Oroklini wetland restoration in Cyprus

Year of issue

2025

Summary

Oroklini Lake lies near Larnaca within Oroklini village. The wetland was modified in the mid-1940s to promote desiccation for health reasons. NWRM actions aimed to retain water and restore habitats for two key breeding species (Black-winged Stilt, Spur-winged Lapwing) and wider biodiversity, including small hydraulic works in the upper basin.

In 2012–2014 the LIFE “Oroklini” project restored and managed the site (water-level management, nesting islets, fencing and visitor facilities), and it was later recognised as a Best LIFE project (2018).

Since 2014, After-LIFE management continues: monthly waterbird counts and nesting surveys, predator monitoring, reed control, and operation of water-control structures to release excess water during floods; bird-collision “diverters” were also installed on power lines.

Recent science characterises Oroklini as a brackish lake (mean salinity ~7.4‰, ≤20‰) with occasional high phytoplankton abundance, influenced by catchment dominated by artificial and agricultural land uses, nformation valuable for water-level and vegetation management.

Under LIFE IP “Pandoteira” (2023–2029), measures relevant to Oroklini include access management to reduce disturbance, water-level plans, reed management and control of non-native predators.

A local issue flagged in late-2023 concerns an upstream runoff channel to the lake that has not been cleaned for decades, raising flood-risk and maintenance needs.

Photo Gallery



Location

34.967222, 33.650833

Project

NWRM

National ID

Cyprus_03

Sector

Hydromorphology

Installation Date

2012

Implementation status

Completed

Contact

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Overview

Location of the project

Oroklini lake is a small shallow brackish lake located close to the coast of Larnaca, within the Oroklini municipality premises.

Country

Cyprus

NUTS2 Code

Κύπρος (Kýpros)

Sponge measures implemented in the case study

Wetland restoration and management

Objectives

Bring target birds to favourable conservation status and adopt a legally binding Action Plan for the SPA.
Species targets (FRVs) set in the management plan: Spur-winged Lapwing Vanellus spinosus: 15 breeding pairs; Black-winged Stilt Himantopus himantopus: 60 breeding pairs.
Habitat target: maintain ~53 ha of halophytic communities in favourable condition (SCI 53.47 ha; SPA 56.43 ha).
Works & measures: water-management (sluice repair/re-connection of basins), creation of nesting islets, fencing, removal of invasives and planting natives, plus visitor facilities (two hides, information kiosk) and awareness actions.

Involved partners

Authority type	Authority name	Authority role	Comments	Authority responsibility
NGO	BirdLife Cyprus	Determination of design details of the measure	—	Responsible
Other	Game Fund Department	Monitoring	Dept of Ministry of Interior	Supporting
Local water authority	Oroklini Community Board	Implementation	Local Authority	Responsible
National water authority	Department of Environment	Monitoring	Dept of Ministry of Agriculture, Natural resources and Environment	Supporting

Documents

cs-cy-01-final_version.pdf (1.89 Mo)

Site Information

Climate Zone

Warm temperate dry

Precipitation

351.50 mm

Temperature (°C)

19.60 °C

Evapotranspiration

2259.00 mm

Runoff

0.01 mm

Runoff coefficient

0.45

Imperviousness

45.00 %

Elevation range

1 m

Slope range

2-5%

Soil type

Solonchaks

Vegetation class

Reedbeds and halophytes

WFD Ecological status

Unknown

WFD Chemical status

Failing to achieve good

Design and Implementation

Project scale

Micro

Project scale specifications

Small wetland

Project area

295

Project area specifications

The catchment area of the lake is 295 hectares. This can be divided to:
- 6 hectares of the upper basin were water is retained
- 31.5 hectares of the lower basin
- 257.5 hectares the catchment basin of the lake

Area subject to Land use change or Management/Practice change (ha)

91.00 ha

Size

91.00

Size unit

m2

Basis of design

100-year storm

Principles

The measures were designed bearing in mind the ecosystem functions and species needs, the achievement of good water quality, the implementation of time-resilient measures and the creation of wetland conditions highly acceptable by the public.

Constraints

Constraints are: urbanization of the area surrounding the lake and demand for new road crossings. Similarly, the urbanization and lack of sewage network causes deterioration of quality of surface water, and future changes of its quantity.

Favourable preconditions

The lowland features of the area and its location favorable to certain bird species and the presence of surface runoff as well as the state ownership of the area are excellent preconditions.

Financing

Total cost

1050000.00 €

Total cost information

The measure is under study. The full investment will be evaluated after the completion of all relevant studies

Costs investment information

The measure exists only partly. On going studies aim to design in full the NWRM and management of the wetland. Full capital cost is still not known

Costs capital

1000000.00 €

Costs operational

25000.00 €

Costs operational information

The costs will be known once the full management plan including necessary monitoring is established. These might involve analyses of water, fauna observations, assistant†™s visit to check water level recorder and other installations.

Costs maintenance

25000.00 €

Costs maintenance information

Expenses will be identified after completion of NWRM design. Additional costs will involve protection of quality of water flowing to the wetland due to urbanization and encroachment of urban development.

Information on Economic costs additional

The measure exists only partly. On going studies aim to design in full the NWRM and management of the wetland. Full capital cost is still not known

Administrative annual cost information

The measure involved studies on the Management Plan of the Natura site, a Life Project for the full evaluation of the wetland and its sustenance, a Hydrologic study for operation of the lake and the wetland etc. Expenses will be determined later.

Financing authorities

Authority name	Type of funding	Financing share
European Union	EU-funds: LIFE+	50 %
—	National funds	50 %

Compensations

Non

Policy and Governance

Policy description

Several hydraulic measures were applied in the mid 40’s in order to desiccate the Oroklini lake due to health concerns such as malaria, as well as other mosquito-borne diseases. These measures included the creation of drainage canals, plantation of Eucalyptus sp. and Acacia sp. trees in the area, the earth fill in parts of the lake for cultivations expansion and the creation of an earth embankment of 292m long in order to restrain water in the upper lake basin. The above led to ecosystem degradation and therefore management measures were considered urgent, in order to retain water quantities and restore the wetland.
As part of the wetland restoration, water retention measures were aiming at secure water availability in the upper basin of the lake and maintain high water level in order to facilitate the needs of avifauna, instead of flowing and spreading in the lower, larger basin, thus creating small ponds that would dry up in a short time.

Land ownership

The wetland core is public/state land, restoration included the reclamation of public land from agriculture.

Policy targets

Improved Biodiversity

Oher Societal Benefits

Peak-flow reduction

Oher Societal Benefits

Target remarks

Regulation of hydrological cycle and water flow

Regulation of the chemical status of freshwater

Natural assimilation (purification) of effluents through dilution, dispersion, and physic-chemical processes

Restore ecosystem habitats, functions and support biodiversity.

Policy pressure

Directive	Relevant pressure
WFD identified pressure	Degradation of physicochemical and ecological status of the water body.
Other EU	Habitats directive : Important habitats degradation
Other EU	Birds Directive: Species and their habitats degradation

Policy impact

Directive	Relevant impact
WFD identified pressure	Alteration of ecological and physicochemical status
WFD identified pressure	Altered habitats due to morphological changes
Other EU	Habitats directive : degradation of important habitats
Other EU	Birds’ directive: degradation of bird species populations and their habitats.

Requirement directive

Requirement directive	Specification
WFD-achievement of good ecological status	—
WFD-achieving objectives for Protected areas	Enforce the community mandates for protected areas
Other EU	Habitats directive : Preservation of important habitats
The Birds and Habitat Directives	Birds directive: Preservation of important bird species and their habitats

Policy challenges requirements

The "Cyprus’s Biodiversity Strategy Action Plan" is in line with the "EU Biodiversity Strategy" and the "Global Biodiversity Strategy". It aims at "halting the loss of biodiversity and the degradation of ecosystem services by 2020, and restoring them in so far as feasible, and in parallel strengthen Cyprus’ contribution to averting global biodiversity loss". The current project aimed at restoring Oroklini lake in order to provide the appropriate habitats for two target species, in order to sustain their populations.

Part of a wider plan

Non

Public consultation

Oui

Has contractual arrangements

Oui

Impacts and Monitoring

Monitoring System

Monitoring parameters

No specific monitoring needs. Monitoring can be commenced for water level, water quality, species and habitats in order to better understand ecosystem processes and apply better management practices.

Maintenance

Maintenance requirements

Reed beds management in order to avoid abstraction of the inflow streams and the wetland encroachment by reed beds

Impact Assessment Methodology

Performance impact assessment method

Catchment outlet

Performance impact estimation information

A monthly water operation study of the Oroklini Lake, under scenarios of drought, average and wet conditions was carried out on the basis of the hydro-climatological conditions of the years 1968 to 2011. This was used to evaluate impact on fauna.

Biophysical impact assessment method

Comparison of pre- and post- measures application.

Socio-economic Impacts

Direct benefits information

Leisure area within an urban environment. Educational area for young people.
Elevated amounts of water and for a greater period have resulted in increased biodiversity in the area and especially increased numbers of wading birds. This has raised the public interest for the wetland and mild tourist activity has been observed.

Biophysical impacts: Hydrology

Retained water

7.10

Retained water unit

mio m3/month

Information on retained water

In an average year the lake created by the dam is dry in June, July, August and September. The lake is full for the rest of the months except of May (nearly half full) and October (nearly full). Spills maintain wetlands downstream the dam

Increased water storage

0.02

Increased water storage unit

mio m3/month

Information on increased water storage

The water stored in the lake created by the retention dam in an average year is 0,017 million m3 per month. The wetland collected certain, reduced, quantities of water for some periods of the year which soon evaporated

Runoff reduction

6600.00

Runoff reduction unit

m3/month

Information on runoff reduction

The average monthly water reduction by the NWRM is estimated to be of the order of 6600 m3. The control could be higher if the controlled releases to the downstream wetlands are considered.

Information on increased infiltration

Infiltration rate over 3mm/h

Information on Restoring hydraulic connection

Although a temporal lake, water was present in the lake until September; i.e. 1-2 month more than previous years.

Biophysical impacts: Biodiversity

Improved biodiversity

Oui

Information on improved biodiversity

The conditions in the area where two very important birds included in Annex I of EU Directive on Birds (Vanellus spinosus and Himantopus himantopus) nest, are greatly improved. The lake hosts some 186 kinds of which 69 are included in the Directive.
Nesting Spurwinged Lapwing and Stonecurlew were recorded on the restored field. First record of Little Egret nesting. Kentish Plover nests. The last breeding record was in 2007. Cattle Egrets nested for the first time. On nesting islets created Spurwinged Lapwings nested. Eels were observed in the lake for the first time.
Hydrology & plankton: 2018–2019 monitoring across Cyprus’s natural lakes found Oroklini is brackish (salinity ~3–20.4‰) and had the highest phytoplankton richness (27 taxa) among the lakes studied; abundance varied widely seasonally. This refines lake functioning post-works.

Biophysical impacts: Water & Soil Quality

Water quality overall improvements

Positive impact-WQ improvement

Information on water quality overall

The presence of stored water reduces the salinity of the water. Increased water residence was observed in 2014. The lake was flooded during summer despite the low precipitation.

Soil quality overall improvements

Neutral impact-no change in SQ status

Information on soil quality overall improvements

No impact on soil quality is observed or expected.

Ecosystem erosion control

Oui

Biophysical impacts: Others

Ecosystem impact climate regulation

No specific impact

Information on ecosystem impact climate regulation

Very minor impact might be expected on climate regulation.

Lessons Learned

Key lessons

Proper water management with small scale measures can restore wetlands within urban areas for furthering nature conservation objectives such as wet grassland conditions for breeding rare birds. This at the same time may offer minor flood protection.
Small, targeted water-management and habitat works can rapidly restore breeding conditions for priority waders in an urban fringe wetland, provided governance and long-term management are in place.
Quantified conservation targets (FRVs) & a binding Action Plan help keep focus after LIFE funding ends.
Monitoring shows progress and gaps: while bird/habitat targets are structured, water-quality pressures at catchment scale persist and need cross-sector action beyond the site fence.
People & access matter: facilities and outreach increased the site’s profile and support, but surrounding development and drainage infrastructure must be actively managed to avoid undermining gains.

Barriers

Barrier type	Barrier role	Comments
Attitude of relevant stakeholders	Main barrier	Land owners within and peripheral areas

Drivers

Driver type	Driver role	Comments
Organisation committed to it	Main driver	Dept. of Environment, BirdLife Cyprus, Game Fund, Local Village Council

Success factors

Success factor type	Success factor role	Comments
Attitude of decision makers	Main factor	Insistence and pressure by Department of Environment , BirdLife Cyprus and Game Fund
Financing possibilities	Main factor	Financial support by LIFE under the project LIFE10 NAT/CY/716

Flexibility / Adaptability

The baseline conditions present in this case study were the dry conditions and desiccation of the lake due to water management measures taken in the past, the presence of alien species and the wetland encroachment by locals. Therefore targeted measures were taken in order to deal with these conditions. These measures can be adapted to different conditions depending on these conditions nature. For instance increased flows can be tackled by the current works.

Transferability

This application can be selected in lake ecosystems which have been degraded due to bad water management practices and/or have been degraded by decreased water inflow. Additionally the creation of retention ponds can be serve with similar measures such as the creation of embankments and weirs. The restoration of riparian buffers can be realized also by removing alien species and planting native plants. Reclamation of floodplain is another associated measure that can be used in other occasions.

Basin characteristics influence

The urban expansion in the drainage basin of the lake, increases point and diffuse pollution sources and other pressures. It can have adverse effects on the wetland quality, affect the measures effectiveness on biodiversity and water purification.

Sources

Sources

Determination of important hydrological features for Oroklini Lake† Project LIFE10 NAT/CY/716 for BirdLife Cyprus as Beneficiary.

Hydrology Report Oroklini Marsh, Cyprus

Preparation of a Management Plan for the Oroklini Lake (in Greek)

Proposal for the Development of the Oroklini Lake (in Greek)

Restoration and Management of Oroklini Lake SPA (CY6000010) in Larnaka, Cyprus / LIFE10 NAT CY 000716 - PROJECT'S WEBSITE

Oroklini Project – “Oroklini Lake: An important wetland rich in biodiversity”