

Nitrogen removal effectiveness in narrow buffers strips: some examples from the river Po catchment

Raffaella Balestrini, Cristina Arese, Carlo Andrea Delconte and Alessandro Lotti
Water Research Institute, Italy

In many Countries the use of vegetated buffer strips represent an important best management practice (BMP) for controlling the diffuse pollution deriving from agriculture (Dosskey 2002). Some financial incentives programs have been established in Italy to support the installation and the restoration of vegetated buffers for ecological objectives and for the protection of water quality. However, watershed planners need to select the key factors for buffer effectiveness and to establish guidelines to optimize the buffer management. One of these factors closely related to the landowners interests is the buffer width. Despite the similarity of purpose, there is a great heterogeneity in the width recommended in the local guidelines. From a scientific point of view there is not yet a consensus for what constitutes optimal riparian buffer design or proper buffer width to achieve maximum nitrogen removal effectiveness. Most studies conducted so far have not shown a direct relationship between the size of riparian strips and efficiency in removing nitrogen (Mayer et al. 2005). Many Authors observed that the drastic reduction of nitrate occurred just in the first few meters (3-5 m) of vegetated buffer (Haycock & Pinay, 1993, Balestrini et al, 2007, Balestrini et al., 2008).

On the basis of these and previous results on narrow buffer strips, we examined the buffering capacities of narrow riparian strips (5-15 m) along irrigation ditches and relatively natural springs. These small water bodies receiving large nutrient input are very common in the agricultural lowlands of the Po basin. The results obtained from the chemical monitoring of the subsurface water in each experimental plots along with the rates of potential denitrification, were discussed considering different environmental features. Particular attention was given to the groundwater dynamic, the soil features, the geomorphology, the vegetation type, the organic carbon availability and the agricultural practises.

References

- Balestrini et al. (2007). *Verh. Int. Verein. Limn.* 29/5, 2217–2220
- Balestrini et al. (2008). *Hydrol. Earth Syst. Sci.* 12, 539–550
- Dosskey (2002). *Environmental Management* 30, No. 5, 641–650
- Haycock et al. (1993). *J. Environ. Qual.* 22: 273-278
- Mayer et al. (2005). EPA/600/R-05/118