Geophysical Research Abstracts,
Vol. 10, EGU2008-A-03417, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-03417
EGU General Assembly 2008

1 Nitrogen balance and land use in three different agricultural watersheds of the Po Valley (Italy)

F. Ventura (1), L. Pieri (1), M. Vignudelli (1), M. Ventura (2), P. Rossi Pisa (1), M. Tagliavini (3).

(1) Dept. of Agroenvironmental Sci. and Tech., University of Bologna, Bologna, Italy, (2) Dept. of Fruit and Woody Plant Sciences, University of Bologna, Bologna, Italy, (3) Faculty of Science and Technology, Free University of Bolzano/Bozen, Italy (fventura@agrsci.unibo.it FAX +39.051.2096241)

Land use and water management strongly influence the soil eco-sustainability. In particular in the Emilia-Romagna region, northern Italy, the problem is very complex because of various issues related to environmental, economic and social aspects. The solutions are often difficult to find and conflicting, as a result of very different environments close one to the other. For example, there are large areas densely populated with high agricultural pressure, prone to water excess and flooding problems due to high ground water table, often polluted. On the other hand, just few kilometers apart, there are hilly areas, scarcely populated, where water withdrawal or poor agricultural management and decline of hydraulic management are enhancing soil erosion and consequently the deterioration of water quality and soil fertility.

This study aims to evidence the different impact on the environment (particularly on water quality) of three typical agricultural and naturalistic scenarios, evaluating the nitrogen balance at watershed level, as well as ecological health of the water bodies.

Three different watersheds, typical of the region, were studied: one hilly, where the cultivated fields, part of them organic, are only the 40%, drained by the seasonal

creek Centonara (Ozzano dell'Emilia, BO, 300 ha); another in the plain near Bologna, drained by the artificial channel Fossa Storta (Argelato, 750 ha) a third in the Ferrara plain, below sea level (Valle Volta, 2000 ha). The water drained from the three watersheds flows to the northwest Adriatic sea, one of the regions in Europe suffering most from eutrophication (de Wit and Bendoricchio, 2001).

Both the water quantity (rainfall, inflow and outflow from watersheds, watertable level) and quality (nitrate inflow and losses in the water bodies) were monitored continuously. Watershed scale nitrogen balance was calculated for each watershed using data about fertilizers applications, seeds and crop yield, obtained from farmers' interview. Biological nitrogen fixation was estimated on the base of dry matter yield.

In the hilly watershed, where the Centonara stream drains a semi natural area, the water quality is not affected by the agricultural activity: nitrates concentrations are always under the U.E. limit for drinking water.

The plain watershed, drained by the Fossa Storta channel, is characterized by intense agriculture, with large application of chemicals, fertilizer and conventional tillage practices. The pollution of active ingredients in water is present all over the year, even if not always of high level.

In the Valle Volta watershed, total N outputs and inputs are of similar magnitude, indicating that crop management, especially N fertilization techniques, has reached good levels of ecological sustainability. Under intensive agriculture this might be explained by the absence of livestock manure distribution, by high N removals with high yielding crops, by the absence of relevant fertilizer applications in autumn, and by crop rotations.

Nutrient balance applied to watersheds is a widely used tool for studying nutrient fluxes in agro-ecosystems (Rossi Pisa et al., 1996, Gardi, 2001), but is not able, *per se*, to define ecological status of ecosystems. For this reason, aim for the future will be to extent the study monitoring biological indicators of the trophic status and ecotoxicological indexes, and relating ecological indicators of water bodies with the landscape characteristics. This will allow to obtain a more precise definition of the factors affecting agricultural impact on aquatic environments (Edwards et al., 2000).