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ON THE WINGS OF KNOWLEDGE: THE POLYXENA CITIZEN SCIENCE PROGRAM

INTRODUCTION.

Natural Systems and Biodiversity are strongly influenced by human activities, but anyone could contribute to preserve them as a “citizen scientist”. Citizen science projects promote interest in and knowledge of science as well as public engagement in scientific research. POLYXENA Citizen Science Program consists in a three year informal science-education plan which involves volunteers in a true “participatory research project”. Different typology of participant are involved: local and neighbour cities dwellers, young volunteers, university science students, and disadvantaged social class members.

The project aims to acquire data on butterfly population structure, such as abundance and distribution of species, and detect any natural or anthropogenic environmental changes. In 2011 the efforts were focused on increasing knowledge on *Zerynthia polyxena* (Denis and Shif., 1775), as a target species.

Butterflies (Lepidoptera Rhopalocera) are often used to monitor the health of an environment or ecosystem. They can be defined “bioindicators”: as well as others *taxa*, their function, population, or status can be used to determine ecosystem or environmental integrity. In particular, butterfly population structure analysis can offer information about environmental complexity (or integrity) with the passing of time. In a Park this could be strategic to the management “good practices”.

South site: “CASTIGLIONE”



The south site chosen for the research project. The habitat consists in a wood hill with small patches of grassland. The white squared picture shows the sampling transect (the red line).

East site: “MONTEPAOLO”



The east site chosen for the research project. The habitat consists in a Mediterranean temporary pond in a typical agricultural and meadow patch. The white squared picture shows the sampling transect (the red line).

MATERIALS AND METHODS.

“On the wings of knowledge” is carried out in a Natural Reserve, nearby Conversano (Bari), in Apulia (Italy), protected by regional management measures since 2006, but this area is a sensible site for amphibians since 80s. The “Laghi di Conversano e Gravina di Monsignore” Regional Natural Reserve, 348ha wide, includes different habitats, such as Mediterranean Scrub, *Quercus ilex* wood, meadows and Mediterranean temporary ponds. These last one is a priority habitat under the Habitats Directive (92/43/CEE).

Though the Reserve has always been considered very important for reptiles, amphibians and migrating birds, in the last years it could be possible assert that it represents a crucial “hot spot” for insect biodiversity.

In 2007, the first investigation about butterflies (Lepidoptera Rhopalocera) was carried out, within the Reserve, by University of Bari (Apulia). Four sites were bimonthly examined over the year, leading up to a complete day-flying butterfly checklist. This data set established the base of the citizen science monitoring program started in 2011.

The Natural Reserve has a patchy disposal in the countryside around the built-up area. The four sites chosen for the research have a cardinal points position compared to the town of Conversano. The East and West sites are Mediterranean ponds in a typical agricultural and meadow patch. The North one is a rocky gorge with *Quercus ilex* wood and shrubs, whereas the South site is a wood hill with small patches of grassland.

Because of this patchy disposition, green corridors represent a great means for the fauna. In this landscape dry-stone wall with related vegetation hold a vital importance for small animals. Dry-stone walls are handmade stone manufactures, used since the past to separate fields with different owners. These stripe shaped habitat are very important for micro-fauna (such as reptiles, amphibians, insects, little mammals) because link far natural areas in a typical human land use landscape. They facilitate individuals exchange between different populations preventing the negative effect of inbreeding which reduce genetic diversity that often occur within isolated populations. These ecological infrastructures (green ways) may be very useful for species with low rate of dispersal, such as *Zerynthia polyxena*.

In the development of the project, volunteers are involved as field assistants. They learn to use scientific field equipment and to collect data using a standard protocol. Participants assist POLYXENA research team in monitoring ecosystem changes using butterflies as environmental bio-indicators; they also explore and measure the impact of human activities on local biodiversity.

West site: “CHIENNA”



The west site chosen for the research project. The habitat consists in a Mediterranean temporary pond in a typical agricultural and meadow patch. The white squared picture shows the sampling transect (the red line).

North site: “MONSIGNORE”



The north site chosen for the research project. The habitat consists in a rocky gorge with *Quercus ilex* wood and shrubs. The white squared picture shows the sampling transect (the red line).

The first phase consisted in a crowdsourcing campaign. People recruitment is accomplished through web open call process and oral interpretations at University. On 2011 the attention was focused on university science students. This enthusiast group attends a short educational course based on butterflies biology and ecology, sampling design and technique, data processing criterion. After this, a field training stage is carried out and it deals about the sites selection, transects location and sampling tests. The data collected on fieldwork will be processing at the end of three year citizen science program.

To investigate butterfly population structure, few simple materials are fundamental, such as an entomological net, a magnifier lens, a specialistic field guide, and a data sheet. Standardized transects have been walked in the four sampling sites. Butterflies met on each transect have been caught, identified, recorded on data sheet and released. This procedure has been repeated every fifteen days from March to October, according to the locality in which the study takes place. From data set can be calculated different biodiversity indexes useful for following analysis.

RESULTS.

Involving local people in conservation projects, establishing a relationship of trust with them and making them aware of researchers work, could be very useful to create social consensus with regard to Natural Reserve. With the challenging purpose of integrate land management with biodiversity safeguard, POLYXENA intend to build up not only “Citizen Science” but a “Science for Citizens”. On 2011, the first year of POLYXENA citizen science program “On the wings of knowledge”, twenty volunteers joined in butterfly monitoring fieldwork. All these actions represent the key to rise up the feeling of ownership to the territory.

DISCUSSIONS AND FOLLOW-UP.

“On the wings of knowledge” is an exciting way for nature and butterflies enthusiasts to contribute basic knowledge about butterfly species population dynamics, and promote butterflies and habitat conservation. Help from citizens gives scientists a far bigger picture of the health of the local Natural Reserve butterflies population. On 2012 the citizen science program will be extended with a *Zerynthia polyxena* dispersal study and with investigation about *Melanargia arge* (Sulzer, 1776) (South Italy endemic species) population monitoring work. At the end of the three year research should be clearer to global pictures about these two protected species, and it could be developed exhaustive safeguard action plans.

In future, a volunteer global network that collects massive quantities of data, about several species belonged to different *taxa* (Coleoptera, Odonata, Arachnida, etc.), could merge into one of the largest citizen science projects of the South of Italy.



Citizen scientists cover the transect. On the left upper side: *Zerynthia polyxena*. On the right upper side: *Melanargia arge*.

These pictures show some moments of citizen science butterfly population monitoring program and three of the most common butterflies in the sampling sites.

BIBLIOGRAPHY.

- Altini E. & Tarasco E., 2011 – Struttura di comunità di lepidotteri ropaloceri in diversi habitat della Riserva Naturale Regionale Orientata “Laghi di Conversano e Gravina di Monsignore” (Bari). Atti XXIII Congresso Nazionale Italiano di Entomologia, Genova 13-16 giugno 2011.
- Bonney, R., Cooper, C., Dickinson, J., Kelling, S., Phillips, T., Rosenberg, K. & Shirk, J. (2009). Citizen Science: A Developing Tool for Expanding Science Knowledge and Scientific Literacy. *BioScience*, 59(11):977–984.
- Carolan, M. S. (2006). Science, expertise and the democratization of the decision-making process. *Society and Natural Resources*, 19, 661–668
- Danielsén, F., Baleté, D.S., Poulsen, M.K., Enghoff, M., Nozawa, C.M., & Jensen, A. E. (2000). A simple system for monitoring biodiversity in protected areas of a developing country. *Biodivers. Conserv.* 9:1671–1705
- Oberhauser, K. S. & Prysby M.D. (2008). Citizen science: Creating a research army for conservation. *American Entomologist* 54:97-99
- Schwartz, M. W. (2006). How conservation scientists can help develop social capital for biodiversity. *Conservation Biology*, 20, 1550–1552.