



Experiences gained from implementing mandatory buffer strips in Denmark: how can we enhance their ecosystem services?

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The Danish Parliament adopted in June 2012 a Buffer Strip Act that required 10 m mandatory buffer strips (BSs) to be established along all watercourses and lakes with a surface area greater than 100 m² from 1st September 2012. The main reasons for deploying BSs was to reduce nitrate-N leaching and phosphorus (P) loss via surface runoff from adjoining fields from the approximately 50,000 ha of BSs as no farming activities were allowed in the BS concerning use of fertilizer, spreading of manure, spraying with pesticides, etc. Reductions in nutrient losses to watercourses are needed for minimizing the eutrophication effects in lakes and coastal waters.

Buffer strips are among the most well studied and frequently adapted mitigation measure for reducing sediment and P losses to surface waters via surface runoff. It has, however, been questioned if BSs can also reduce N losses. The international literature gives an overwhelming support to their functioning for reduction in sediment and especially particulate P losses. However, their functioning for dissolved P and nitrogen is more questionable when comparing studies from the international literature. In Denmark, many farmers were against the introduction of BSs as a general mitigation measure for several reasons. The most used argument in the public debate was that BSs in general are not very efficient for reducing N and P losses to surface waters which was originally the argument behind the BS Act from the Ministries of Environment and Food and Agriculture. A desk study had been made prior to the adaptation of the law that showed 10 m BSs to be able to reduce the N loading with 40-50 kg N ha⁻¹ of BS and 0.04-0.4 kg P ha⁻¹ BS. The total reduction from the BSs established in Denmark in 2012 would then amount to 2,000-2,500 tonnes N and 2-20 tonnes P. The intense public debate in Denmark made the Parliament to adopt a new BS law in June 2014 to be implemented in August 2014 that reduced the total areas with mandatory BSs along watercourses from ca. 50,000 ha to ca. 25,000 ha and at the same time they reduced the width of the mandatory BSs from 10 m to 9 m. The aim of this presentation is to share the experience gained in Denmark on establishing mandatory BSs. Furthermore, we will show some preliminary results from two newly initiated research projects (BUFFERTECH and BALTICSEA2020) that studies how to enhance the ecosystem services provided by buffer strips. We will show how intelligently to guide managers when establishing BSs along watercourses at catchment scale utilizing a combined P-index model for soil erosion and a statistical model for P retention in BSs as well as results obtained from new 'Engineered' or 'Constructed' BSs that delays tile drainage flow from field to streams thereby increasing nutrient retention.

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