Ancient man-made ponds in the Eastern Po River plain landscape: resources for both biodiversity and tourism

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Abstract: *Until the middle of the 20th century, cultivation of* Cannabis sativa *for textiles was of fundamental economic and cultural importance in the eastern parts of the Po River plain. To serve the textile industry many maceration ponds were introduced to the landscape.The Museum of Natural History of Ferrara is carrying out a georeferred census of the ponds that still remain in the territory that surrounds the city. Many of the surviving ponds are close to some Natura 2000 sites and provide refuges for species of the "Habitat" and "Birds" EU directives. About 20% of them can be considerd "temporary waters". Their contribution to landscape complexity can be important as shown by their overall fractal dimension. As a consequence, they assume great importance in the planning of ecological networks. Due to the historical and ecological value of ponds and to the new development of the* Cannabis sativa *industry, cultural itineraries can be anticipated.*
Keywords: *ponds, ecological network, fractal dimension, cultural heritage*

1. Introduction

Until the middle of the 20th century, cultivation of *Cannabis sativa* for textiles was of fundamental economic and cultural importance to the human population of the eastern parts of the Po River plain. To extract the fibres from the plant, its stems were macerated in fresh water. To serve the textile industry, many man-made maceration ponds were introduced to the landscape. In the latter half of the 20th century, *C. sativa* cultivation was progressively abandoned in Italy because of its dwindling economic value. Then, in the 1970s, its production became strictly prohibited due to the close similarity between *C. sativa* and *C. indica*: maceration ponds were progressively closed to recover land. The Museum of Natural History of Ferrara is carrying out a census of the ponds that still remain in the territory defined by the administrative boundaries of the Municipality of Ferrara to achieve information for uses in projects that aim to preserve biodiversity by the construction of ecological networks.

2. Materials and Methods

A first screening on the still existing ponds was carried out using digital satellite images derived from 2003 with ArcView 3.2 software (Corazza *et al.*, 2005). Digital maps dating back to 1977 were updated pointing out the ponds which didn't exist any more. The new shape file was used with a GPS device to support surveys carried out on the ground during 2006. Each detected pond, generally of rectangular shape, was photographed and measured in terms of length and width. A quick list of plants and animals that were seen was recorded.

To estimate the possible contribution of the ponds to the landscape complexity, the overall fractal dimension D of the whole perimeter of the pond assemblage surveyed on the ground was calculated with the Perimeter/Area Relationship (Sugihara & May, 1990)

$$P = A^{D/2} \quad (1)$$

or

$$\ln P = \ln k + (D/2)\ln A \quad (2)$$

where D/2 is the slope of the regression line.

3. Results and Discussion

The number of expected ponds after updating the shape file by satellite images was 459. Up to now 278 have been examined on the ground but 23 (8%) of them resulted closed after 2003. So, the real number of still existing ponds may be as low as 422: on the 1977 map, there were as many as 967 ponds. The measured mean surface of the surveyed ponds is not large (1014 ± 803 m^2), the overall fractal dimension of the perimeter is equal to 1,11 (Figure 1) but significant differences do exist

between different assemblages: D ranges from 0.84 to 1.22, thus contribution to landscape complexity can be of high value. 123 basins provide some species listed in the "Habitat" or "Birds" EU Directives with refuge. About 20% of ponds belong to the ecologically important group of the "temporary waters", filled with water in spring and drying out in summer.

4. Conclusions

Many of the surviving ponds are close to the Natura 2000 sites IT 4060016 and IT 4060017 and provide refuges for species of the "Habitat" and "Birds" EU directives. Their complexity measured by the fractal dimension that they introduce to the landscape can be as high as 1,20. As a consequence, they become important stepping stones in the planning of ecological networks. Moreover, modern exploitation of re-established crops of *Cannabis sativa* is now being proposed by some technologically advanced factories, to provide a sustainable source of income for farm workers. Using GPS devices and information retrieval software, the development of associated cultural itineraries targeting tourists and explaining historical heritage, biodiversity protection and future textile industry development, can be anticipated as a further source of incoming for farmers.

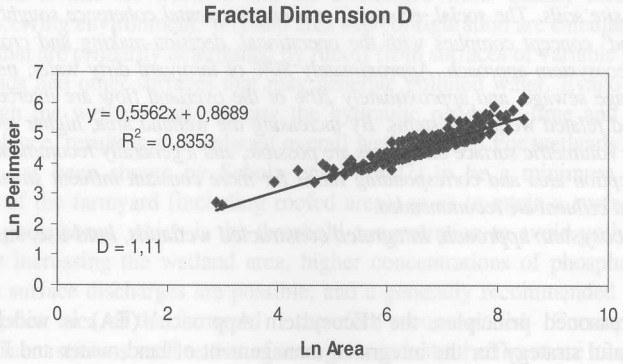

Figure 1 - Computation of the ractal dimension D of the perimeter of the whole assemblages of ponds surveyed on the ground; D equals 2m, where m is the slope of the regression line.

5. Acknowledgements

This paper is written in memory of Dr. Enrico Casari, who proposed cultural itineraries correlating historical heritage, biodiversity and new development of *Cannabis sativa* industry in his master thesis. In February 2007 Dr. Casari died at the age of only 28 due to a serious heart disease.

References

- Corazza C., Busoli Badiale S., Monti S. and Barillari A. (2005). Il contributo dell'indagine naturalistica alla pianificazione del territorio: il caso di Ferrara. Atti XV Congresso della Società Italiana di Ecologia, Torino. http://www.xvcongresso.societaitalianaecologia.org/articles/Corazza-1.pdf
- Sugihara G. and May R.M. (1990). Applications of Fractals in Ecology. *Trends in Ecology and Evolution, 5(3): 79-86*