NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS
SCHOOL OF SCIENCE
FACULTY OF BIOLOGY
DEPARTMENT OF BOTANY

Conservation of priority forests and forest openings in "Ethnikos Drymos Oitis" and "Oros Kallidromo" of Sterea Ellada
LIFE11 NAT/GR/1014 - "ForOpenForests"

ACTION A.3.
Determination of vegetation structure and
of flora and fauna composition and phenology
in the Mediterranean temporary ponds (3170*)

DELIVERABLE A.3.3
Monitoring protocol for the temporary pond (3170*) plant communities

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ΕΘΝΙΚΟ ΚΑΙ ΚΑΠΟΔΙΣΤΡΙΑΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ
ΣΧΟΛΗ ΘΕΤΙΚΩΝ ΕΠΙΣΤΗΜΩΝ
ΤΜΗΜΑ ΒΙΟΛΟΓΙΑΣ
ΤΟΜΕΑΣ ΒΟΤΑΝΙΚΗΣ

Διατήρηση δασών και ανοιγμάτων προτεραιότητας στον "Εθνικό Δρυμό Οίτης" και στο "Όρος Καλλίδρομο" της Στερεάς Ελλάδας
LIFE11 NAT/GR/1014 - "ForOpenForests"

ΔΡΑΣΗ Α.3.
Καθορισμός της δομής της βλάστησης και της σύνθεσης και της φαινολογίας της χλωρίδας και της πανίδας στα Μεσογειακά εποχιακά λιμνία (3170*)

ΠΑΡΑΔΟΤΕΟ Α.3.3
Πρωτόκολλο παρακολούθησης των φυτοκοινοτήτων των εποχιακών λιμνίων (3170*)

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SUMMARY

The monitoring objectives for the plant communities of the temporary ponds (3170*) are in the framework of the project ForOpenForests are:

- Assessment of the results of conservations actions C.1, C.3, and C.4 (action D.1).

- Assessment of the conservation status of the habitat and the long term results of the conservation actions (after-LIFE monitoring).

The main monitoring parameters for assessing the conservation status of a habitat according to the requirements of Directive 92/43/EEC are: distribution and range, area, structures and function including the typical species, and conservation potential (pressures and threats). The same parameters can be used as indicators of the success of the conservation actions.

For the ponds of the project sites monitoring will include the following:

- Habitat mapping including plant community identification (after-LIFE).

- Vegetation transects (D.1). A less intensive scheme must be designed for after-LIFE.

ΠΕΡΙΛΗΨΗ

Οι αντικειμενικοί στόχοι της παρακολούθησης της των φοιτοκοινοτήτων των εποχιακών λιμνίων στο πλαίσιο του έργου ForOpenForests είναι:
- Εκτίμηση των αποτελεσμάτων των δράσεων διατήρησης C.1, C.3, και C.4 (δράση D.1).
- Εκτίμηση της κατάστασης διατήρησης του οικοτόπου και των μακροπρόθεσμων αποτελεσμάτων των δράσεων διατήρησης (παρακολούθηση μετά το LIFE).

Οι κύριες παράμετροι παρακολούθησης για την εκτίμηση της κατάστασης διατήρησης ενός είδους σύμφωνα με τις απαιτήσεις της Οδηγίας 92/43/ΕΟΚ είναι: κατανομή και εύρος εξάπλωσης, έκταση, δομές και λειτουργίες συμπεριλαμβανομένων των τυπικών ειδών και προοπτικές διατήρησης (πιέσεις και απειλές). Οι ίδιες παράμετροι μπορεί να χρησιμοποιηθούν και ως δείκτες για την εκτίμηση της επιτυχίας των δράσεων διατήρησης.

Στην περίπτωση της *Veronica oetaea*, λόγω του πολύ μικρού μεγέθους και της εξειδίκευσης του φυτού, του προτύπου κατανομής του στα λιμνία, του πολύ μεγάλου αριθμού ατόμων, και της σημαντικής διακύμανσης του μεγέθους του πληθυσμού και της χωρικής κατανομής, προτείνεται να παρακολουθούνται ετήσια:
- Χαρτογράφηση οικοτόπου συμπεριλαμβανομένης της αναγνώρισης του οικοτόπου (μετά το LIFE).
- Διατομές βλάστησης (D.1). Λιγότερο εντατική παρακολούθηση θα πρέπει να σχεδιαστεί για μετά το LIFE.

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1. Monitoring objectives and parameters for the plant communities of habitat 3170*

At the project site of Mt. Oiti there are four temporary ponds which correspond to habitat 3170*: Livadies, Greveno, Alykaina and Louka. At the project site of Mt. Kallidromo there are three temporary ponds which correspond to habitat 3170*: Nevropoli and the two small neighnouring ponds Mourouzos and Mouriza.

Monitoring of temporary ponds within the project ForOpenForests has two main objectives:

- Assessment of the results of the conservation measures of actions C1 (fencing of the perimeter of the ponds), C3 (additional fencing to preclude grazing at part of the ponds), and C4 (restoration of the biotic communities) on the plant communities of the ponds. This corresponds to monitoring within the LIFE project in the frame of action D.1.

- Assessment of the conservation status of the plant communities of the ponds including the long-term results of the conservation actions C1, C3, and C4. This corresponds to after-LIFE monitoring.

The main monitoring parameters for assessing the conservation status of a habitat in terms of the Directive 92/43/EEC and the relevant reporting (Article 17) by member states are (Evans & Arvela 2011):

i. Diistribution and range of the habitat (expressed in 10x10 grid).

ii. Area of the habitat.

iii. Special structures and functions of the habitat, including the typical species.

iv. Conservation potential (as assessed by the impacts of threats and pressures on the area and stuctures and functions of the habitat).

The above parameters were used during the base study of the temporary pond plant communities (actions A.2 and A.3) and can also be used as indicators of the success of the conservation measures within the LIFE project.

The significant interannual variation in the spatial distribution and abundance of the flora species in the absence of any restoration inteventions poses difficulties in the assessment of the results of the restoration actions in the short term. Monitoring should be intensive and long term in order to produce reliable results. On that count, the application of the surveying methodology used in action A.3 will be advantageous since there will be direct comparison with the existing data. In addition, coupling with meteorological data is important in order to assess at least part of the variation of the monitored parameters due to stochastic events.

Distribution and range

Distribution is defined as the number of grid cells where a species occurs and range is an envelope including these cells. For habitats in Greece a 10x10 grid has been used, bit this has little meaning in monitoring in the case of the temporary ponds of the project sites since the have a small area and occupy one 10x10 grid cell on Mt, Oiti and one 10x10 grid cell on Kalliidromo, so even if one of the ponds dissappers the distribution and range will not change.

A 1x1 grid would be appropriate for this habitat. Monitoring of distribution and range only needs the confirmation of the existence of the typical temporary pond communities at the known or other sites. This includes plant community identification which means at least recording of the typical species.

Distribution and range do not change in the short term (except in case of catastrophic events). Their assessment is an object for after-LIFE monitoring.

Area

The use of a current satellite image combined with ground truthing is an adequate methodology for mapping and monitoring the area of any habitat. Ground truthing includes plant community identification.

Distribution and range do not change in the short term (except in case of catastrophic events). Their assessment is an object for after-LIFE monitoring.

Structures and functions including typical species

The assessment of the structures and functions of temporary pond communities includes monitoring of important abiotic and biotic factors.

Abiotic factors are related to hydrology (water depth, duration of wet and dry ecophase) and hydrogeochemistry and are ideally coupled with meteorological data mainly due to the fact that the ponds are rain fed and dependent on precipitation. The monitoring protocol of abiotic factors for the temporary ponds of the project sites is provided in the deliverable A.2.2.

Biotic factors include the plant and animal communities. Regarding the plant communities, spatial distribution and abundance of the species present significant interannual variation depending at a large degree on water depth and the duration of the wet ecophase. Recording the plants on transects scanning the pond area provides an adequately accurate picture of the spatial distribution and abundance of the plant species and their respective assemblages. It is a good method to identify changes which may not be evident when few and random vegetation plots are appliied. Assessment of the transect data should include coupling of the transect data with the data on abiotic factors by multivariate methods and the use of indices such as the number/abundance of typical species of the habitat versus the number of species of other vegetation units and the number/abundance of alien species versus the number of native species. This method is also capable to assess the success of restoration procedures (planting of typical species, removal of aliens, effects of grazing) since it will provide data on the adundance and spatial distribution of the species planted at or removed from each site and on the status of plant communities with or without grazing.

The above described monitoring methodology is intense, time consuming and expensive. It is certainly required within action D.1 but may not be appropriate for after-LIFE monitoring. Depending on the results of the restoration actions, a scheme with less intense sampling (e.g. 1 or 2 transects) should be designed.

Conservation potential

Pressures (current in the past 10 years) and threats (projected in the future) acting on the plant communities generally include natural or anthropogenic loss of habitat area, disastrous events as well as impacts of interspecific relationships such as competition, invasion or predation. The main pressures identified at the ponds of the project sites are grazing and trampling by animals and vehicles (Alykaina, Louka, Nevropoli, Mourouzos, and Mouriza). The effect of the restoration actions on these pressures will be assessed by monitoring for the structures and functions of the habitat.

2.   Monitoring protocol

Distribution, range, and area

Method: Aquisition of current satellite image and visit at all the ponds for plant community identication and recording of the boundaries of the habitat with GPS (point data).

Plant community identification by recording of all the plant species in 4x4 plots: 2 plots for Livadies, Greveno, Alykaina, Louka, Mourouzos, and Mouriza; 4 plots in Nevropoli. Plots should be places at the centre and at the margins of the ponds. Plant community identification is not necessary if vegetation monitoring by transects takes place.

Process of GPS and plant community data and construction of GIS map using the satellite image as a background. The results of plant community data should be assessed by an expert.

Timing: Every 3 years. Field work in early or late June on Mt. Oiti and in August or September on Mt. Kallidromo.

Man-days: Two days of field work for all ponds. Approximately four days of office work.

Vegetation transects

Method: Methodology as in Deliverable A.3.1. Setting of permanent transects at distances of 2 m throughout the area of each ponds Livadies, Greveno, Alykaina, Louka, Mourouzos, and Mouriza, and at distances of 20 m at the pond of Nevropoli. The permanent transects established in action A.3 will be used. At Louka new transects will be added between the existing ones. At Mourouzos and Mouriza the transects established in 2015 will be used and new transects will be added.

Recording of the cover-abundance of all plant species and total vegetation cover in 1x1 plots placed systematically along the transects at distances of 2 m in Livadies, Greveno, and Alykaina; at distances of 5 m at the pond of Nevropoli; and at continuous plots at Louka, Mourouzos, and Mouriza.

Timing: Annually, in early or late June on Mt. Oiti and in August or September on Mt. Kallidromo. Checking of the ponds every 15 days starting in late May is advisable.

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In general, the suitable period at Alykaina and Louka is usually 15 days earlier than in Livadies and Greveno and suitable period in Mourouzoa and Mouriza is a month earlier than in Nevropoli.

Equipment: Measuring tapes at least 50 m, printed protocol (Table 1 and Table 2) and stationery. For Nevropoli setting of transects also requires a 300 m rope. Equiment for the collection and storage of plant samples.

Man-days: Two people for 8 or 10 days, depending on the weather conditions.

Table 1. Protocol for vegetation transects at the ponds of Mt. Oiti.

Transect*	**A_____**	GPS file		**Pond Name***: Alykaina							
Author									Date		
Notes											
Plot No		A___	A___	A___	A___	A___	A___	A___	A___	A___	A___
Distance from start (m)											
GPS											
Plant cover %											
Carex ovalis											
Eleocharis palustris											
Elymus repens											
Erophilla verna											
Juncus compressus											
Juncus minutulus											
Limosella aquatica											
Lythrum portula											
Lythrum thymifolia											
Mentha pulegium											
Myosurus minimus											
Polygonum arenastrum											
Ranunculus lateriflorus											
Spergularia rubra											
Trifolium hybridum											
Trifolium repens											
Veronica oetaea											
Anthoxanthum odoratum											
Armeria canescens											
Campanula spatulata											
Centaurea nervosa subsp. promota											
Cerastium brachypetalum											
Convolvulus betonicifolius											
Cruciata pedemontana											
Dianthus tymphresteus											
Festuca jeanpertii subsp. achaica											
Festuca dalmatica											
Galium verum											
Hieracium cymosum											
Hieracium hoppeanum subsp. pilisquamum											
Leontodon cichoriaceus											
Lotus augustissimus											
Lotus corniculatus											
Luzula spicata											
Nardus stricta											
Phleum alpinum											
Plantago argentea											
Plantago holosteum											
Plantago lanceolata											
Poa bulbosa											
Poa trivialis											
Potentilla pedata											
Ranunculus paludosus											
Rumex acetosella											
Rumex crispus											
Trisetum flavescens											
Veronica arvensis											
Veronica serpyllifolia subsp. humifusa											

* Livadies Transect **L**, Greveno Transect **G**, Alykaina transect **A**, Louka Transect **K**

Table 1. Protocol for vegetation transects at the ponds of Mt. Kallidromo.

Transect* **N____**	GPS file				Pond Name*: Nevropoli					
Author							Date			
Notes										
Plot No	N__	N__	N__	N__	N__	N__	N__	N__	N__	N__
Distance from start (m)										
GPS										
Plant cover %										
Crypsis schoenoides										
Cyperus fuscus										
Heliotropium supinum										
Juncus articulatus										
Lotus angustissimus										
Mentha pulegium										
Verbena supina										
Crypsis schoenoides										
Cyperus fuscus										
Heliotropium supinum										
Juncus articulatus										
Lotus angustissimus										
Mentha pulegium										
Verbena supina										
Chara species										
Eleocharis palustris										
Ranunculus trichophyllus										
Veronica beccabunga										
Bellis perennis										
Juncus sp.										
Plantago lanceolata										
Potentilla reptans										
Rorippa sylvestris										
Trifolium fragiferum										
Trifolium repens										
Amaranthus species										
Centaurea solstitialis										
Cichorium intybus										
Cirsium vulgare										
Convolvulus arvensis										
Cuscuta campestris										
Cynodon dactylon										
Echinochloa crus-galli										
Echium italicum										
Eryngium campestre										
Geum urbanum										
Hibiscus trionum										
Lolium rigidum										
Portulaca oleracea										
Xanthium spinosum										
Parentucellia latifolia										
Bellis annua										

* Nevropoli Transect **N**, Mourouzos Transect **MO**, Mouriza Transects **MA**

3. Literature

Evans D., Arvela M. 2011 Assessment and reporting under Article 17 of the Habitats Directive - Explanatory Notes & Guidelines for the period 2007-2012 - Final Draft. European Topic Centre on Biological Diversity, p. 1-123.