

# Optimising the implementation of the 2nd RBMP in the Malta River Basin District

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# The Project

Addresses specific social, economic and environmental challenges associated with a highly populated Mediterranean small island state:

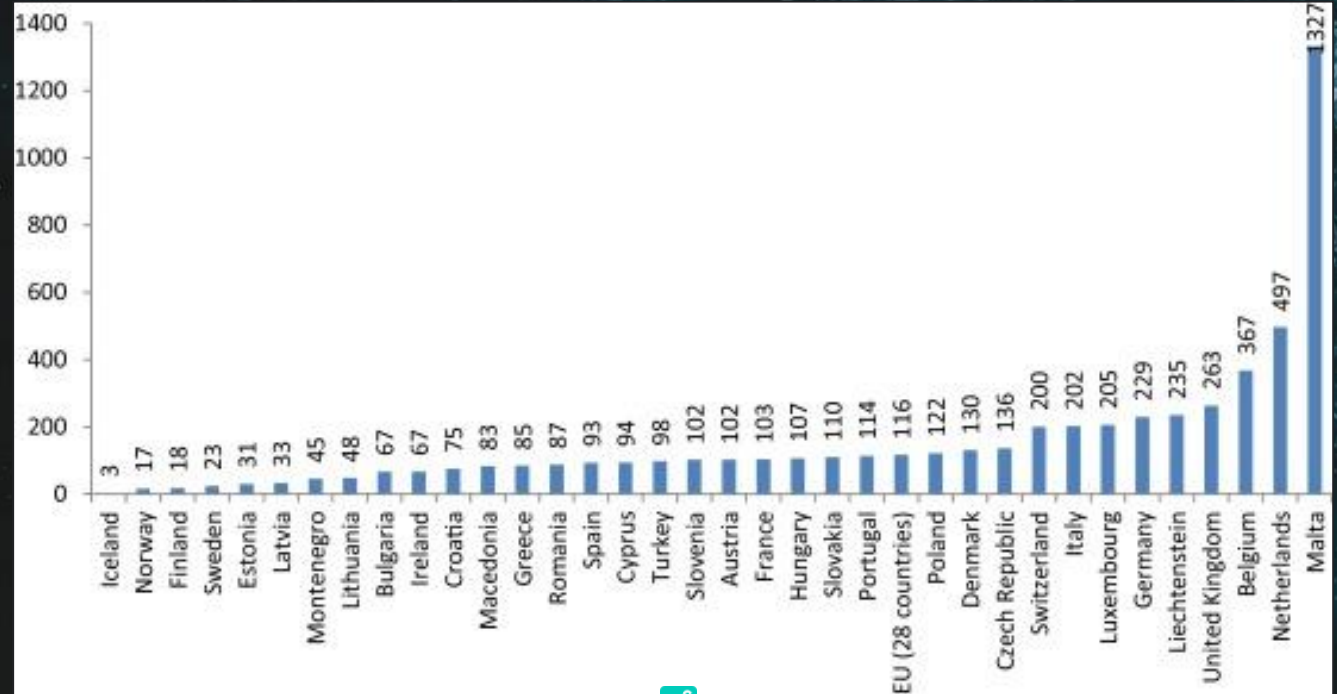
- Water scarcity and drought conditions
- High population density
- Saline Intrusion
- Contamination
- Vulnerability of coastal waters



# Malta and Riga comparison



# Population density in Europe by country (2012)



R<sup>6</sup>



# Our Actions

## Public Works Department:

- **C.7 Sustainable Urban Drainage Systems**

## PARKS Malta

- **A.8 Catchment Modeling**
- **C.9 Valley Management**



# Action C.7

Aims to:

“to yield a Strategic Framework Document that identifies opportunities for the implementation of SuDS in the Maltese Islands and includes the development of a multi-disciplinary assessment tool for SuDS selection”

**GSI Manual**

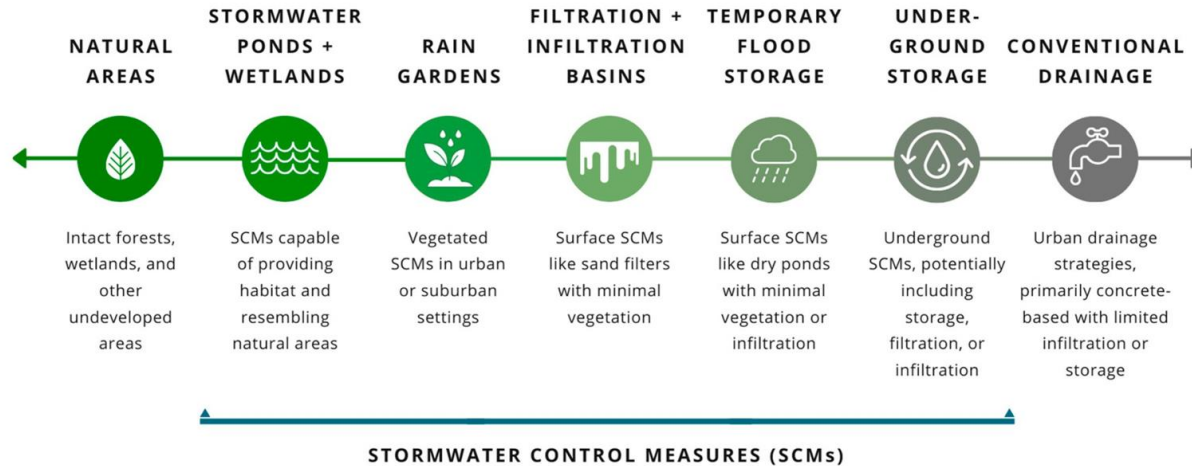


[https://meae.gov.mt/en/Public\\_Consultations/MTI/Documents/Green%20Stormwater%20Infrastructure%20Guidance%20Manual.pdf](https://meae.gov.mt/en/Public_Consultations/MTI/Documents/Green%20Stormwater%20Infrastructure%20Guidance%20Manual.pdf)

# The relevance of NBS to SuDs

## "GREEN" INFRASTRUCTURE

## "GRAY" INFRASTRUCTURE



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# The driving forces for GSI in Malta

- Flood reduction
- Groundwater Under stress
- Soil Protection, Public Health and Green Spaces
- Climate Change
- Water Policy

# Examples of flooding in Malta

Despite high traffic location and surcharging of sanitary sewers, is relatively clean, and recommended for indirect groundwater recharge

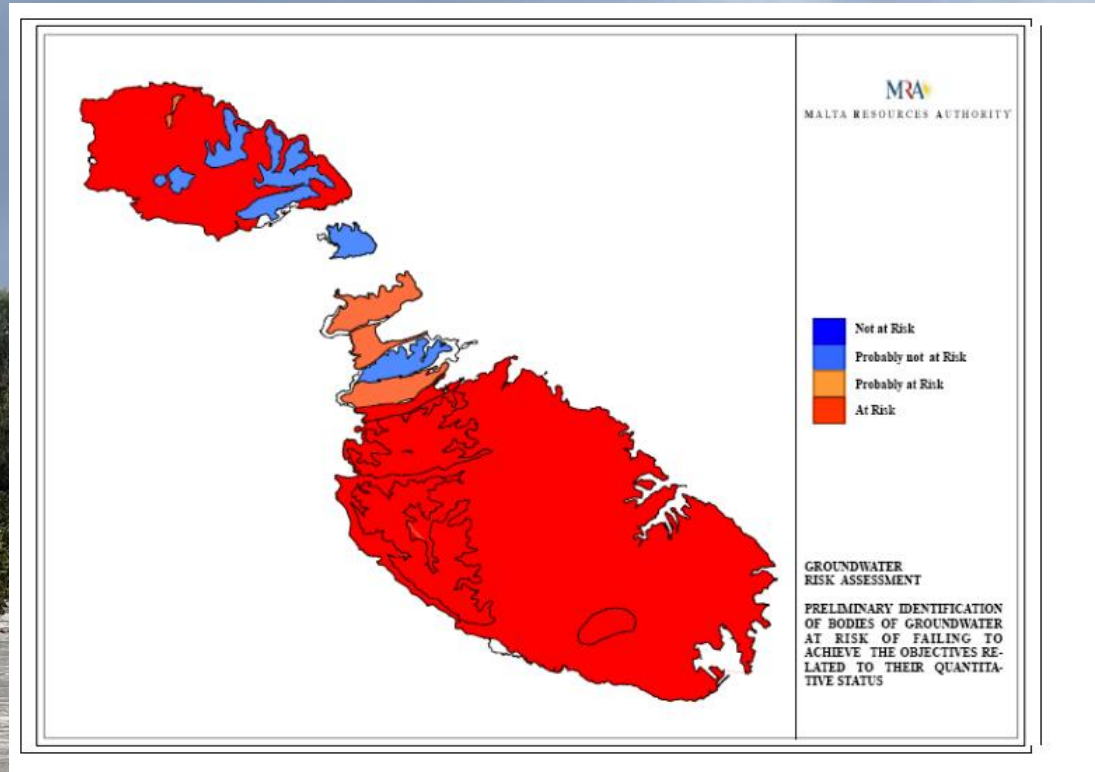




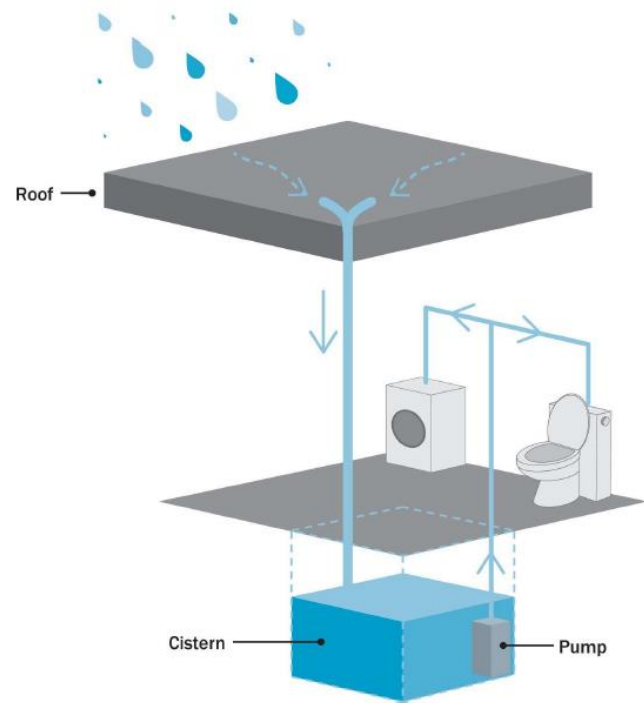




# Qualitative Status of the Maltese Aquifers



# GSI Techniques: Rainwater harvesting



**Table 10: Size of well or cistern**

Building Type	Size of cistern (m <sup>3</sup> )
1. Domestic dwellings (inc. Apartment blocks)	Total roof area (m <sup>2</sup> ) x 0.6m
2. Hotels, Schools, Offices, Factories, Industrial buildings and Hospitals	Total roof area (m <sup>2</sup> ) x 0.6m
3. Shops and showrooms, and places of public gathering and entertainment not integrated in 2 above	Total roof area (m <sup>2</sup> ) x 0.45m
4. External paved areas (inc. open terraces and balconies) *	Total paved area (m <sup>2</sup> ) x 0.6m
<b>*Note:</b>  This requirement applies only if the total open paved area is greater than 300sq.m	



*Runoff Volume (cubic metres) =*

*[Runoff Coefficient] x [precipitation, in metres] x [catchment area in metres squared]*

**Runoff Coefficients for Different Cover Types**

Roof	0.9
Asphaltic and concrete road	0.85
Pervious pavement (concrete blocks)	0.4
Gravel Road	0.7
Paved areas	0.9
Flat grass	0.15
Grass on medium slope	0.2
Grass on steep slope	0.25
Garigue	0.15
Green roofs, intensive	0.35
Green roofs, extensive	0.65
Terraced fields	0.1
Urban soils	0.2
Unused bare land	0.25

**Case Study 1A: 4-person occupied Townhouse without a garden, 140 m<sup>2</sup> roof area, rainwater used for flushing toilets and laundry**

Supply > demand, Optimum cistern capacity = 15.1 m<sup>3</sup> (equivalent to 'Doc F factor' of 0.11 based on cumulative summer deficit), 70% utilisation of collected runoff, 30% surplus runoff.

**Case Study 1B: 4-person occupied Townhouse with 70 m<sup>2</sup> garden, 140 m<sup>2</sup> roof area, rainwater used for flushing toilets, laundry and irrigation**

Demand > supply, Optimum cistern capacity = 23.5 m<sup>3</sup> (equivalent to a 'Doc F factor' of 0.17 based on cumulative surplus), Full utilisation of collected runoff.

# Applicability of GSI Techniques

			<i>All systems can help reduce downstream flooding</i>	<i>All systems require maintenance</i>
			<i>Systems can be combined</i>	<i>All systems need an overflow</i>
Chapter Reference	Name	Description	Pro	Con
8.01	<i>Rainwater Harvesting</i>	Direct storage and re-use	Minimum loss of water	Weight and Volume - Expense; normal location below ground (excavation issues)
			Traditional & legal Doc F requirement	Ownership & management issues of both catchment & water in multi-owner sites
			Minimal treatment at catchment; first flush management	
			Helps with peak flow lopping	
8.02	<i>Green Roofs</i>	Vegetation on top of structure	Water absorption 60% - 90% of low flow events	Weight – minimum 15 cm engineering medium & waterproofing of supporting structure
			High potential amenity value & thermal absorption	Reduction of trafficable (paved) space



# Action A8

## Catchment Modeling

Aims to:

“to develop a long-term vision  
for the protection,  
conservation and  
rehabilitation of Malta’s  
valleys”

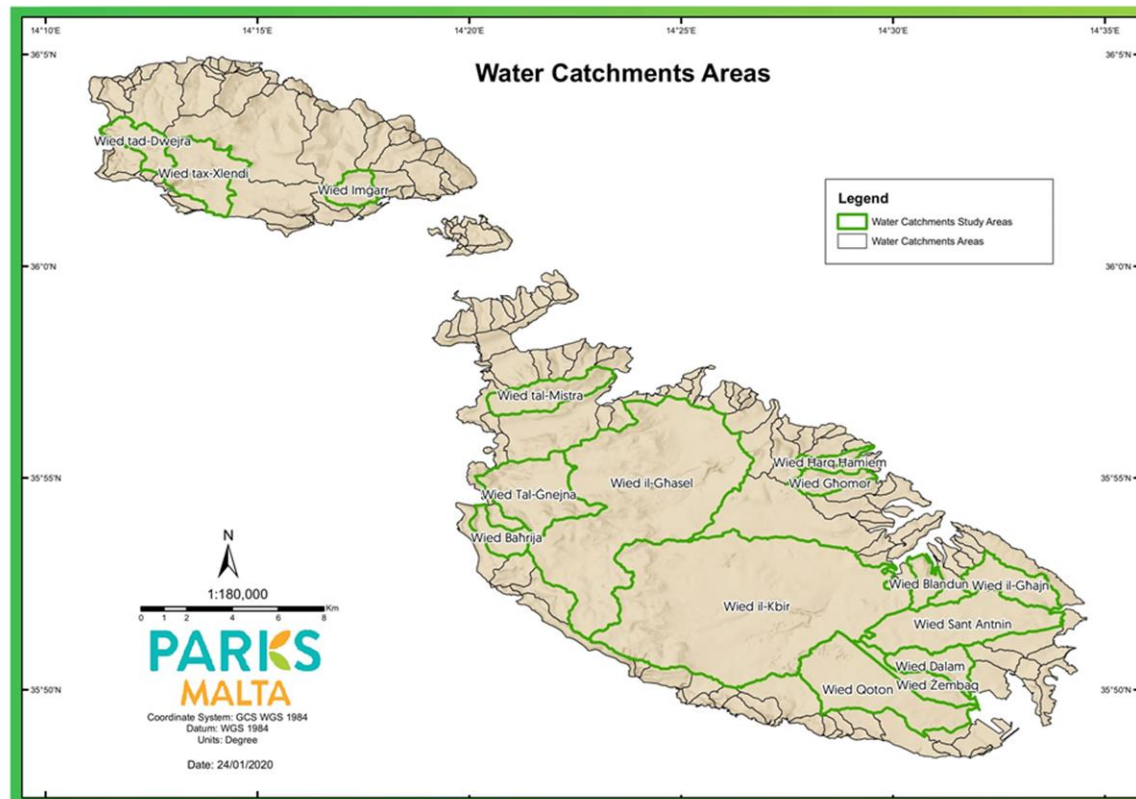


Feeds into:

### Action C9:

Pilot valley management projects in Malta & Gozo







## Action A8

### Steps taken



**Desktop studies** were conducted to identify existing information



Data gaps filled through **field surveys**



**Geographic Information System** developed by combining the outputs of the above



**Ecosystem services** provided by the study; catchments were identified and mapped



**Catchment categorisation** system developed in order to identify their relative importance



**Master plans** and **technical guidelines** used to develop management options



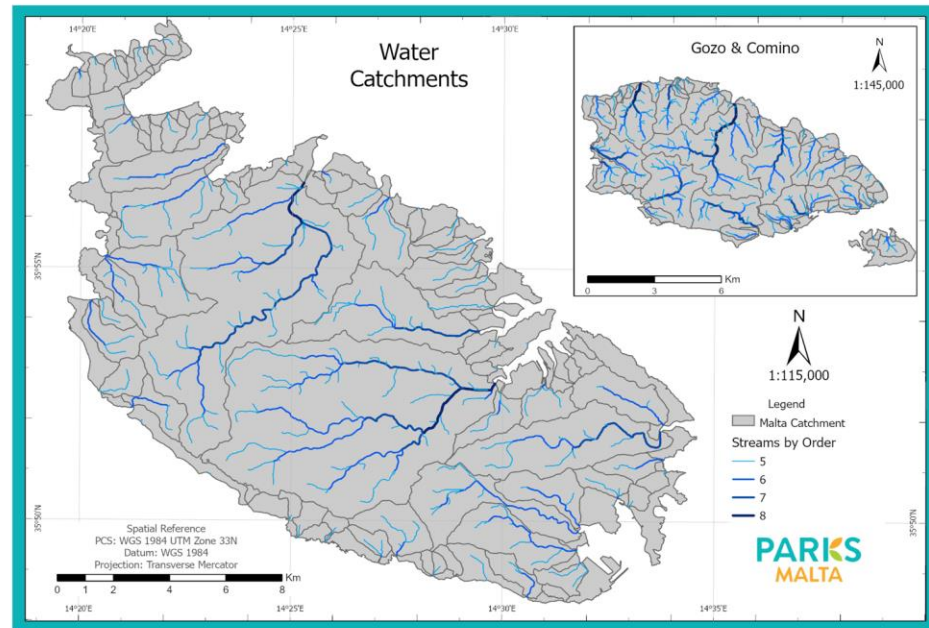
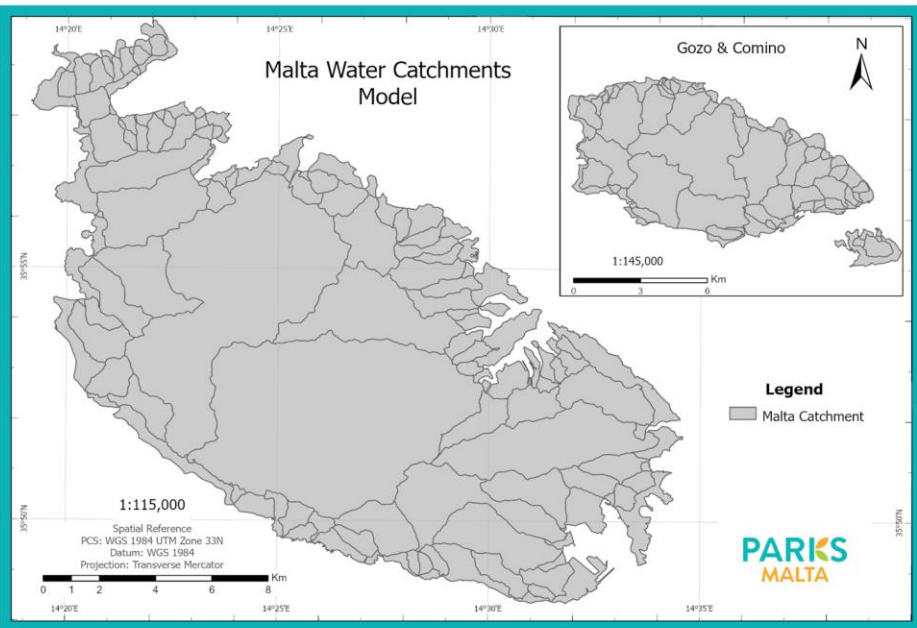
**Publishing** of an **edited book** on valley resources and ecology



# Results obtained and utilized



# The catchment model

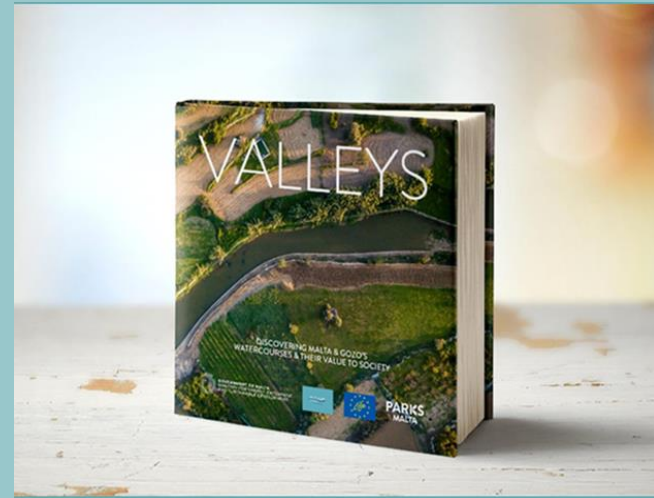




# Masterplans



# Book



# Master Plans

## General structure and information

Includes:

- **Identification** of all sub-catchments situated in the main catchment and any information related to the catchments
- An **analysis** of the **pressures** and **issues** related to the catchments such as anthropogenic interferences and disturbance from invasive and alien species



## Strategic direction and objectives

Includes:

- Actions that have already been taken as well as actions and suggestions on the **monitoring, maintenance**, and rehabilitation of the catchments
- **Monitoring** programmes



# Published Book

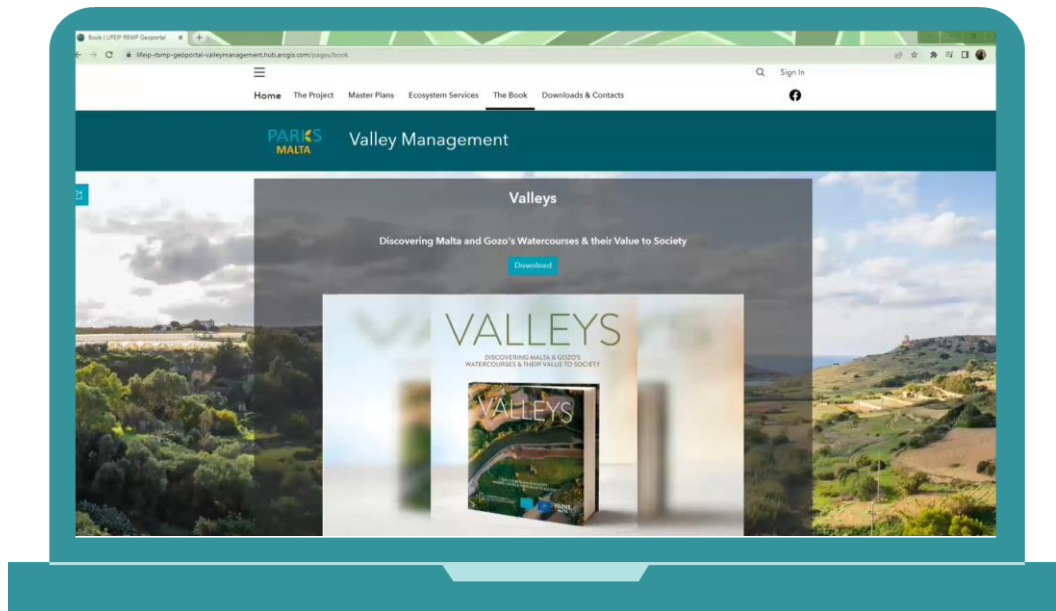
The edited coffee table book was designed with the aim to **increase public awareness** of ecosystems found in valleys as well as their environmental and social value.

## Topics discussed;

- Vegetation hotspots
- Mapping of valleys (Catchments & Sub-catchments)
- The importance of valleys for birds and other fauna
- Analysis of the Great Reed (*Arundo donax*)

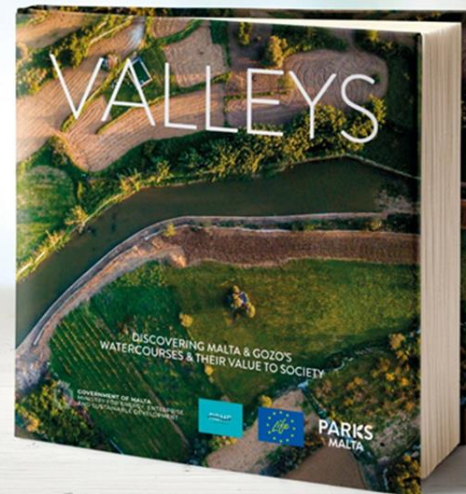






# VALLEYS

DISCOVERING MALTA & GOZO'S  
WATERCOURSES & THEIR VALUE TO SOCIETY



GOVERNMENT OF MALTA  
MINISTRY FOR THE ENVIRONMENT,  
ENERGY AND ENTERPRISE



**PARKS**  
MALTA



**SCAN ME!**

Masterplans are being **utilised** as a baseline for the creation of technical applications that contribute to valley **rehabilitation** and **management**.

Furthermore, the edited book was **distributed** to every public library in Malta and Gozo to further **increase communal access** towards **aiding** in the **understanding** of the ecology, hydrology, and geology in **local valleys**.



# Action C9

## Valley Management Plan

This action is intended to setup **pilot projects** both in **Malta** and **Gozo** to serve as case studies to monitor the effectiveness of the **guidelines** provided in the **master plans** developed in **Action A8**.





# Site Selection Criteria

Criteria	Indicator	Value
Diversity	No. and Area of Habitat Subtypes	no. and km <sup>2</sup>
Diversity	No. of Notable Tree Species	no.
Fragility	Undefined	Undefined
Naturalness (Inverse)	Length of Channel Modification	km
Naturalness (Inverse)	Length of Barriers	km
Naturalness (Inverse)	Urban Area	%/km <sup>2</sup>
Naturalness (Inverse)	Presence of Alien Species	%/km <sup>2</sup>
Non-recreatability	Undefined	Undefined
Proximity to important sites	Distance to sites of conservation importance	km
Site designation	List of site designations	no.
Rarity	Proportion rare habitats on an international and local level	% or km <sup>2</sup>
Size	Area in metres squared. Minimum 15,000m <sup>2</sup>	m <sup>2</sup>
Typicalness	Undefined	Undefined
Accessibility	Category (Full access, Small vehicles, On Foot, None)	category type
Connectivity	No of Barriers or length of 'Relic Channel' Flow Obs and Gaps	no / km
Stakeholders	Are there stakeholders that can form part of implementation agreements?	Yes/No
Pressures	Hunting, Dumping, Inaccessible (Private Signs)	category type
State of Infrastructure	Barriers Layer	Condition Class

# Pilot Project Malta



**Wied tal-Isperanza**  
which is a sub-  
catchment of Wied il-  
Għasel



# Wied tal-Isperanza





# Pilot Project Gozo



**Wied tal-Grixti** which is part of the Xlendi Catchment

## Wied tal-Grixti



# Water Monitoring



**Monthly water testing** to analyse **water quality** via pH, Dissolved Oxygen, Ammonium ( $\text{NH}_4$ ), Nitrates ( $\text{NO}_3$ ), specific conductance, conductivity, salinity, temperature, barometric pressure

Monitoring and analysis of **phosphate testing**

**Macroinvertebrates** analysis

- Identification
- Quantification



## Water Monitoring- Observed Results

April 2022

Site	BAR AVG	pH AVG	DO AVG	NH4 AVG	NO3 AVG	AVG Cond.	AVG Sp. Cond.	AVG SAL	AVG Temp
XL_07	101.795	8.0325	5.925	3.15	78.6	2.01175	2339.25	1.21	17.65
XL_11	101.445	7.9925	7.99	2.05	66.95	4.23075	5009	2.705	16.875
XL_04	102.075	8.4025	9.33	1.8	96.6	2.043	2373.5	1.225	17.725
XL_06	101.988	8.33	11.136	1.766667	107.85	1.9552	2299.8	1.19	17.14

## June 2022

Site	BAR AVG	pH AVG	DO AVG	NH4 AVG	NO3 AVG	AVG Cond.	AVG Sp. Cond.	AVG SAL	AVG Temp
XL_04	102.07	7.75	16.895	2.75	NO3 probe malfunction	2.0905	2287.5	1.18	20.5
XL_06	102.025	7.83	12.06	1.9		2.03	2230.5	1.15	20.3
XL_07	101.805	7.85	5.04	2.9		2.016	2238	1.15	19.8
XL_11	101.485	7.885	5.485	2.95		5.9355	6100	3.32	23.6
					NO3 probe malfunction				



# Expected Results

Rehabilitation and maintenance of the pilot sites through the **removal of invasive and alien species**, **cleaning** of the valley from any waste, and **planting** of riparian galleries.

The interventions proposed are **aimed** to make Maltese valleys **more accessible** thus more **open spaces** which result in a **better quality of life**.

The **results** from action A8 and action C9 aim to set forth **nature based solutions** as well as **more awareness** and **appreciation** of the limited water resources found on our island, so the public can better **understand** the importance of water conservation.



# Thank you!



LIFE IP Programme 2014-2020

LIFE 16 IPE/MT/000008 - *"Optimising the implementation of  
the 2nd RBMP in the Maltese River Basin District"*

Co-financing rate: 60% European Union, 40% National Funds

