Sediments feed and conserve soil

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Introduction: The yearly net sediment inflow into the Netherlands with rivers Rhine, Meuse, Ems and Scheldt mounts to 8 million m^3. It deposits in sheltered and low flow zones like harbours, creeks, inside bends of rivers and floodplains. The management and maintenance of the Dutch rivers are under pressure due to climate change, tight budgets and risen public awareness of local challenges requiring action. These challenges include land degradation and restoration (SDG15). Peat grounds oxidise, resulting in land subsidence. Arable farming has exhausted sandy soils - poor water retention and nutrient availability. Traditionally, the yearly inflow of fine sediments from rivers and coastal waters was used to revitalise meadows and agricultural land. In the 20th century, river training and contamination of surface water and sediments hampered such revitalisation. European and national policies have led to a significant improvement of water and sediment quality over the past decades. Therefore, it is time to look forward and to identify renewed opportunities for making use of sediments and their valuable properties for agriculture. This is key to attaining affordable and sustainable river basin management *and* to reverse degradation of agricultural land.

Methods: A preliminary exploration of social costs and benefits of applying dredged sediments on arable farmland indicated significant potential net benefits [1]. Governments, farmers and research institutes have joint forces to head agronomical, legislative and organisational challenges and to set-up lab-scale and field trials. Draft guidelines for joint agronomical, pedological and environmental assessments on dredged sediment have been developed [2]. These are currently being tested prior to carrying out the field trials. The guidelines aim to help find good matches between needs of farmland and sediment properties, and to improve those properties if required.
Field trials are undertaken on sandy grounds with a 3/6 years' maize/grassland rotation and on peat soils. Hypothesis for the latter is that clay illuviation from applied sediments into the peat layer would slow down peat oxidation by forming clay-humus complexes.

Fig. 1: Application of sediment on meadow.

Results: Expected results of the field trials on sandy soils are improved water retention and nutrient availability resulting in higher yields (up to 3 t dm per ha maize more than now [1]), to be measurable after 5 years.
The first results of applying the draft guidelines showed remarkable conflicts between environmental and agronomic standards. While Dutch environment standards would restrict application of sediment because of high zinc and copper, the agronomical assessment recommended to enrich this same sediment with zinc and copper [3]. Likewise, mineral oil would hamper application of several sediments on agricultural land, while higher amounts of mineral oil are applied on crops with pesticides [3].

Discussion: Such conflictive points of view between environmental and agronomical interpretations appeal for urgent joint attention from both sectors and from governments.

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