E-III13

Model for the Distribution of Submerged Vegetation in a Gradient of Coastal Marsh. Albufera of Majorca (Balearic Islands)

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On the basis of the dynamics of physico-chemical variables of water outcropping in the Albufera and the environmental tolerances of submersed macrophytes, the most probable composition of submersed vegetation of rehabilitated lagoons in the silted coastal marsh is predicted.

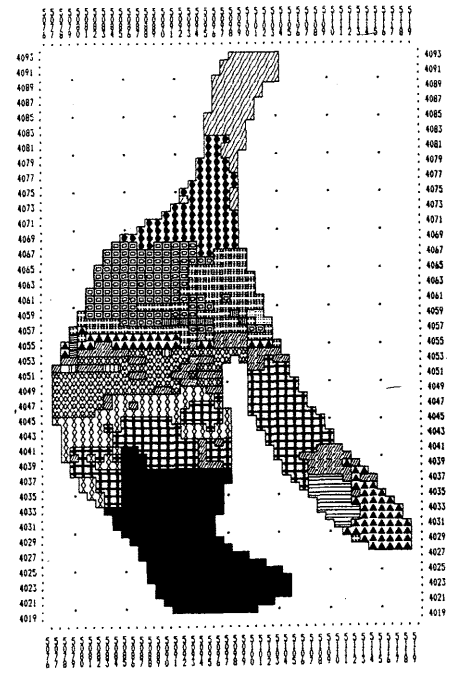
After dividing the Albufera into 10000 m^2 squares we plotted the seasonal distribution of values for variables of the environment over the digital cartography. These values include all the squares of the margins of the Albufera and the values of the isolines among sample stations. The values Z of empty slots among squares with values are a function of the variable Z in the closeset 4 slots, as an extension of the UTM axes, and their distance in relation to the problem slot are extrapolated. The Z values in the problem slot p would be as follows:

$$Zp=\frac{(Za/Ya-Yp)+(Zb/(Xb-Xp)+(Zc/Yp-Yc)+(Zd/Xp-Xd)}{(1/Ya-Yp)+(1/Xb-Xp)+(1/Yp-Yc)+(1/Xp-Xd)}$$

Zi: value of the parameter Z for each slot.
Xi,Yi: values of co-odinates for each slot.

These extrapolations have been applied to NO_2+NO_3, PO_4 and conductivity, which correspond to the most important loading factors derived from the principal components analysis of the system, and for each season during two years. As a consequence we obtain the margins and range of variation for each variable within each square.

The second step consists of the introduction of the data referring to the margins and range of environmental tolerance of submerged macrophytes for the parameters previously used.



From the information of slots and tolerances we calculated the overlap between the degree of variation of each square and the tolerance of each species by means of a procedure of iterative integration which applies the Jaccard index modified for quantitative data (MARTINEZ-TABERNER, 1983). This index has a range of variation between 0 and 1 which allows its treatment as a value of the probability of occurrence of each species in each of the geographical squares.

The probability of occurrence of specie x within square y is a function of all parameters used. For this purpose the following open expression is calculated:

$$Px,y=\sqrt[n]{S_1xS_2x...xS_n}$$

S is the probability of species x within square y for the paremeter i. P is a total probability and Si represents partial probabilities of each variable used.

Finally, species are arranged from highest to lowest probability, and an inventory of potential vegetation for each square is produced.

References:

MARTINEZ-TABERNER, A. (1983). *Boll. Soc. Hist. Nat. Bal.* 27,23-32.