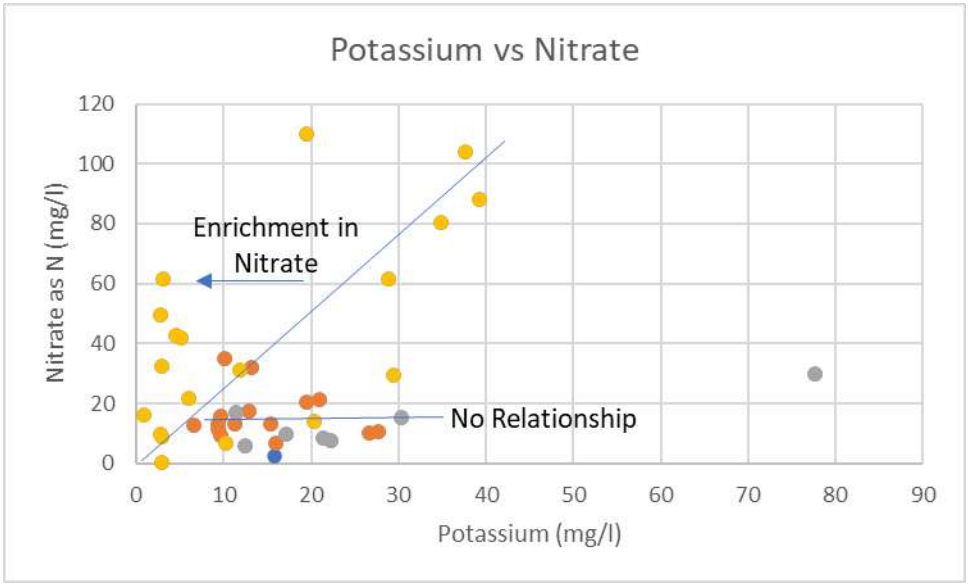
Results - Nitrate

Possible correlation between Nitrate and Chloride in Perched Aquifers.

Enrichment in Nitrate in Perched Aquifers in correlation with Potassium.

Possible evidence of more direct influence of fertilizers due to thin unsaturated zone?





Results - Nitrate

Status defining parameter.

Only four minor groundwater bodies qualify for good qualitative status conditions.

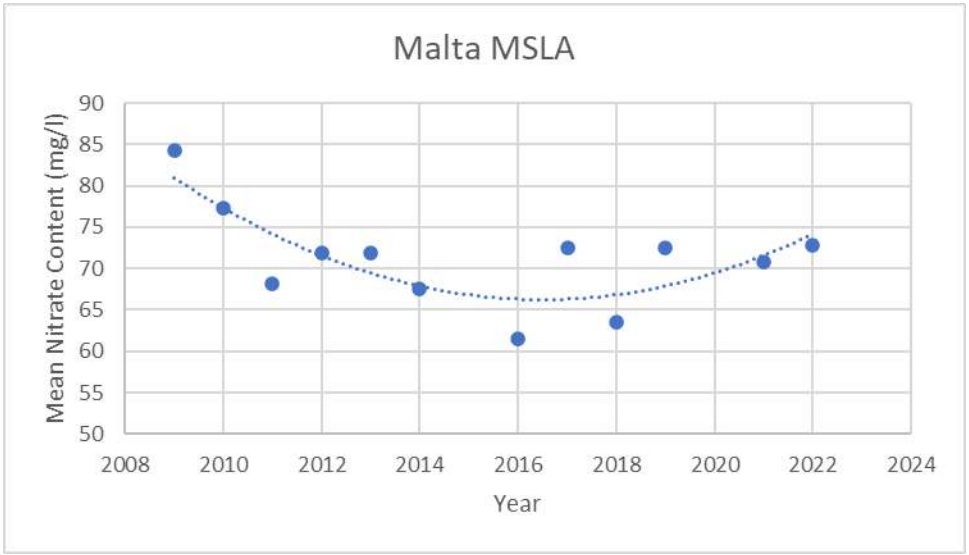
Code	Groundwater Body	% of sites exceeding Nitrate QS
MT001	Malta Mean Sea Level	75%
MT002	Rabat Dingli Perched	100%
MT003	Mgarr Wardija Perched	75%
MT005	Pwales Coastal	100%
MT006	Mizieb Mean Sea Level	100%
MT008	Mellieha Perched	0%
MT009	Mellieha Coastal	0%
MT010	Marfa Coastal	100%
MT012	Comino Mean Sea Level	0%
MT013	Gozo Mean Sea Level	50%
MT014	Ghajnsielem Perched	0%
MT015	Nadur Perched	100%
MT016	Xaghra Perched	100%
MT017	Zebbug Perched	100%
MT018	Victoria Kercem Perched	100%

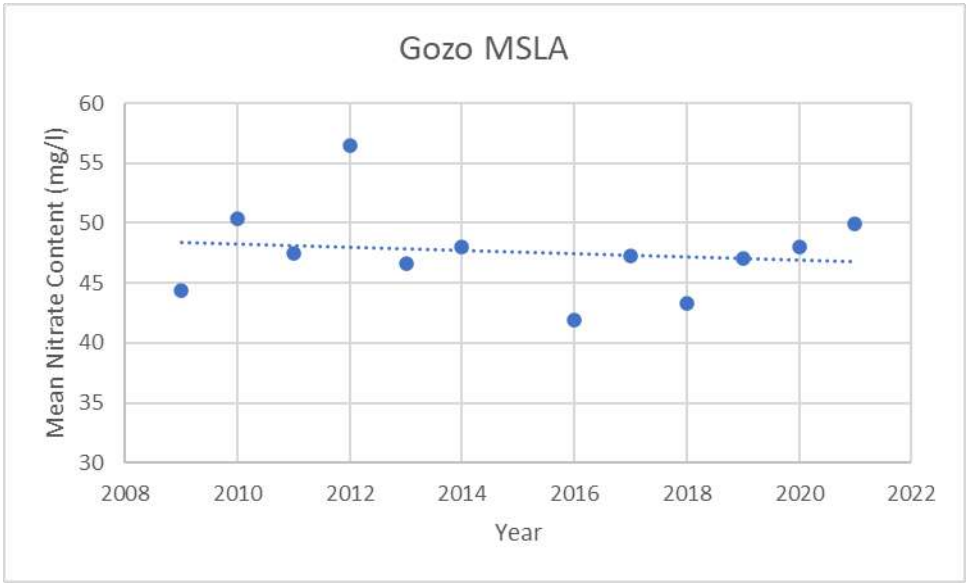
Results – Nitrate

Possible increasing trend in Nitrate concentration in main groundwater bodies.

Trends are still not statistically significant.

Outcome which needs to be investigated further, including through the development of a nitrate time-curve for Malta.



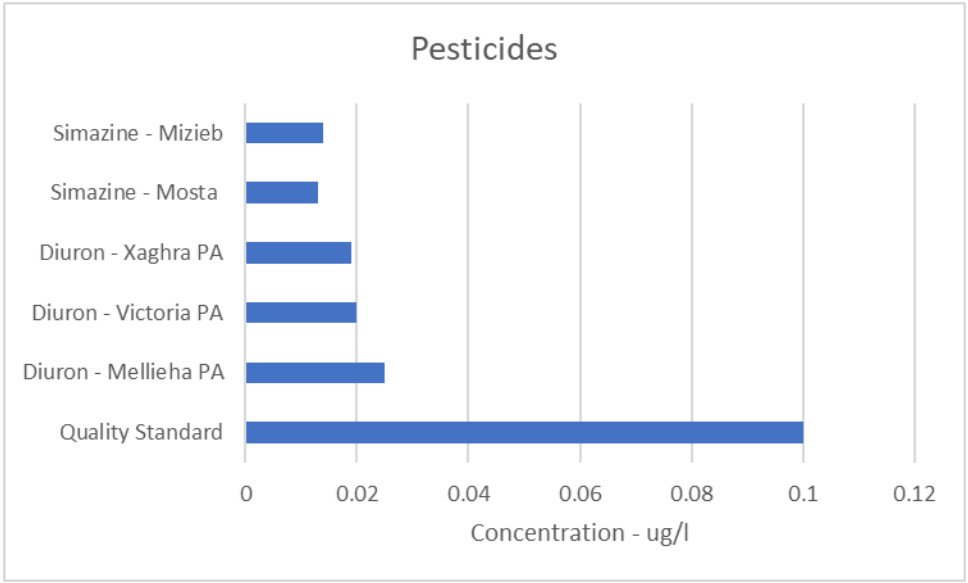


Results – Pesticides/Herbicides

Simazine and Diuron detected in five groundwater bodies.

Both are herbicides – and hence used possibly in both agricultural and urban applications.

All five detections are well below the GWD Quality Standard for Pesticides.



Results – Pesticides/Herbicides

Wide suite of pesticide products analyzed as part of the Surveillance Monitoring exercise.

26 Organochlorine Pesticides
7 Organophosphorus Pesticides
31 Pesticides

Selection of parameters gives due consideration to:

- Pesticide imports in Malta, and
- Pesticides of concern in other EU countries.

Organochlorine Pesticides	Organophosphorus Pesticides	Pesticides	Pesticides - Other
2.4-DDD	Crotoxyphos	Alachlor	Acrylamide
2.4-DDE	Fenitrothion	Ametryn	
2.4-DDT	Fenthion	Atrazine	
4.4`-DDD	Leptophos	Azinphos-ethyl	
4.4`-DDE	Mevinphos	Azinphos-methyl	
4.4`-DDT	Parathion-methyl	Chlorfenvinphos	
Aldrin	Tetrachlorvinphos	Chlorpyrifos	
Dicofol		Chlorpyrifos-methyl	
Dieldrin		Coumaphos	
Endosulfan sulfate		Cyanazine	
Endrin		Desmetryn	
Heptachlor		Diazinon	
Heptachloroepoxide-cis		Dichlorvos	
Heptachloroepoxide-trans		Dimethoate	
Hexachlorocyclohexane Alpha		Diuron	
Hexachlorocyclohexane Beta		Famphur	
Hexachlorocyclohexane Delta		Fensulfothion	
Hexachlorocyclohexane Epsilon		Glyphosate	
Hexachlorocyclohexane Gamma		Malathion	
Isodrin		Methidathion	
Methoxychlor		Metolachlor (isomers)	
Mirex		Molinate	
Sum of 4 isomers DDT		Parathion-ethyl	
Sum of 5 hexachlorocyclohexanes		Pendimethalin	
Sum of 6 isomers DDT		Phorate	
Sum of endosulfanes		Prometryn	
alpha-Endosulfan		Propazine	
beta-Endosulfan		Simazine	
cis-Chlordane		Terbuthylazine	
trans-Chlordane		Terbutryn	
		Triazophos	

Results – Pesticides/Herbicides

From a groundwater qualitative status assessment perspective, Pesticides are not a parameter of concern.

No groundwater bodies are classified in poor status due to pesticide contamination.

Code	Groundwater Body	% of sites exceeding QS for Pesticides
MT001	Malta Mean Sea Level	0%
MT002	Rabat Dingli Perched	0%
MT003	Mgarr Wardija Perched	0%
MT005	Pwales Coastal	0%
MT006	Mizieb Mean Sea Level	0%
MT008	Mellieha Perched	0%
MT009	Mellieha Coastal	0%
MT010	Marfa Coastal	0%
MT012	Comino Mean Sea Level	0%
MT013	Gozo Mean Sea Level	0%
MT014	Ghajnsielem Perched	0%
MT015	Nadur Perched	0%
MT016	Xaghra Perched	0%
MT017	Zebbug Perched	0%
MT018	Victoria Kercem Perched	0%

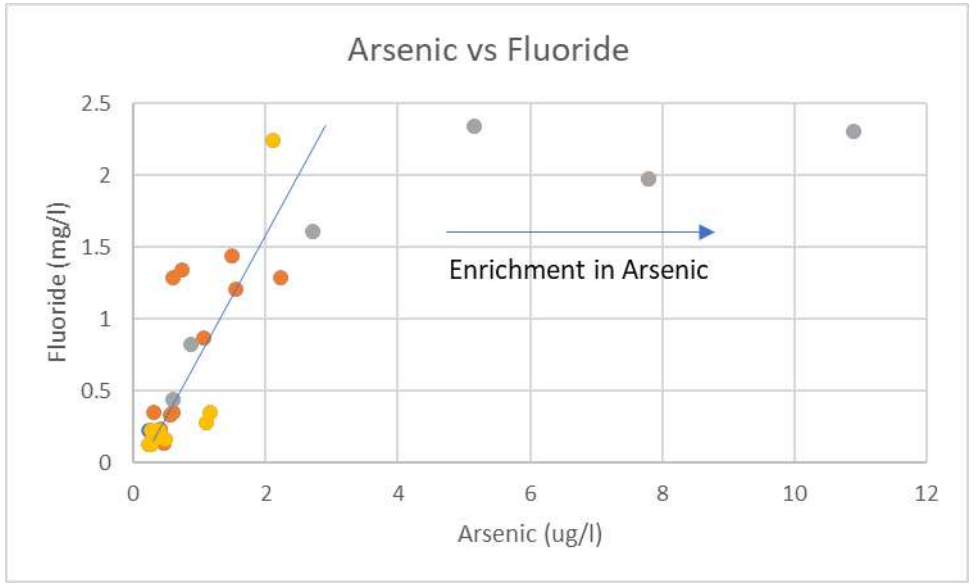
Results – Geogenic

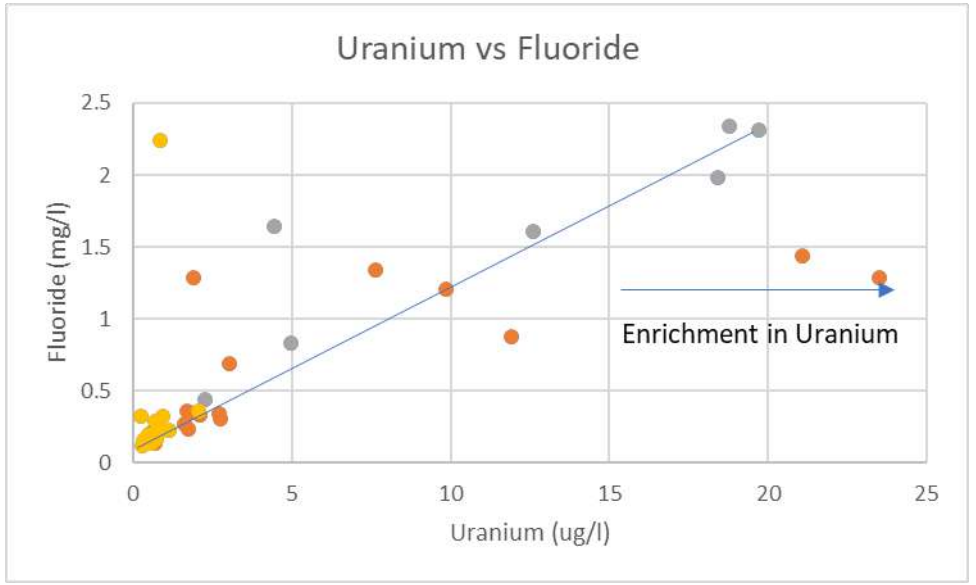
Parameters present naturally in the bedrock which are transferred to groundwater by recharge percolating in the rock.

High natural background levels attributed to the variable geochemical nature of the Phosphorite Conglomerate layer.

Threshold Values:
Fluoride 2.75mg/l
Arsenic: 7.5ug/l

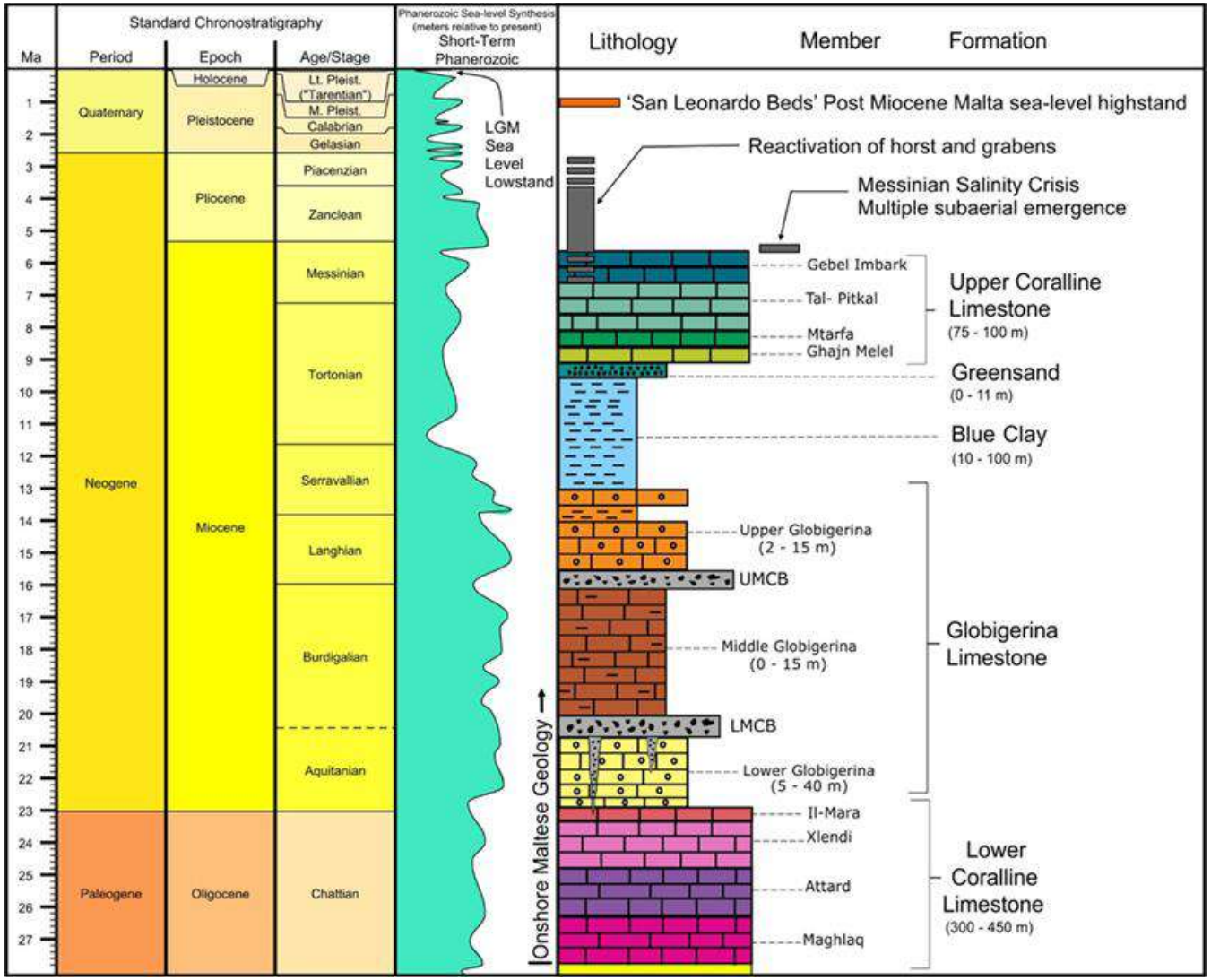
Criteria Value:
Uranium: 30ug/l





Results - Geogenic

Conglomerate beds in the Globigerina Limestone profile.



Results - Geogenic

Naturally occurring parameters.

Analysis do not show anthropogenic influence.

Not of concern for groundwater status assessment.

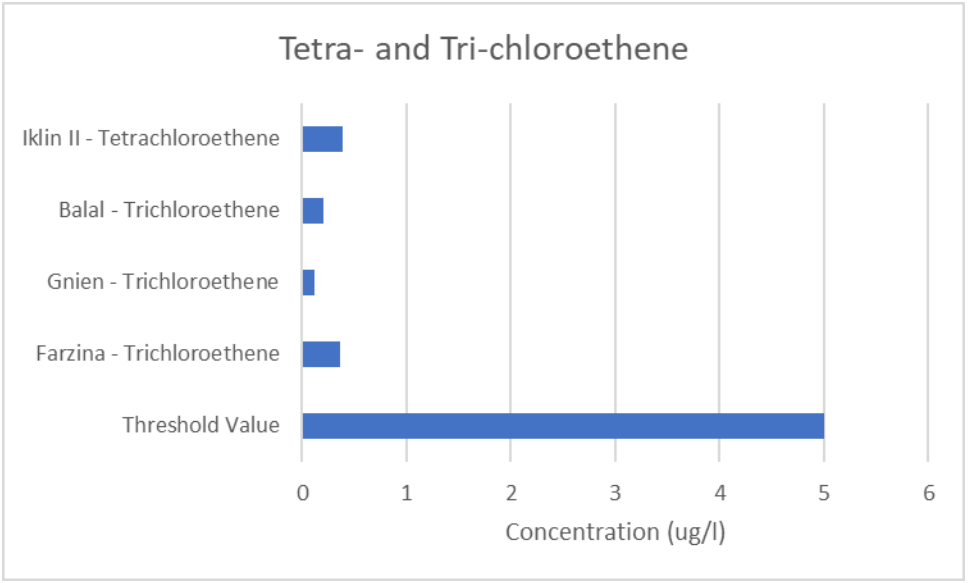
Code	Groundwater Body	% of sites exceeding TV for		
		Fluoride	Arsenic	Uranium
MT001	Malta Mean Sea Level	0%	0%	0%
MT002	Rabat Dingli Perched	0%	0%	0%
MT003	Mgarr Wardija Perched	0%	0%	0%
MT005	Pwales Coastal	0%	0%	0%
MT006	Mizieb Mean Sea Level	0%	0%	0%
MT008	Mellieha Perched	0%	0%	0%
MT009	Mellieha Coastal	0%	0%	0%
MT010	Marfa Coastal	0%	0%	0%
MT012	Comino Mean Sea Level	0%	0%	0%
MT013	Gozo Mean Sea Level	0%	15%	0%
MT014	Ghajnsielem Perched	0%	0%	0%
MT015	Nadur Perched	0%	0%	0%
MT016	Xaghra Perched	0%	0%	0%
MT017	Zebbug Perched	0%	0%	0%
MT018	Victoria Kercem Perched	0%	0%	0%

Results - Synthetic

Trichloroethene and Tetrachloroethene detected in four stations in the Malta MSLA.

All detections are well below Threshold Value (established for these parameters).

Not of concern from a groundwater status perspective.

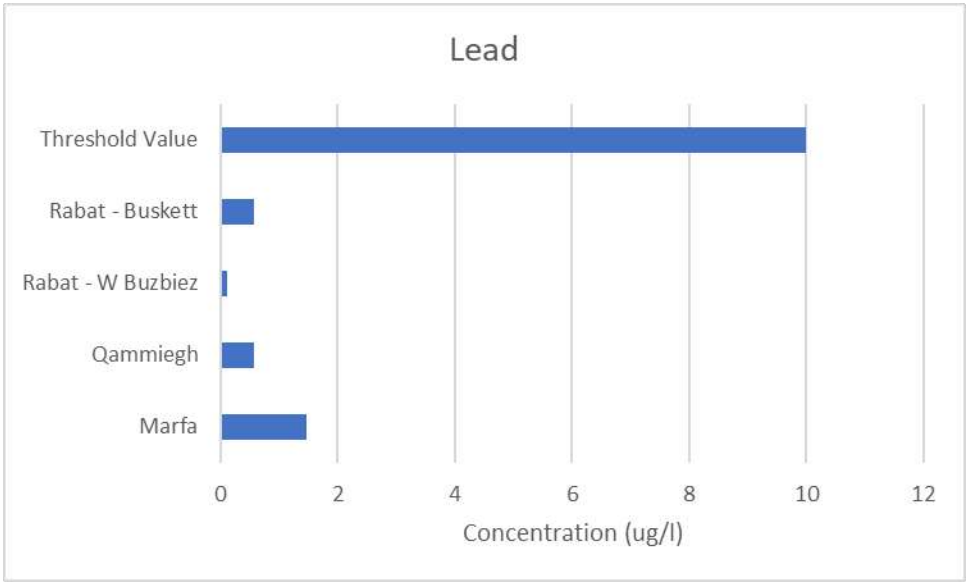


Results - Metals

Lead, Copper and Zinc are detected in groundwater monitoring samples.

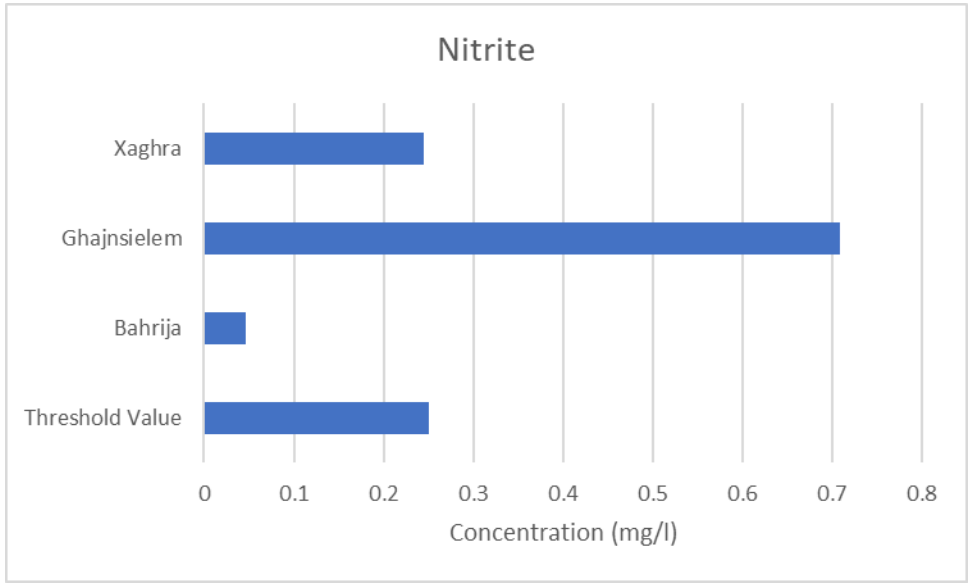
Lead: 4 detections
Copper: 14 detections
Zinc: 30 detections

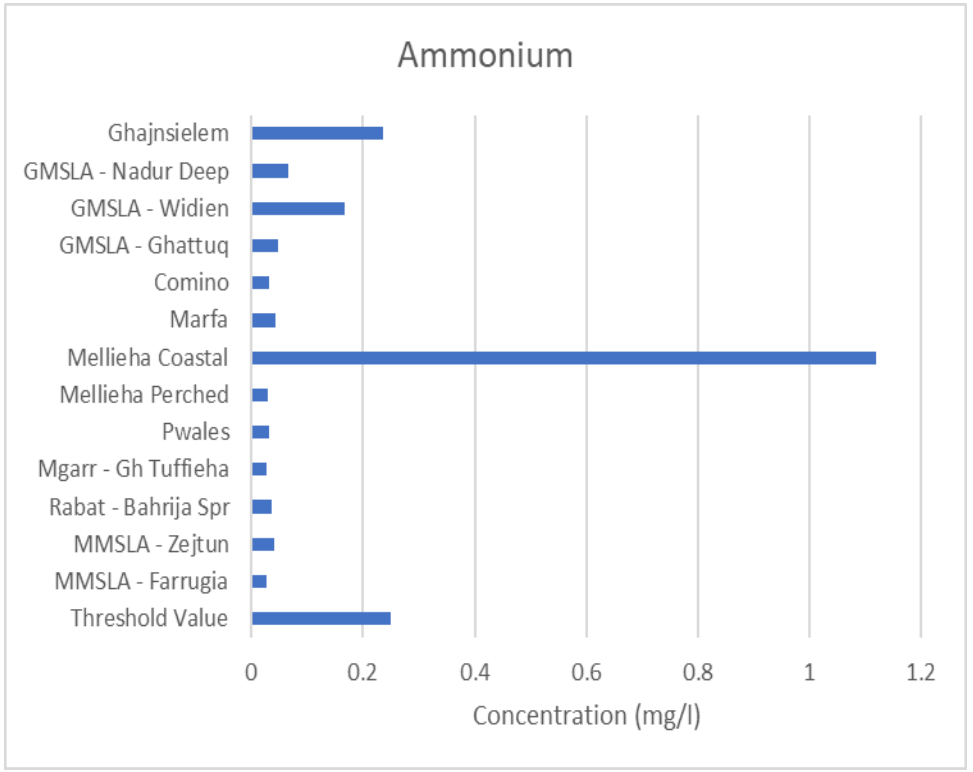
All detections are well below Threshold Value (established for these parameters).



Results – Surface Contaminants

Ammonium, Nitrite and Phosphate: Considered as additional indicators of surface contaminants



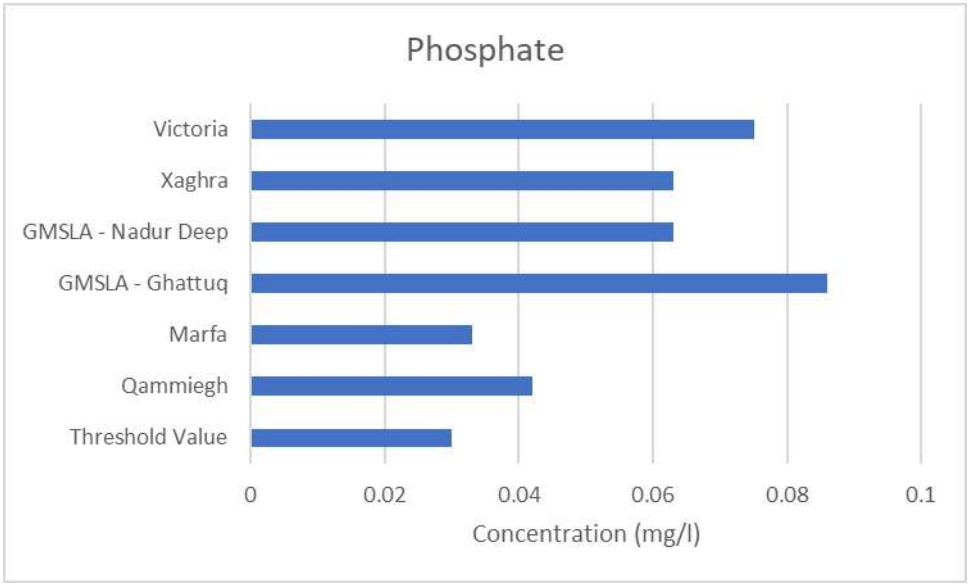


Results – Surface Contaminants

Only one monitoring station exceeds TVs for Ammonium and Nitrite.

Six stations exceed the TV for Phosphates.

Results are primarily of concern to Perched Aquifers – due to limited protection by thin unsaturated zone.

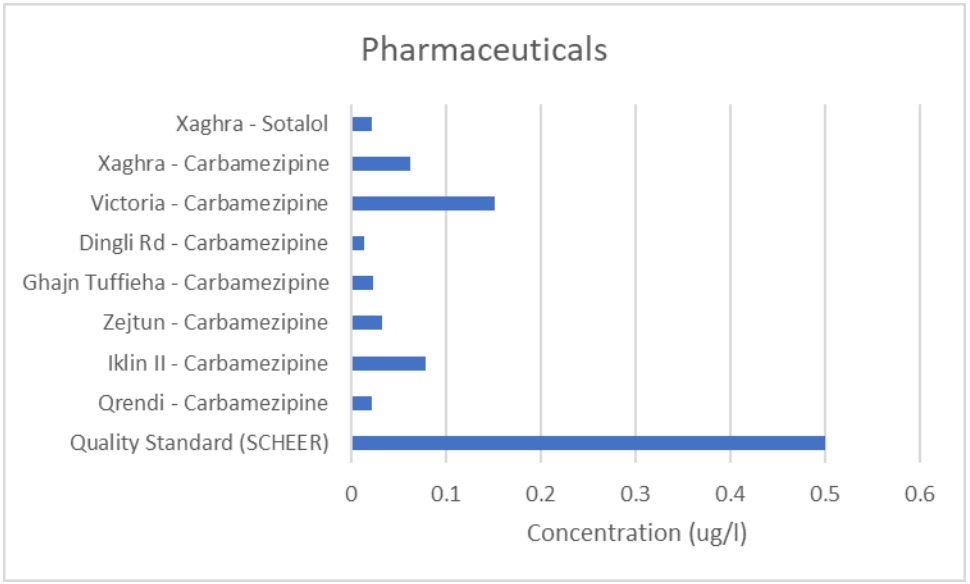


Results – Emerging Contaminants

Two pharmaceutical compounds detected in five groundwater bodies.

Carbamezipine – Pain Reliever
Sotalol – Heart medication

All detections are well below Quality Standard indicated by SCHEER for pharmaceuticals in groundwater.

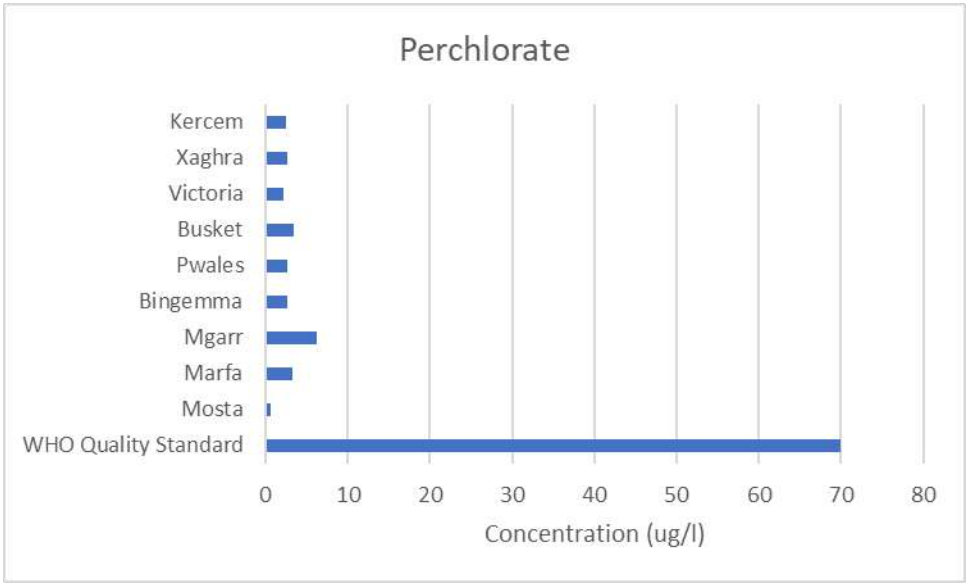


Results – Additional Parameters

Additional parameters monitored:

Perchlorate – Detected in 9 samples, where all cases were well below the WHO Quality Standard for Drinking Water.

PFAS – No detections were registered.



Results – Additional Parameters

Groundwater Body	% of sites exceeding TV for										
	Trichloroethene	Tetrachloroethene	Lead	Copper	Zinc	Nitrite	Ammonium	Phosphate	Pharmaceuticals	Perchlorate	PFAS
Malta Mean Sea Level	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Rabat Dingli Perched	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Mgarr Wardija Perched	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pwales Coastal	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Mizieb Mean Sea Level	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Mellieha Perched	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%
Mellieha Coastal	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Marfa Coastal	0%	0%	0%	0%	0%	0%	100%	100%	0%	0%	0%
Comino Mean Sea Level	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Gozo Mean Sea Level	0%	0%	0%	0%	0%	0%	0%	30%	0%	0%	0%
Ghajnsielem Perched	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%
Nadur Perched	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Xaghra Perched	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%
Zebbug Perched	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Victoria Kercem Perched	0%	0%	0%	0%	0%	0%	0%	50%	0%	0%	0%

Overall Status Assessment

Groundwater Body	Overall Status	% of sites exceeding TV for:																			
		Cl	Na	B	SO4	EC	NO3	Pest	F	As	U	TCE	PCE	Pb	Cu	Zn	NO2	NH4	P204	Pharma	ClO4	PFAS
Malta Mean Sea Level	Poor	20%	50%	0%	0%	12%	75%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Rabat Dingli Perched	Poor	60%	0%	0%	40%	60%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Mgarr Wardija Perched	Poor	75%	0%	0%	0%	0%	75%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pwales Coastal	Poor	100%	100%	0%	100%	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Mizieb Mean Sea Level	Poor	100%	100%	0%	0%	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Mellieha Perched	Poor	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%
Mellieha Coastal	Good	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Marfa Coastal	Poor	100%	100%	0%	100%	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%	0%	0%	0%
Comino Mean Sea Level	Good	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Gozo Mean Sea Level	Poor	50%	50%	0%	0%	0%	50%	0%	0%	15%	0%	0%	0%	0%	0%	0%	0%	0%	30%	0%	0%	0%
Ghajnsielem Perched	Poor	100%	100%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%
Nadur Perched	Poor	100%	100%	0%	0%	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Xaghra Perched	Poor	100%	100%	0%	0%	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%
Zebbug Perched	Poor	100%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Victoria Kercem Perched	Poor	100%	100%	0%	0%	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	0%	0%	0%

Conclusions

1. Two groundwater bodies in Good Qualitative Status (down from three at start of 2nd RBMP).

2. Main issues of concern remain saline intrusion and nitrate contamination.

3. Emerging challenges with detection of new parameters (possibly a result of extended and more accurate monitoring)

Conclusions

4. 3rd RBMP to propose Threshold Values for additional parameters:

   - Trichloroethene
   - Tetrachloroethene
   - Uranium
   - Perchlorate
   - PFAS
   - Pharmaceuticals

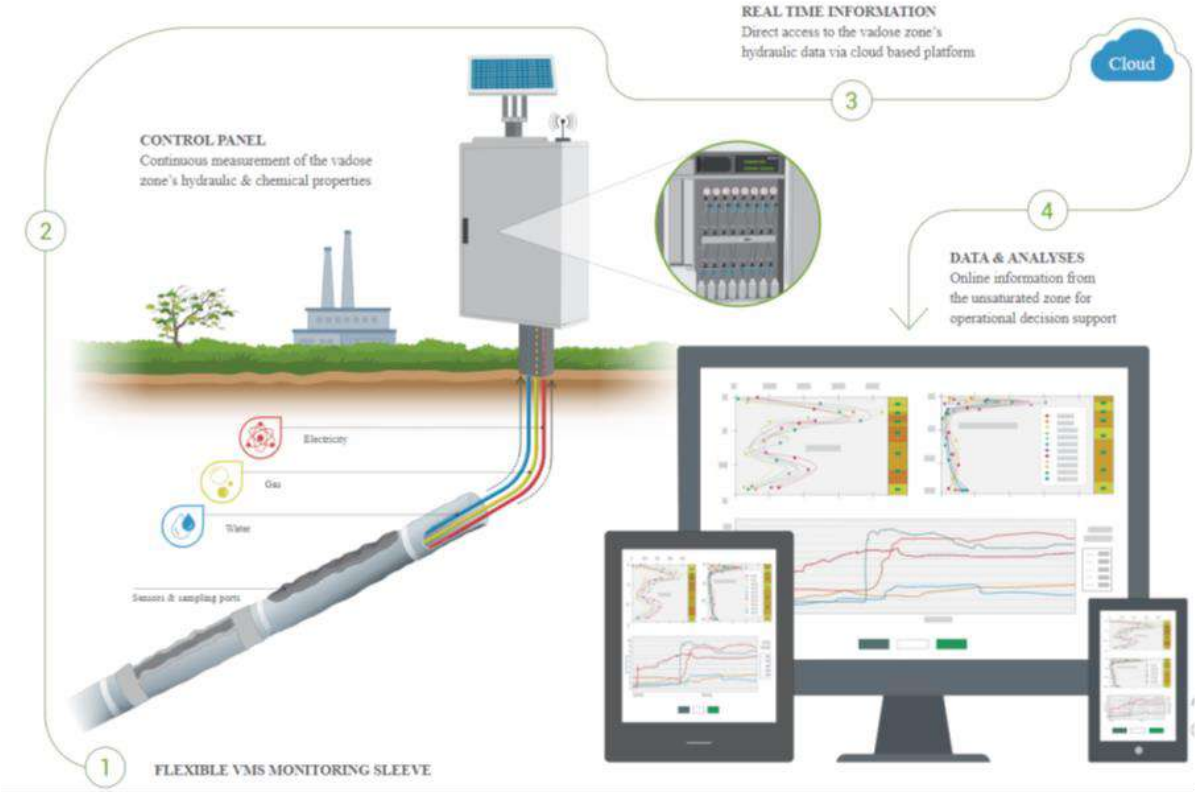
Conclusions

5. Operational Monitoring under 3rd RBMP to include additional parameters which have been detected, including a broader list for PFAS.

6. 3rd RBMP to include specific studies to support determination of origin of particular parameters, in particular those associated with geogenic origin.

Unsaturated Zone Monitoring Network

Network Characteristics:
Slanted boreholes driven in soil and rock up to a vertical depth of 23m.
Vadose-zone Sampling Ports and Flexible Time Domain Reflectometry sensors installed every 3m (approx.) along the monitoring sleeve.
Stations enable the monitoring of the % water content in the rock and the collection of water samples.



Network Information:
- Total Number of Stations: 16
- Date of Commissioning: June 2021

The project CF.10.096 “Enhancing National Monitoring and Public Engagement Capacity for improved Water Resources Management” is part-financed under the EU Cohesion Fund.

Unsaturated Zone Monitoring Network

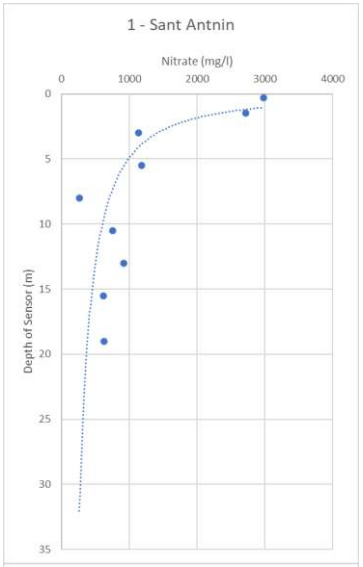
Unsaturated Zone Monitoring Network

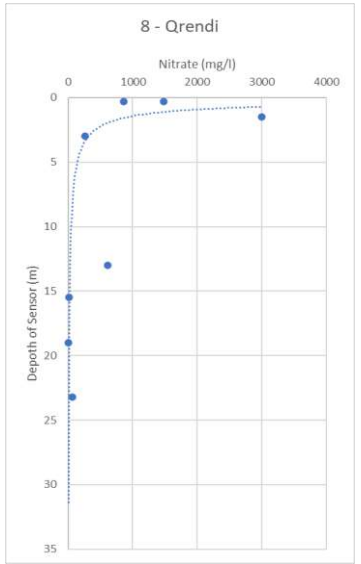
First Analysis of data on the Nitrate content in Monitoring Stations indicates:

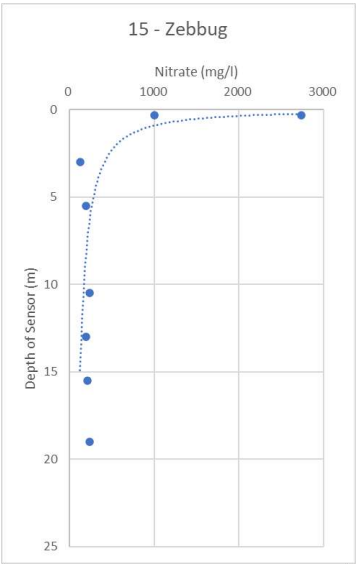
(i) a sustained decrease in the Nitrate content of recharge water with depth in all reporting stations, with the most significant decrease generally occurring within the first 10m of the unsaturated zone;

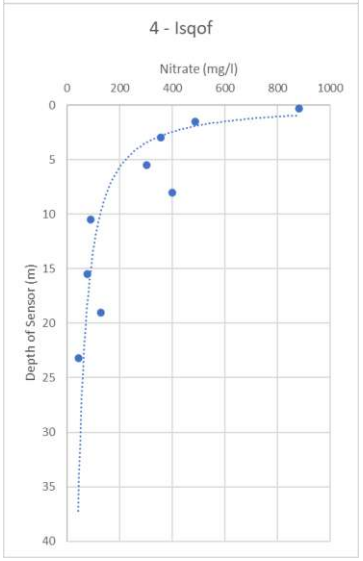
(ii) a potential relationship between nitrate content in the first sensors (soil depth of 1.5m) and agricultural land use with stations representative of forage and potatoes showing values around 3000mg/l, whilst stations representative of vineyards (where nitrate application is highly managed) showing values of around 300mg/l; and

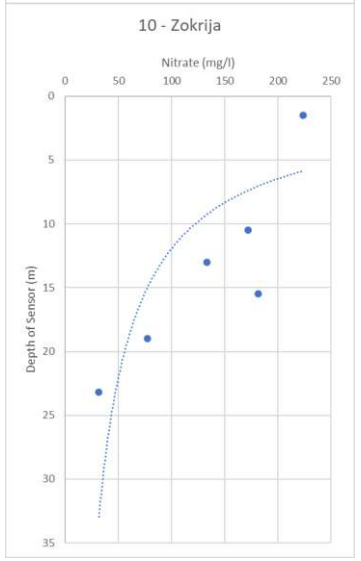
(iii) Nitrate content in the deepest stations goes below 50mg/l (quality standard) in only 2 monitoring stations.

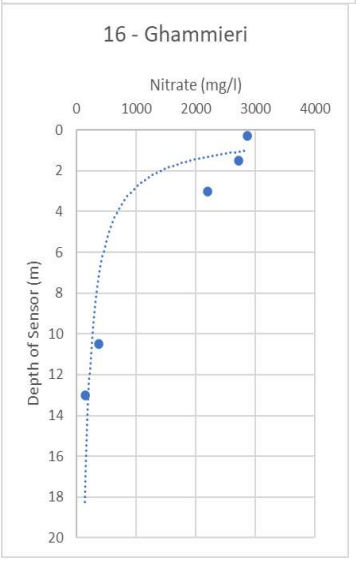












Unsaturated Zone Monitoring Network

The Vadose Zone Monitoring system is in its first year of operation, and hence further data and analysis are required for definite conclusions and interpretations.

The long term scope of this project is the development of a policy support tool which can provide an effective analysis of the fate of nitrate applied to land from agricultural activities. This will enable:

(i) An effective assessment of the impact of Nitrate Management Measures on the annual recharge – hence assessing the effectivity of the Nitrates Action Programme; and

(ii) The development of nitrate content mixing curves which can provide a reliable projection on the timeframe required for groundwater status achievement (nitrate content below 50mg/l)

The vadose zone monitoring network will be further developed in the short to medium term through:

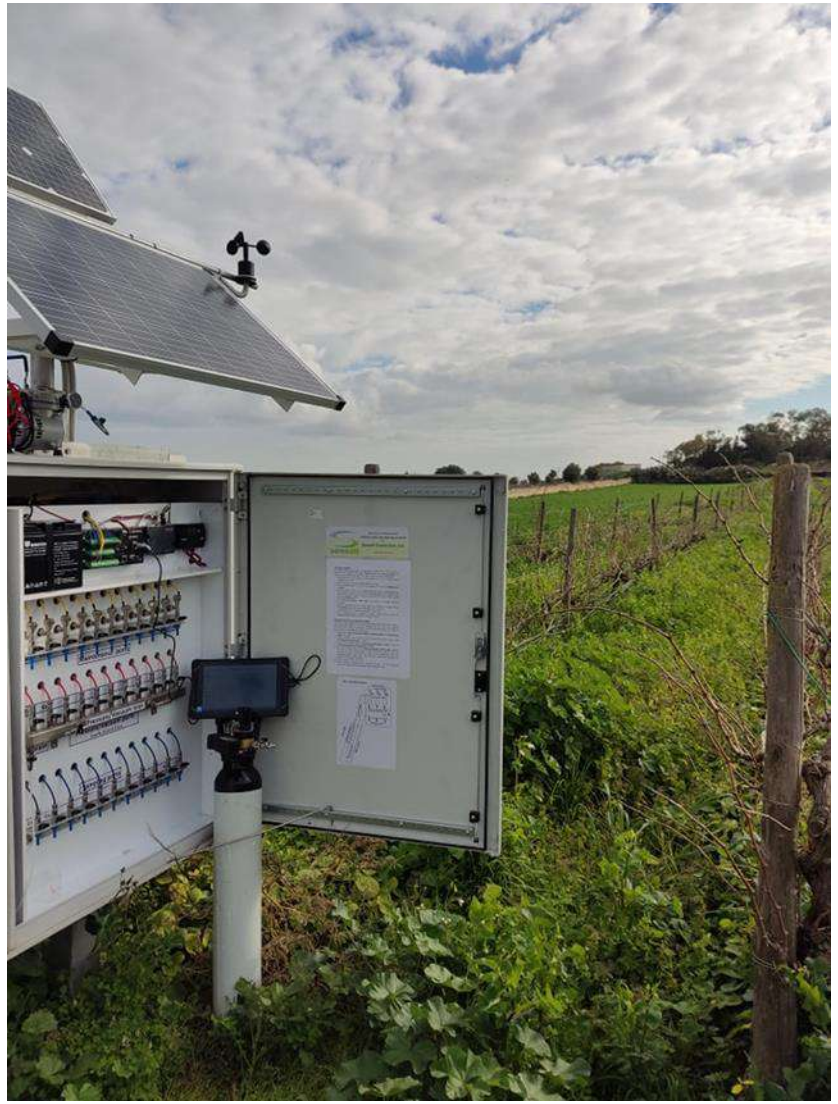
(i) the integration of dedicated weather stations at each monitoring site, and

(ii) the extraction of geological cores to better address the role of geological features on the recharge process.

THE ENERGY &WATER AGENCY

EU funds for Malta 2014 2020

Thank-you for your attention



Questions and Further Information:

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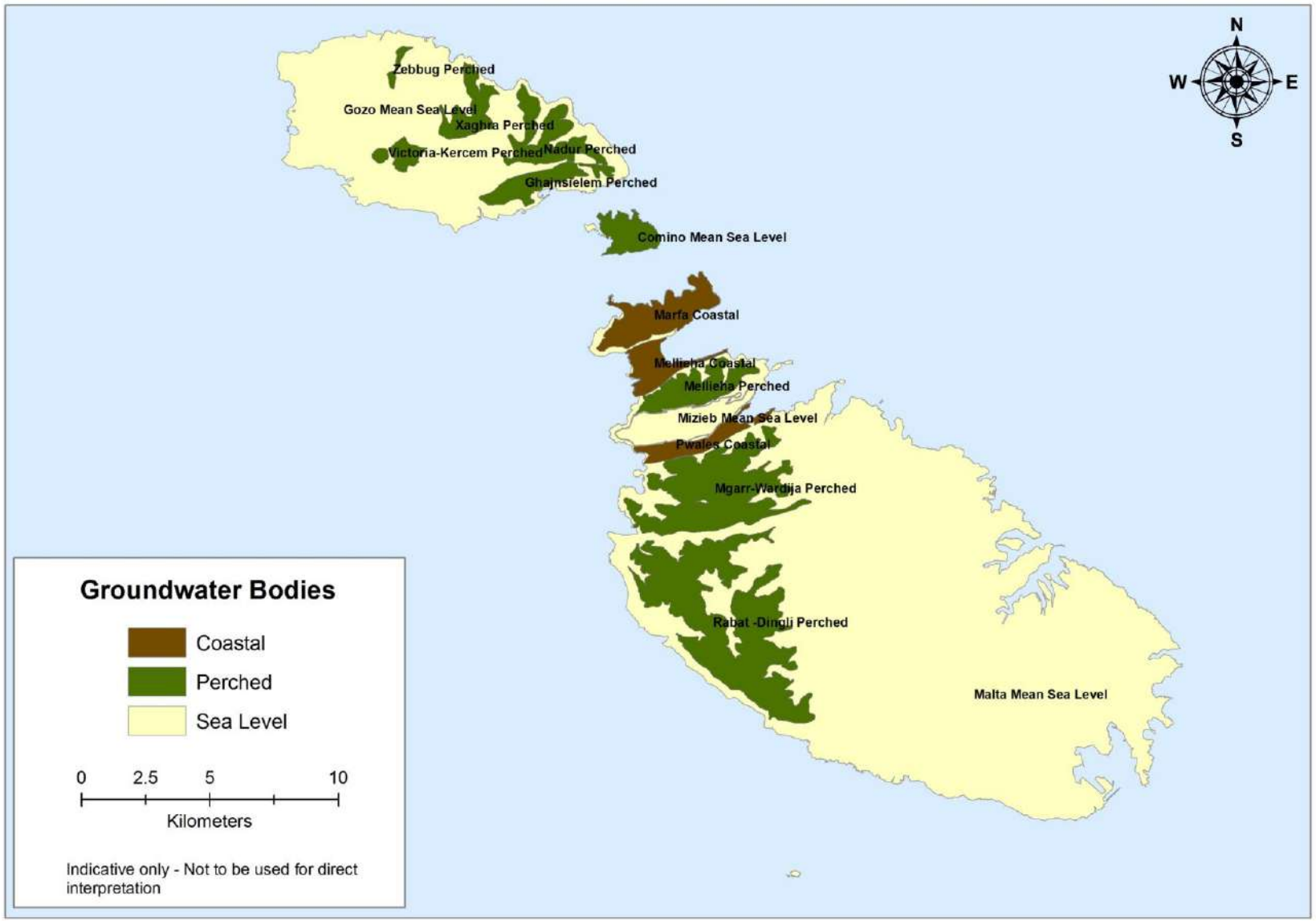
Quantitative Assessment of Malta's groundwater bodies

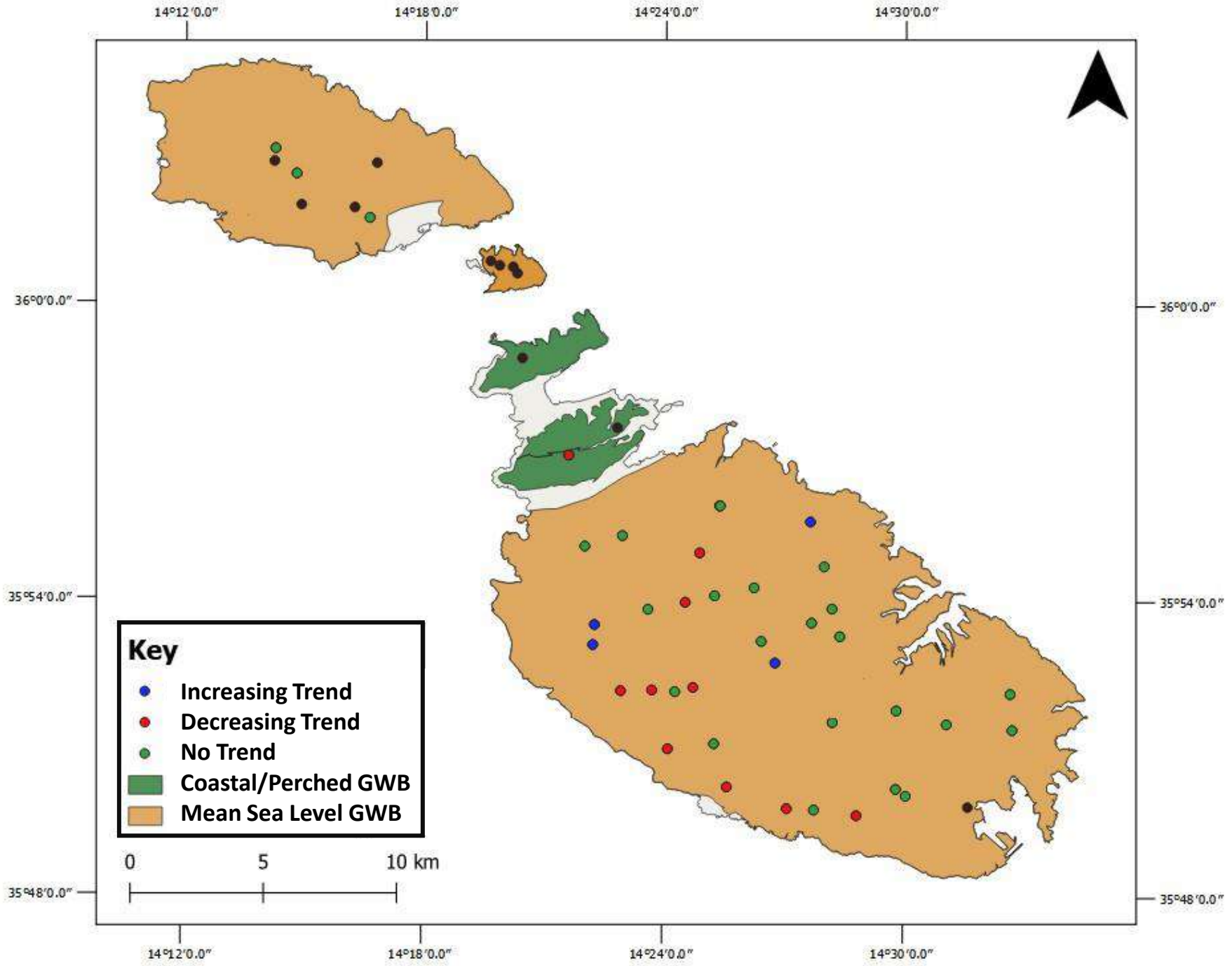
Michael Schembri
Chief Policy Officer
Energy and Water Agency

Malta's Groundwater Bodies

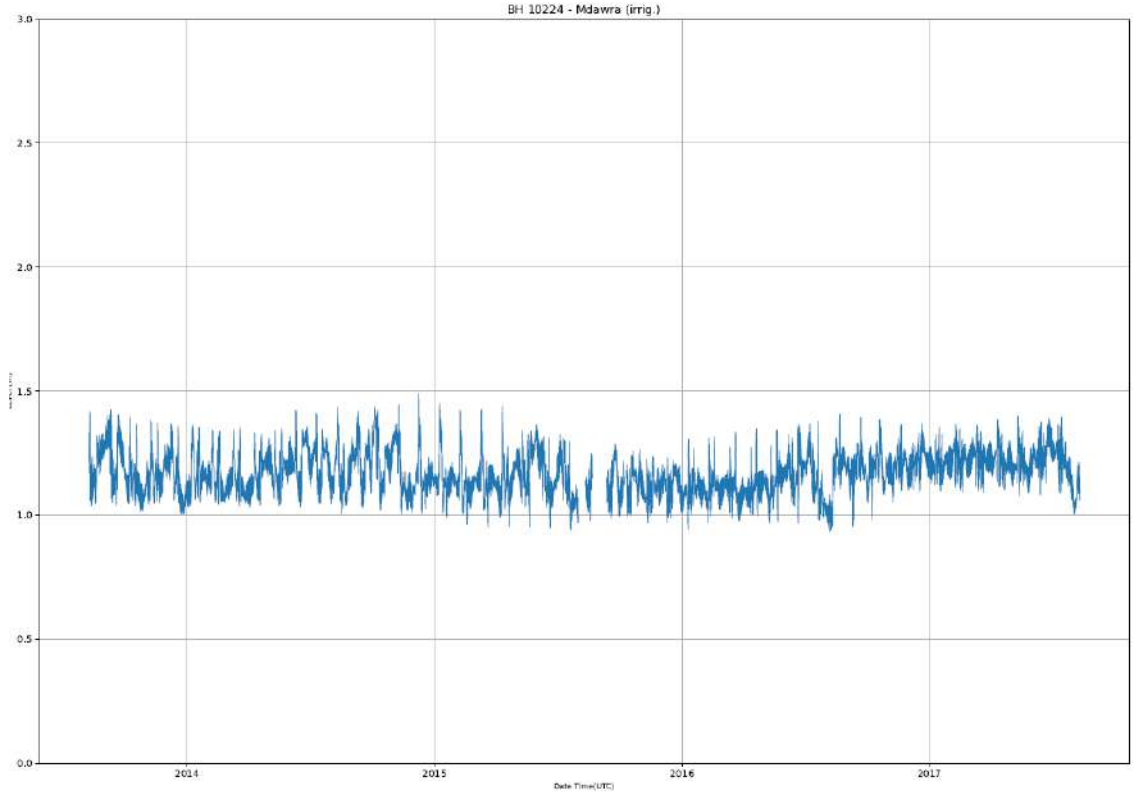
Groundwater Body
Sea-Level Groundwater Bodies
MT001 Malta Mean Sea Level
MT006 Mizieb Mean Sea Level
MT012 Kemmuna Mean Sea Level
MT013 Gozo Mean Sea Level
Perched Groundwater Bodies
MT002 Rabat Dingli Perched
MT003 Mgarr-Wardia Perched
MT008 Mellieha Perched
MT014 Ghajnsielem Perched
MT015 Nadur Perched
MT016 Xaghra Perched
MT017 Zebbug Perched
MT018 Victoria-Kercem Perched
Coastal Groundwater Bodies
MT005 Pwales Coastal
MT009 Mellieha Coastal
MT010 Marfa Coastal

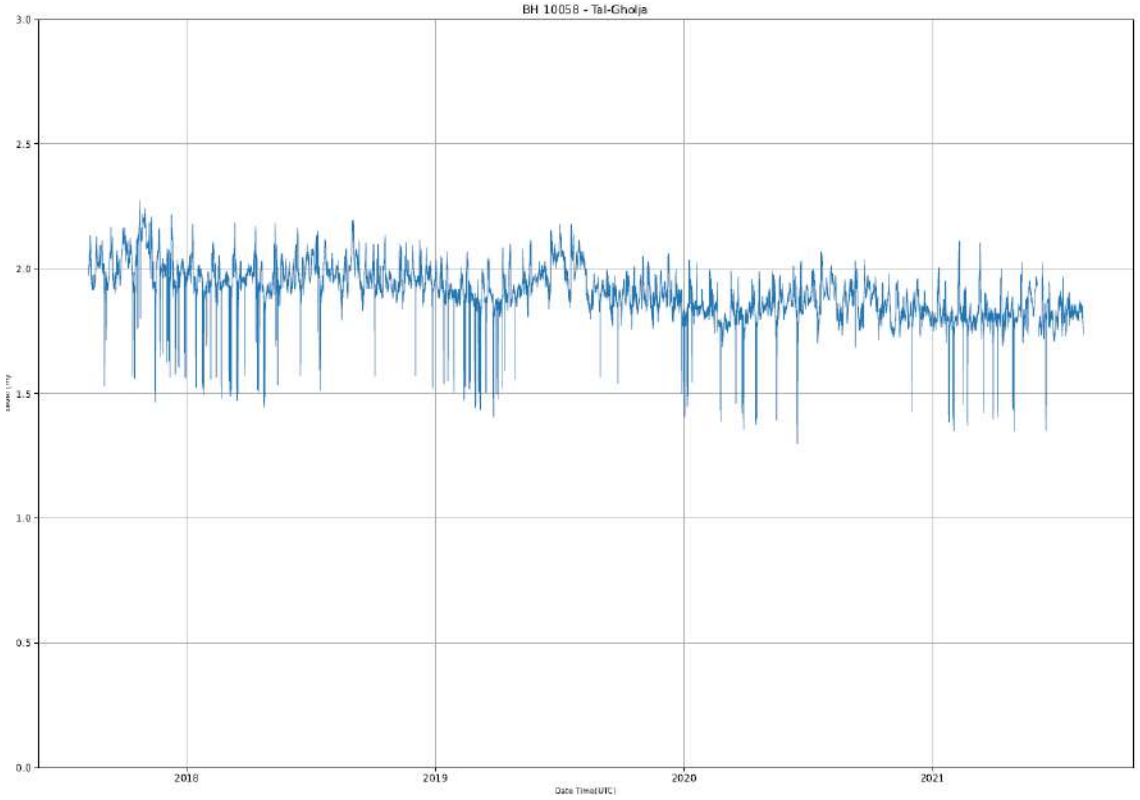


Site	Time Period	Trend
10024 Mriehel	1998 - 2021	No significant trend
10035 Buqana	1999 - 2021	Decreasing Trend
10049 Latnija	1990 - 2021	No significant trend
10058 Tal Gholja	1999 - 2021	No significant trend
10060 Propostu	2014 - 2021	No significant trend
10064 St Katarina	1999 - 2021	Decreasing Trend
10075 Mosta Rd	1997 - 2021	No significant trend
10076 Torri Cumbo	2000 - 2021	No significant trend
10077 Wied il Qliegha	1999 - 2021	No significant trend
10078 Gomerino	1990 - 2021	Increasing Trend
10081 Ta Kandja	1999 - 2021	No significant trend
10083 Girgenti	1990 - 2021	Decreasing Trend
10084 Hal Saflieni	1990 - 2021	No significant trend
10085 Lapsi Rd	1990 - 2021	Decreasing Trend
10089 Tal Gharbi	1999 - 2021	Increasing Trend
10092 Guarena	1990 - 2021	Decreasing Trend
10093 Madliena	1990 - 2021	Increasing Trend
10095 St Agatha	1999 - 2021	Decreasing Trend
10096 Targa	2001 - 2021	Decreasing Trend
10097 Karwija 1	1990 - 2021	No significant trend
10117 Isqof 1	2014 - 2021	No significant trend
10224 Mdawra 1	1990 - 2021	No significant trend
10225 Wied is Sewda	1997 - 2021	No significant trend
10238 Mizieb	2004 - 2021	Decreasing Trend
10247 Karwija 2	1990 - 2021	No significant trend
10259 Isqof 2	1999 - 2021	Decreasing Trend
10264 Hamra	1999 - 2021	No significant trend
10271 Buskett Rd	1990 - 2021	Decreasing Trend
10283 Benghisa	1990 - 2003	No significant trend
10300 Hal Farrug	1990 - 2021	No significant trend
10303 Kanun	1990 - 2021	No significant trend
10309 Ta Paris	1999 - 2015	No significant trend
10317 Wied Babu	2005 - 2021	No significant trend
10353 Hal Tmiem	2005 - 2021	No significant trend
10366 Barrani 2	2000 - 2021	No significant trend
10371 Wied Busbies	1999 - 2021	Increasing Trend
10431 Mdawra 2	1990 - 2021	No significant trend
10432 Mgarr	2003 - 2021	No significant trend
10816 Stacecilia	2003 - 2006	No significant trend
10821 Wied Sara	2002 - 2021	No significant trend
10834 Taflija	2005 - 2006	Not enough data
10860 Hniena	2003 - 2021	No significant trend
10866 Republic Street	2016 - 2021	No significant trend
10870 Garzelli	2005 - 2006	Not enough data
10901 Comino 1	2021 - 2022	Not enough data
10906 Comino 6	2021 - 2022	Not enough data
10907 Comino 7	2021 - 2022	Not enough data
10910 Comino 10	2021 - 2022	Not enough data

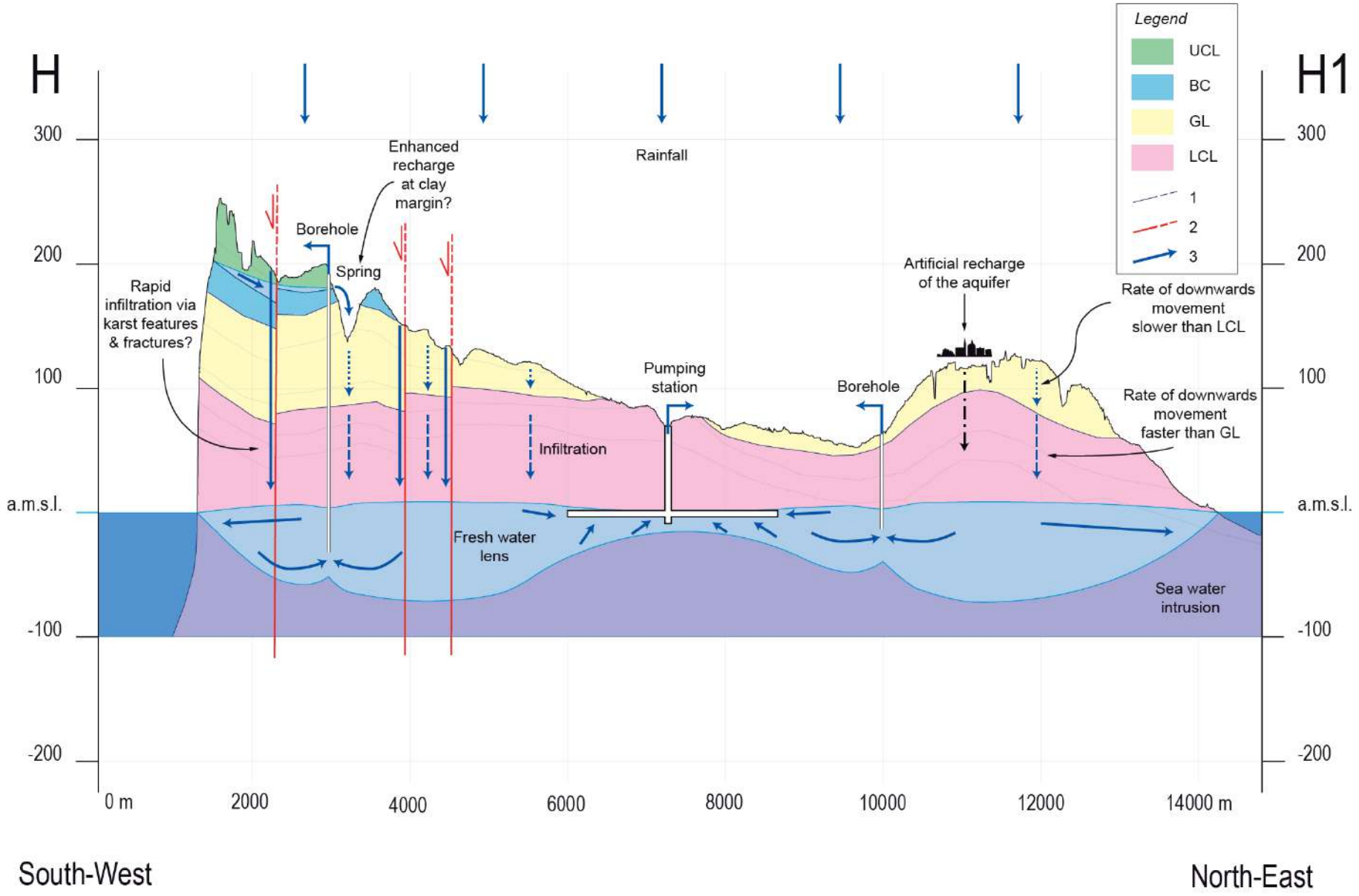


Groundwater Levels

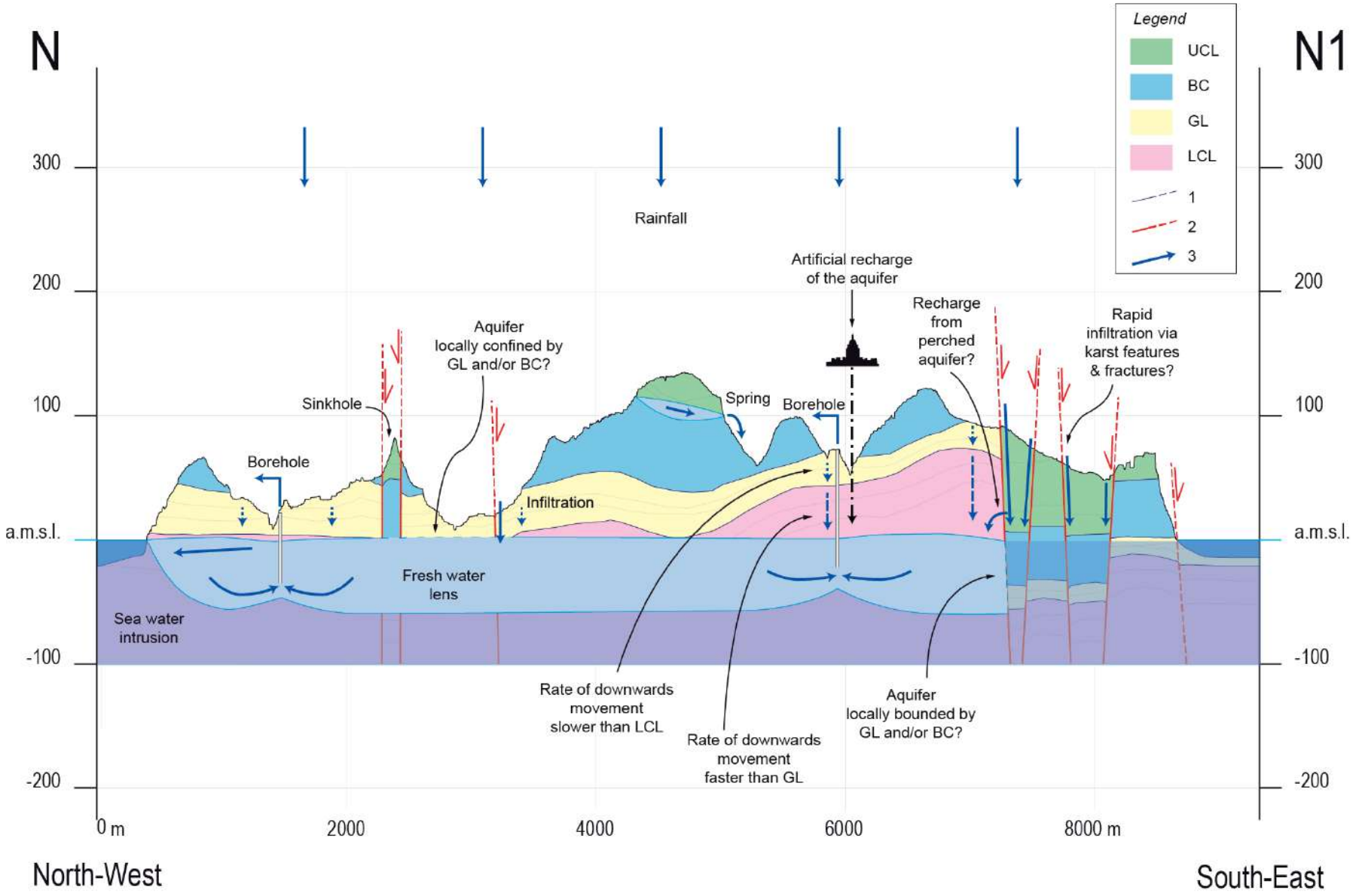




Conceptual Model - Malta Mean Sea Level Groundwater Body



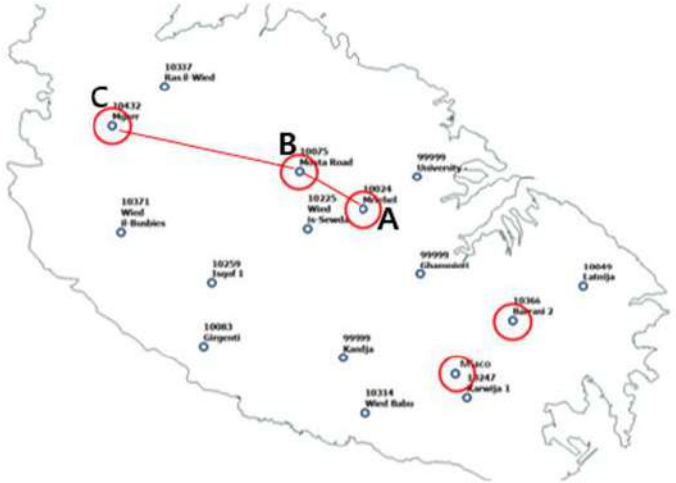
Conceptual Model - Gozo Mean Sea Level Groundwater Body

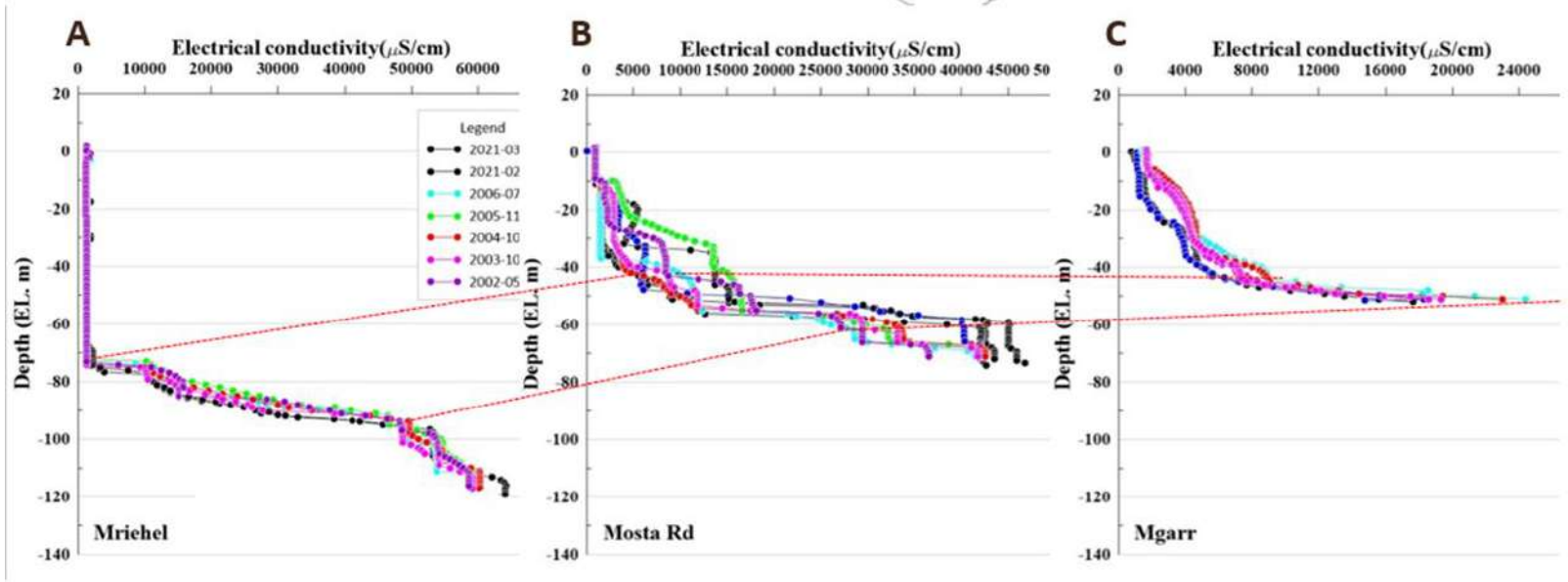


Freshwater Saltwater Interface

Groundwater quantitative status has high dependency on the qualitative issues.

Freshwater changes gradually into saltwater through a “transition zone”. The thickness of the transition zone defines the volume of freshwater available for exploitation.

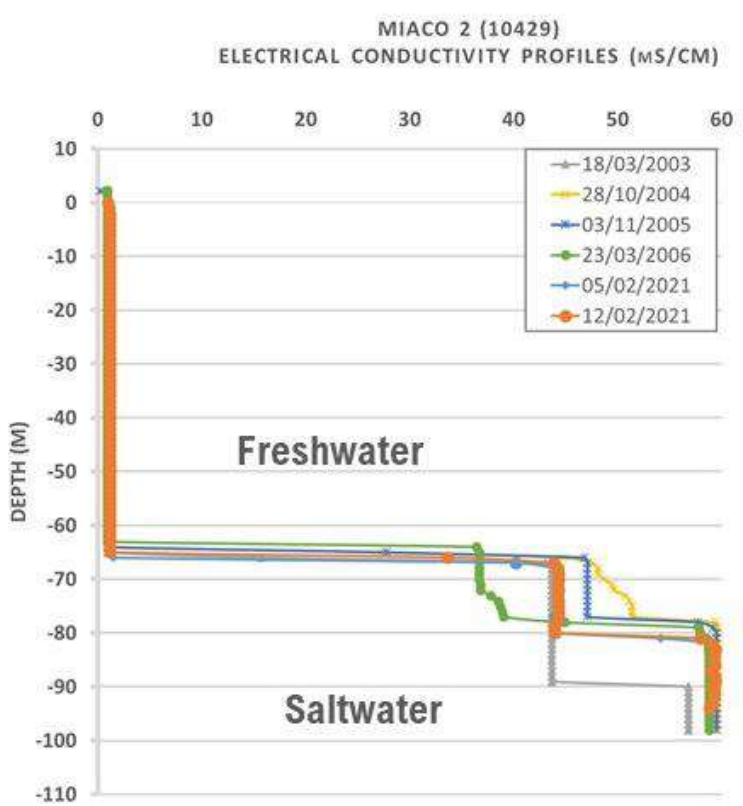


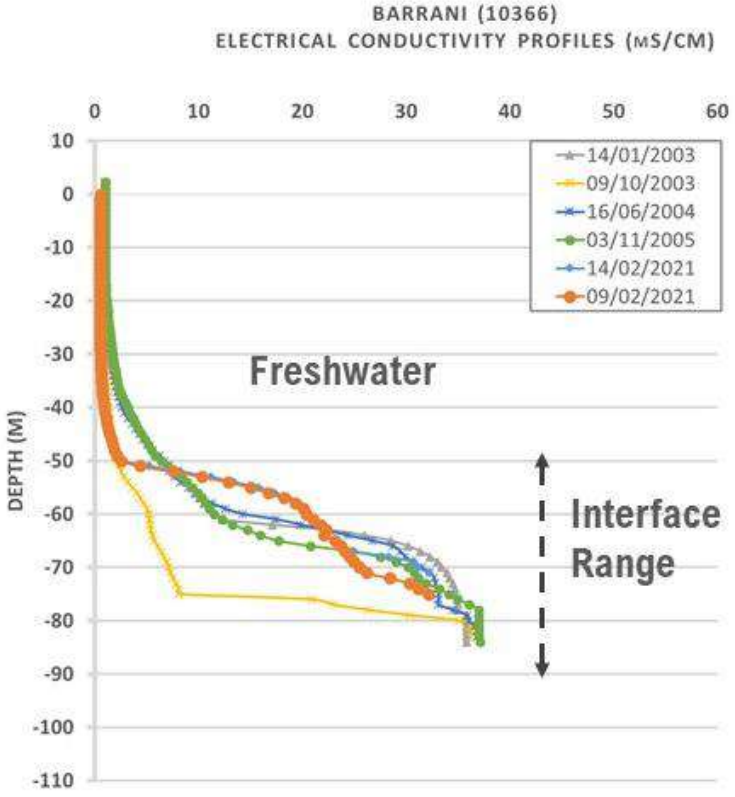


Freshwater Saltwater Interface

Piezometric levels provide limited information on the status and regional sea-water intrusion.

Case Study: Two monitoring wells with same hydraulic head (app 2.9m amsl) but different freshwater profiles due to the development of the “transition zone”.



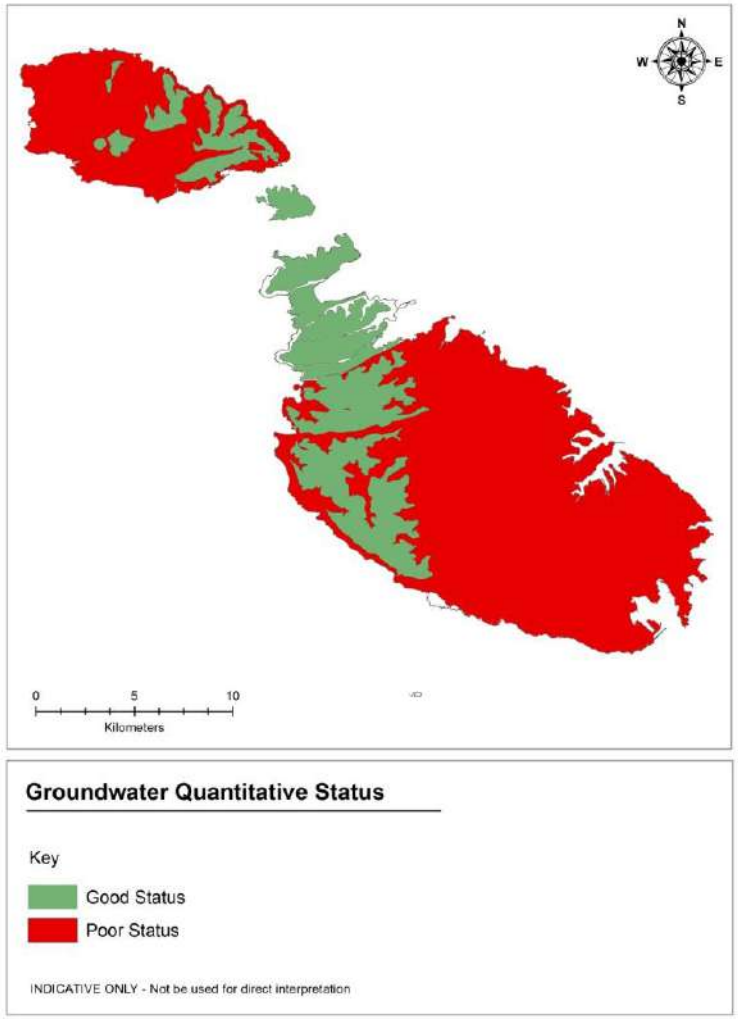


Groundwater Quantitative Status Assessment

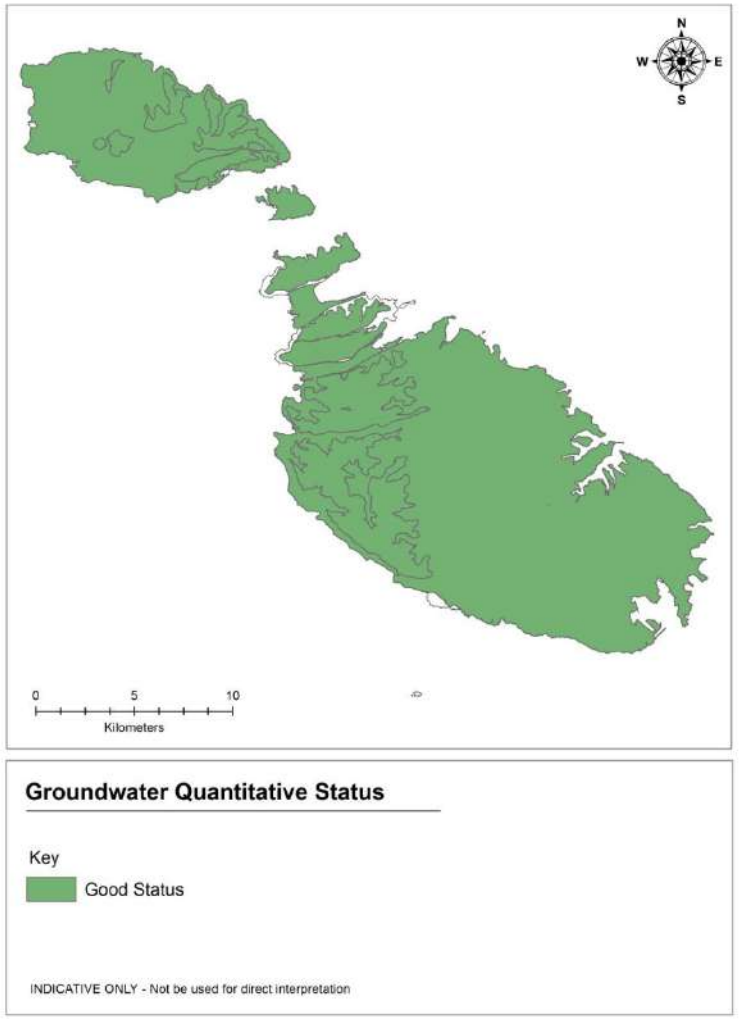
Groundawter Body Group	Natural Recharge Mm^3	Leakage from perched groundwater bodies Mm^3	Artificial Recharge Mm^3	WSC Abstraction Mm^3	Agricultural Abstraction Mm^3	Abstraction from other sectors Mm^3	Natural Discharge Mm^3	INFLOW Mm^3	OUTFLOW Mm^3	BALANCE Mm^3
Malta Mean Sea Level	27.4	1.4	6.8	-11.8	-8.2	-3	-18	35.6	-41	-5.4
Malta Perched and Coastal	10.8	-1.4	2.9	0	-5.6	-1	0	12.3	-6.6	5.7
Gozo Mean Sea Level	9.22	0.75	2.6	-2.2	-4.2	-1	-6.4	12.57	-13.8	-1.23
Gozo Perched	2.5	-0.75	0.9	0	-1.9	-0.25	0	2.65	-2.15	0.5

Groundwater Quantitative Status Assessment

Current Status



Status Objectives



Concluding Remarks

(i) Recognize the inherent link between quality and quantity – with particular reference to transition zone effects.

(ii) Increase confidence in the quantification of key parameters in the water balance framework - addressing uncertainties in recharge (inflow) and natural coastal discharge and iimproved correlation between key elements of the water balance: rainfall depth, runoff, evaporation and recharge.

(iii) Inform more reliable conceptual understandings and numerical models of the aquifer system.

Concluding Remarks

(iv) The groundwater quantitative status assessment also outlines that there are hotspots of deterioration in the MSLA.

(v) Measures need to address the current and projected increasing water demand of the Maltese islands

Water Framework Directive: Inland Surface & Transitional Waters

Inland Surface Waters – Rivers

WFD definition

A body of inland water flowing for the most part on the surface of the land but which may flow underground for part of its course

Malta's water bodies in this category:

***Watercourses*:**

Wied tal-Baħrija

Wied il-Luq

Wied tal-Lunzjata

Issues:

Small streams

Intermittent water flow

Low water flows

Inland Surface Waters – Lakes

<u>WFD definition</u>

a body of standing inland surface water

<u>Malta's water bodies in this category:</u>

<u>Freshwater Pools</u>:

Il-Qattara

L-Għadira ta' Sarraflu

<u>Issues:</u>

Very small and highly variable

Fluctuating water levels

Transitional Waters

WFD definition

bodies of surface water in the vicinity of river mouths which are partly saline in character as a result of their proximity to coastal waters but which are substantially influenced by freshwater flows

Malta's water bodies in this category:

Is-Simar

L-Għadira

Is-Salini

Magħluq ta' Marsaskala

Il-Ballut ta' Marsaxlokk

Issues:

Hydromorphological Changes

WFD Objectives:

- **Good Chemical Status** on the basis of concentration of chemical contaminants as listed in the 'Environmental Quality Standards Directive'

- **Good Ecological Status** on the basis of 'Biological Quality Elements' and supporting parameters including hydromorphology and nutrients

- **Good Ecological Potential** for Heavily Modified Water Bodies

Qualitative Status

Qualitative Status – Physico-Chemical Parameters

2nd River Basin Management Plan:

Freshwater Pools & Transitional Water Bodies:

- **large fluctuations** in physico-chemical parameters including salinity and nutrients (nitrates)

Watercourses:

- **very high nitrate levels**

2021/2022 monitoring data:

- High nitrate levels (>200mg/L) in watercourses confirmed
- Fluctuations in salinity levels including high salinity values reported in selected transitional water bodies

Additional Information:

- Algal blooms reported in the past at L-Għadira ta' Sarraflu & Salini

Qualitative Status – Chemical Contamination

2nd River Basin Management Plan:

- **No exceedances** in concentration of chemical contaminants in water
- Presence of plasticizer **Di(2-ethylhexyl) phthalate** (DEHP)
- Presence of **Nickel** in both water and sediment
- **Polyaromatic hydrocarbons**, **Dioxins**, **Cadmium** and **Lead** in sediments
- No pesticides reported.

2021/2022 monitoring data:

- Confirmed consistent presence of **Nickel** and **Lead**
- **Polyaromatic hydrocarbons** also reported
- No confirmation of presence of DEHP

Qualitative status - Relevant Pressures

- Limited water exchange and freshwater input in transitional waters
- Nutrient enrichment
- Contaminated surface water run-off from urban and agricultural areas – all water bodies

Gaps towards good qualitative status

1. Nutrient levels in watercourses

- High nutrient levels are of detriment to both water quality and ecology: oxygen depletion; algal blooms; toxicity; hindering achievement of good ecological status
- Need to address nutrient input from adjacent agicultural areas

2. Salinity levels in transitional water bodies

- Large fluctuations in salinity in transitional water bodies may be determinental to biological components, hence need to be addressed
- Hydrographical conditions/water flows need to be assessed and restored to the extent possible

3. Chemical contamination

- Chemical contaminants can result in toxic effects on aquatic ecosystems
- Need to achieve reduction trends in chemical contamination by addressing/managing sources of contamination

Quantitative Aspects & Ecological Status

Quantitative aspects of surface waters:

- Availability of water required to sustain aquatic ecosystems
- Connectivity with groundwater: hence link to quantitative status of goundwater
- Issues:
  - Water scarcity
  - Low water flows/intermittent flows
  - Low freshwater input
  - Historical hydromorphological changes or water diversions

Biological Quality Elements

- Macrophytes & Phytobenthos (plants/algae)
- Macroinvertebrates
- Fish (transitional waters only)
- Phytoplankton (transitional waters and freshwater pools)

Ecological Status

2nd River Basin Management Plan:

Benthic invertebrates only:

- **Watercourses**: Moderate/Poor/Bad (applicability of index questionable)
- **Freshwater Pools**: Good/Moderate
- **Transitional Waters**: Moderate/Poor/Bad

2021/2022 monitoring data:

- **Watercourses**:
  - Riparian Quality Index (preliminary): Poor/Bad
  - Benthic Invertebrates: Moderate/Poor

Ecological Status

Natura 2000: Listed habitats and species associated with the aquatic ecosystems

- Wied tal-Baħrija: Unfavourable/Bad
- Wied il-Luq : Unfavourable/Bad
- Wied tal-Lunzjata: Unfavourable/Bad
- Il-Qattara: Inadequate/Unfavourable
- Is-Simar: Inadequate/Unfavourable (except for the status of the killifish)
- L-Għadira: Inadequate (most habitat types)
- Is-Salini: Inadequate/Unfavourable
- Magħluq ta' Marsaskala: Unfavourable/Bad
- Il-Ballut ta' Marsaxlokk: Unfavourable/Bad

Ecological status - Relevant Pressures

- Low water flows/fluctuating water levels
- Hydromorphological alterations
- Nutrient enrichment
- Spread of non-indigenous species

Gaps towards good ecological status

1. Low/fluctuating water levels

- Unavailability of water and fluctuating water levels create changing environmental conditions that do not sustain aquatic ecosystems
- Need to restore minimum ecological/water flows, also by addressing hydromorphological changes

2. Non-Indigenous Species

- NIS replace Malta's native ecosystems.
- Need to implement management measures targeting NIS

3. Water Quality

- High nutrient levels negatively affect ecosystem functioning
- Address water quality (as per qualitative gap analysis).

Panel: Questions

Questions

1. Why would you consider inland surface and transitional waters important?
2. What are the issues that need to be addressed with highest priority?
3. Which activity is the most relevant when considering management of such waters?
4. Which management approach is considered a priority to enable achievement of good water quality?
5. Which management approach is considered a priority in achieving ecological status?
6. What is the best approach in engaging relevant stakeholders in management processes?

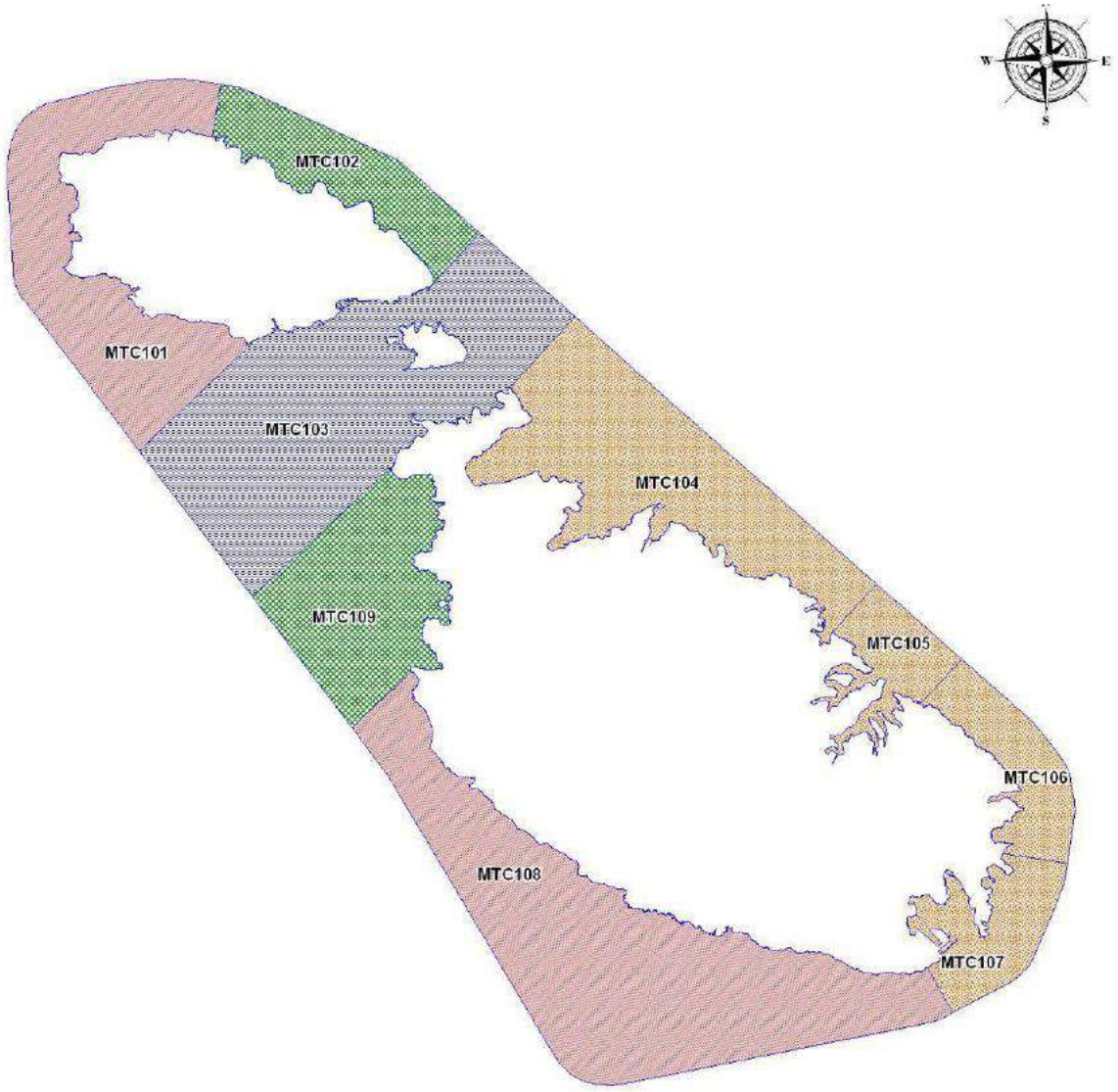
Thank You

Water Framework Directive: Coastal Waters

OCEANA / Carlos Minguell © LIFE BaHAR for N2K

Coastal Waters

- 9 coastal water bodies: 7 natural & 2 heavily modified
- Delineated on the basis of exposure & water depth
- Up to 1 nautical mile as per definition of coastal waters by the WFD



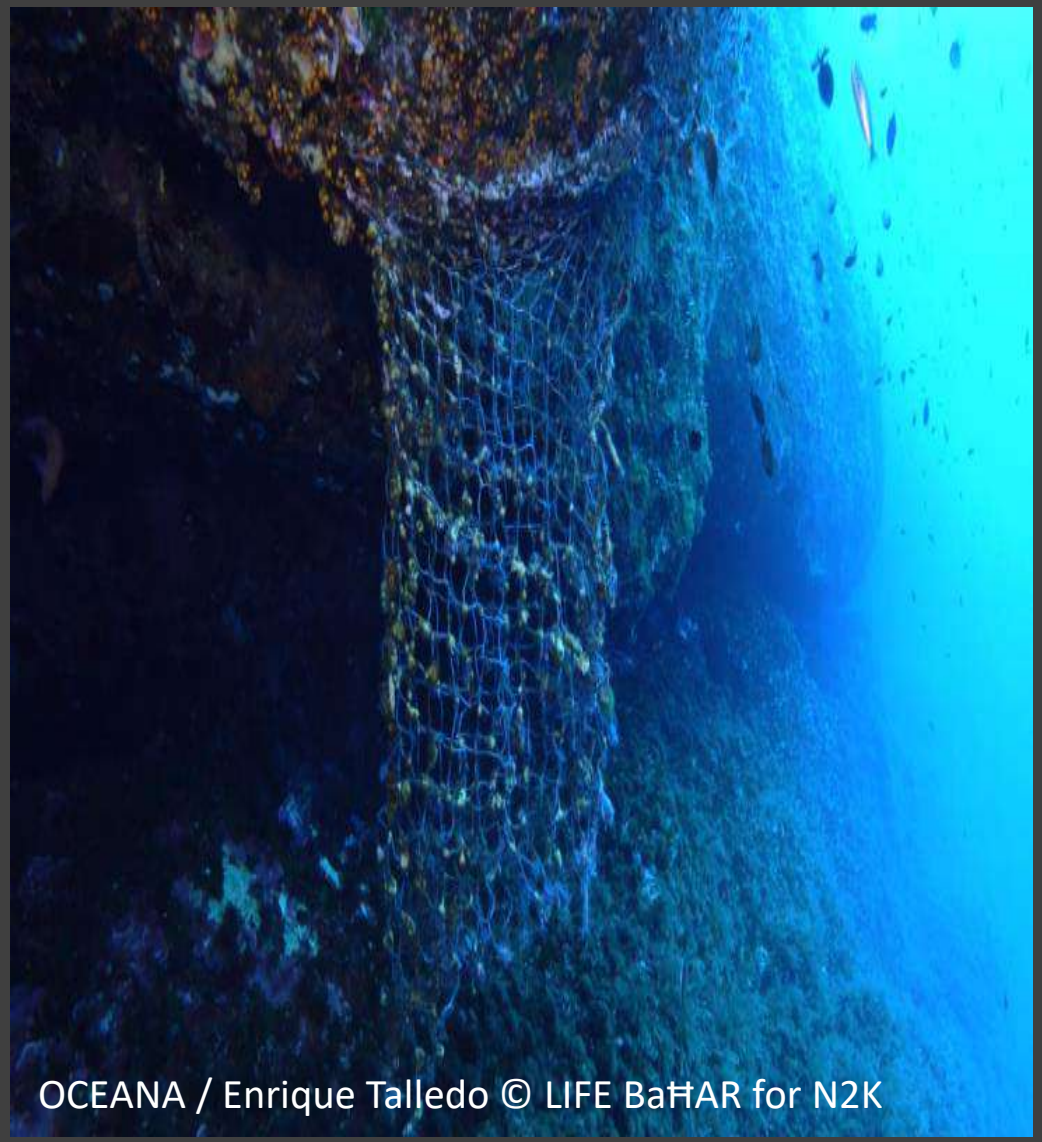
WFD Objectives:

- **Good Chemical Status** on the basis of concentration of chemical contaminants as listed in the 'Environmental Quality Standards Directive'

- **Good Ecological Status** on the basis of 'Biological Quality Elements' and supporting parameters including hydromorphology and nutrients

- **Good Ecological Potential** for Heavily Modified Water Bodies

Qualitative Status



OCEANA / Enrique Talledo © LIFE BaHAR for N2K

Qualitative Status – Physico-Chemical Parameters

2nd River Basin Management Plan:

- Status in terms of nutrient concentrations, primarily based on 'phytoplankton'
- Most water bodies are **not** subject/susceptible to nutrient enrichment with the exception of the Grand Harbour area (heavily modified water body).

2017-2019 & 2021 monitoring data:

- Generally low nutrient concentrations
- Most monitoring stations indicative of good status in terms of nutrient levels

Additional Information:

- Algal blooms (or their products) reported in inshore waters, but trigger is generally not known.

Qualitative Status – Chemical Contamination

2nd River Basin Management Plan:

- Contamination of water matrix with **mercury, lead, nickel and polyaromatic hydrocarbons**
- In sediments, **mercury**, **nickel** and **cadmium** reported.
- **PAHs** in sediment particularly high in the Grand Harbour and Marsamxett harbour

2017-2019 monitoring data:

- **Mercury**, **Nickel**, **Lead** & **Naphthalene** in water column (no significant exceedances)
- **Mercury levels in biota**
- **Fluoranthene** and **Polyaromatic hydrocarbons** in sediment

Qualitative status - Relevant Pressures

- Point discharges to coastal waters
- Stormwater run-off
- Aquaculture
- Sea-based activities including chronic or accidental spillages from boats

Gaps towards good qualitative status

1. Chemical Contamination

- Chemical contaminants can result in toxic effects on coastal ecosystems
- Need to achieve reduction trends in chemical contamination by addressing/managing sources of contamination

2. Emerging Issues

- Quality status is based on list of contaminants that are regulated. This may not be representing all potential contaminants
- Need to address qualitative status holistically (e.g. chemicals of emerging concern, litter & microplastics)

3. Harmful Algal Blooms

- Although this is quite a rare phenomenon in Maltese waters, there is a need to understand triggers, noting that such events can be detrimental.

Ecological Status

Biological Quality Elements

- *Posidonia oceanica* meadows
- Macroalgae
- Benthic Invertebrates
- Phytoplankton

Ecological Status

2nd River Basin Management Plan:

- ***Posidonia***: High/Good status
- **Macroalgae**: High/Good status with the exception of Moderate status in Grand Harbour
- **Benthic Invertebrates**: High/Good status
- **Phytoplankton**: High/Good status except in one water body

2017-2019 monitoring data:

- All Biological Quality Elements in good/high status

Ecological status - Relevant Pressures

- Physical Disturbance of the seabed (e.g. dredging, boating)
- Hydromorphological alterations
- Spread of non-indigenous species

Gaps towards good ecological status

1. No gaps towards good ecological status overall

- Localised impacts may not necessarily be captured by monitoring data
- Need for better understanding of localised impacts and manage drivers

2. Non-Indigenous Species

- Over 40 newly introduced NIS were reported for marine waters
- Need to address pathways/manage established NIS

3. Links with protected areas

- Need to ensure achievement of objectives for protected areas, including bathing water quality.

Panel Questions

Questions

1. Which is the most relevant issue that needs to be addressed with priority in our coastal waters?
2. Which activity needs to be managed with priority in order to work towards good water quality in coastal waters?
3. Which management approach is considered a priority in achieving ecological status?
4. Which is the best approach in engaging relevant stakeholders in management processes?

Thank You

5. Images

Below one can find a number of images that were taken during the event.

5.1 Conference Area

The technical workshop was organised in 5-star leading hotel in Malta offering full conference facilities and exhibition area.

5.2 Registrations

A registration desk was provided in order to greet the participants.

5.3 Signage indicating direction to conference

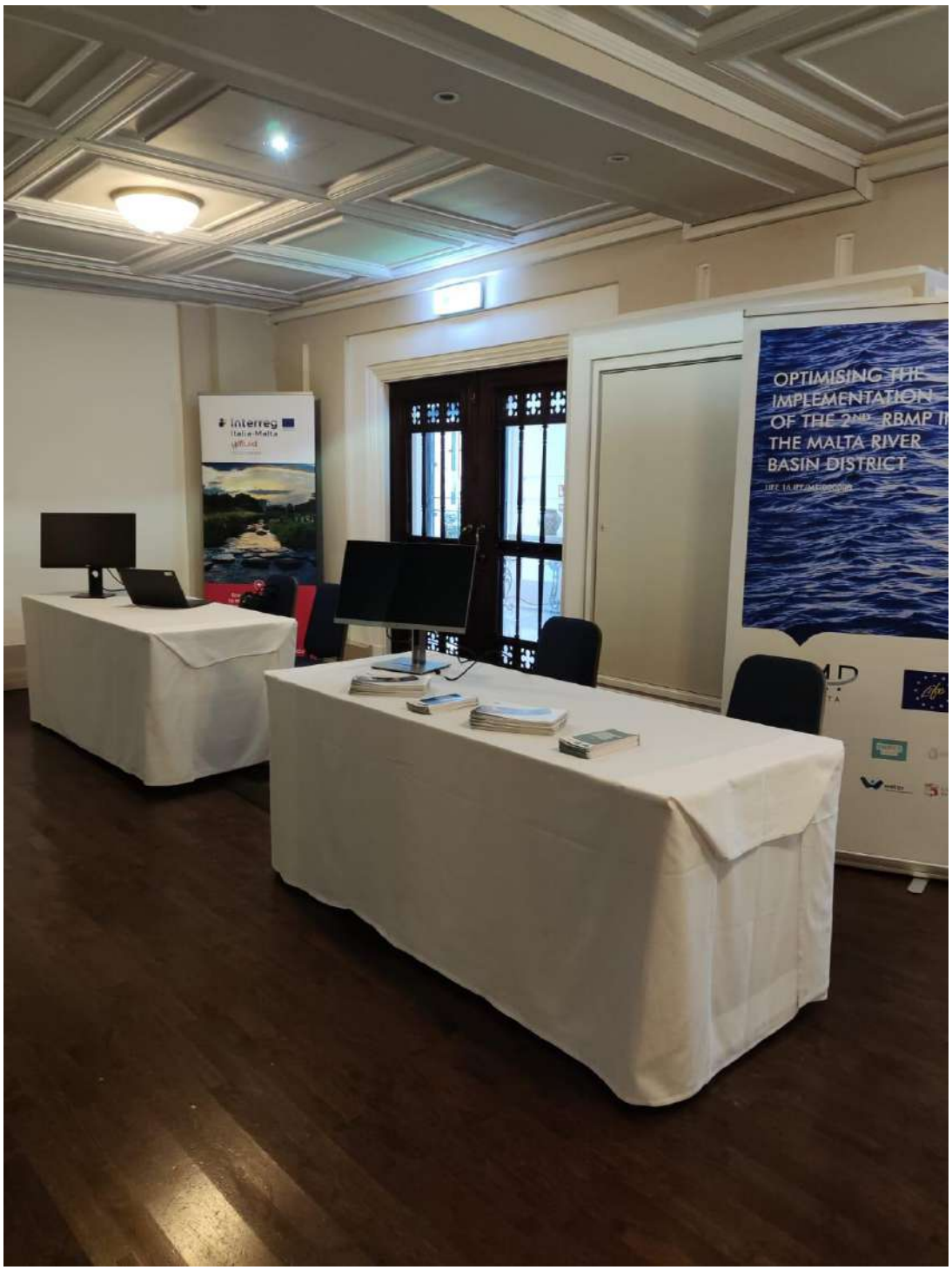
Signage was provided by the organiser in various locations around the hotel.

5.4 Roll Ups

Roll ups designed for the campaign were utilised during this activity.

5.5 Exhibitors Area

An exhibition area was provided, which allowed several exhibitors to set up and promote their services.




WE MAKE
Main Objective
Actions
Data Collection
ENERGY, WATER & WASTE SOLUTIONS

5.6 Attendees

The conference was well attended by both the general public and private sectors respectively.