UNIVERSITY OF THE AEGEAN

TERRACE SCAPE

LIFE TERRACESCAPE

"Μετατροπή των εγκαταλειμμένων τοπίων αναβαθμίδων σε πράσινες υποδομές μέσω συμμετοχικής επιστασίας γης για καλύτερη προσαρμογή στην κλιματική αλλαγή"

Δράση Α3
Σχέδιο Παρακολούθησης

Ιούνιος 2018

Το έργο LIFE16 CCA/GR/000050 υλοποιείται από το Πανεπιστήμιο Αιγαίου σε συνεργασία με τον Δήμο Άνδρου, το Πράσινο Ταμείο, το Εθνικό & Καποδιστριακό Πανεπιστήμιο Αθηνών, τον ΕΛΓΟ ΔΗΜΗΤΡΑ και το Εθνικό Αστεροσκοπείο Αθηνών, με την οικονομική υποστήριξη της Ευρωπαϊκής Επιτροπής.

UNIVERSITY OF THE AEGEAN · MUNICIPALITY OF ANDROS · GREEN FUND · HELLENIC REPUBLIC National and Kapodistrian University of Athens

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Executive Summary

The Monitoring Plan focuses on monitoring key ecosystem elements before and after the implementation of the Project. Elements include abiotic factors (microclimatic conditions, erosion, fire risk, and organic matter), biodiversity (reptiles, amphibians, mammals, soil invertebrates, pollinators, and plants), as well as ecosystem services (pollination, decomposition):

Microclimatic conditions

Small autonomous and automatic meteorological stations (total number: ~10) will be installed on selected terrace sites of Andros Island to record (micro-)climatic conditions. Several sites were inspected for potential weather station installation during field visits with due attention given to logistical considerations. These sites are currently evaluated; the final site selection is dependent on input from the Municipality of Andros. Installation of the stations is scheduled to take place over the coming months.

Automatic meteorological stations (~2) will contain sensors and a digital data-logger that are able to record all key meteorological parameters, including (a) air temperature and relative humidity, (b) wind speed and direction, and (c) precipitation. Additionally, small autonomous stations (~8) will record air temperature and relative humidity. These latter stations offer extended internal memory for data storage, but are not equipped with remote access for data collection. Therefore, manual downloads have to be scheduled during periodical visits every 2 months.

Erosion

In the framework of this project, the scientific team for erosion monitoring will record and map specific soil properties in the selected areas. In particular, the following soil properties will be recorded: a) soil depth, b) soil slope, c) rock fragments percentage, d) carbonates concentration, e) soil texture, f) degree of erosion, g) pedogenetic soil class, h) slope aspect and i) species and percentage of plant cover. The recording of the above mentioned features will be conducted at Soil Mapping Unit level using existing and recognized soil mapping systems. Then, after each major rainfall event, the degree of erosion will be estimated in the field according to observations of soil material losses at specific sites. At the same time in each soil erosion observation site, the percentage of vegetation cover will be recorded using a framework of regular square grid. After recording the degree of erosion, in the observations sites and for approximately three years, an assessment of the applied cultivation techniques will be carried out for estimating their impact on soil protection against erosion.

Fire risk

To estimate and map fire risk and predict parameters of fire propagation and behavior (e.g. rate of spread, flame length, fire line intensity), we will employ FARSITE (fire spread simulator) and point-based models such as BEHAVE (Fire Behavior Prediction and Fuel Modeling System). Site specific custom forest fuel models needed to run these models will derive from existing vegetation information, field sampling, Unmanned Aerial Vehicle (UAV) and Terrestrial Laser Scanner (TLS)

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data combined with additional high resolution remote sensing data. Specific parameters needed to describe the fuel models will be estimated from the best available method (e.g. field sampling, UAV, TLS). Most of these parameters e.g. fuel load, surface to volume ratio, moisture etc. will be measured on the spot (field sampling) supported by UAV, TLS and other remote sensing data in order to classify and map the whole study area to fuel models that is the basic input to fire propagation and behavior software. Fire propagation and behavior parameters will be estimated for selected areas in the 1st year and in the 4th year so that finally to estimate fire risk in the beginning of the project and in the end of the project.

Organic matter

Within the framework of the project, the impact of terraced cultivation and applied cultivation practices on soil quality, both on spatial and temporal basis, will be evaluated. The content of organic carbon as a measure of the presence of organic matter, is one of the most important parameters of soil quality and productivity as it affects soil structure, porosity, aeration, moisture retention, biodiversity, biological activity soil organisms and the availability of plant nutrients. Sampling sites for the assessment of organic carbon content in soils will be shared with those in which the other project impact indicators will be monitored. The first sampling will take place in the third quarter of 2018, before any intervention in the research areas, in order to capture the current status of the studied territories. Subsequently, sampling will be carried out once a year in the period 2019-2021, along with sampling for the assessment of other indicators. Soil sampling and pretreatment will be based on well-established protocols whereas the determination of organic carbon will be carried out using the classic Walkley Black method, as modified by Jackson (1958).

Biodiversity

The Biodiversity Research Group (UOA) will perform fieldwork surveys for the diversity and community structure of vertebrates (reptiles, amphibians, mammals) and invertebrates, before, during and after the cultivation of selected fields that are part of the project implementation. The aim is to examine the impact of the project's actions on the terrestrial biodiversity of the study sites. Three fauna experts (reptiles and amphibians, mammals, invertebrates) will undertake the field data collection and subsequent analysis. The first year's surveys have started in May 2018 and two more visits are expected to take place until October 2018. This first wave of surveys will depict the current composition of the focal animal groups and will be used as baseline data to evaluate the project's impact. All experts use the appropriate established survey methodologies of their field: line transects for reptiles and amphibians, Sherman traps for mammals, pitfall traps for invertebrates.

Pollinators, Plants and Pollination

In order to monitor the Project's impact on pollinators, plants and pollination, samplings (time, replication, methods, and protocols) will be carried out using the same methodology followed by the Laboratory of Biogeography & Ecology of UAEGEAN in many occasions. In particular, sampling will include the collection of pollinators (with pantraps and hand net), observation of plant–pollinator relationships, as well as the estimation of flower abundance and diversity for each

site. Identification of insects to species level will be completed at the Lab or insects will be sent to experts across Europe. Plant Identification will be performed by the Endemic Plant Expert. To evaluate pollination services two plants will be selected (one cultivated and one indigenous) and the pollination efficiency will be measured based on the comparison between seeds coming from hand-pollinated and unmanipulated flowers for each plant species. Important indicators are going to be estimated, concerning plant and pollinator α- and β-diversity and Plant–pollinator networks.

Decomposition – Soil microclimatic conditions

Decomposition rates are going to be estimated on seasonal and annual bases**.** The seasonal rates will be measured by estimating the rate of cellulose mass loss using meshes with filter paper. The meshes will be buried below ground (5cm) at least two times per year and after their removal the decomposition rate will be estimated based on the weight difference before and after. The annual decomposition rates will be estimated with the use of lignin sticks (wooden tongue depressors) based again on the weight difference. Moreover, in each sampling area a datalogger connected with two sensors that measure soil temperature and humidity will be placed near the cellulose and lignin specimens.

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