IDENTIFICATION OF NON-POINT AGRICULTURAL POLLUTION USING THERMOGRAPHIC IMAGING

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Water quality monitoring has a much shorter history in the Czech Republic (CR) than water quantity monitoring. Yet the quality of water resources is crucial for society, industry and agriculture. One of the most significant sources of water pollution is non-point agricultural pollution, transported mainly by agricultural drainage. Drainage runoff contributes to stream and river pollution especially with nitrates, pesticides and their metabolites, and potentially with other water-soluble (phosphate) compounds applied to agricultural land.

Agricultural drainage systems were built in the past to support and develop agriculture. Their tradition in the Czech Republic dates back to the end of the 19th century, but most drainage systems were built in the period between 1960 and 1990. Drainage systems were usually built as systematic tile drainage with conducting drains discharged into main drainage facilities as single-purpose constructions for draining surplus water from the land. Recently, the negative effects of land drainage (eg. shrinking periods of time when water remains in the drained area, lowering the ground water table, and polluting shallow subsurface water with nitrates and pesticides) have been also considered, especially during periods of drought or rainstorms linked to climate change.

In order to design proper measures for the mitigation of such negative effects of drainage systems (e.g. drainage biofilters, constructed wetlands, regulation drainage systems, pools placed on outlets), precise knowledge about the location of tiles and outlets is required. One way to get this knowledge is to find, scan and ortho-rectify detailed construction plans. The issue with this approach is that many of these plans were lost during the huge economic and proprietorial changes (end of the socialist period) in the 90s. That´s why surface thermography was tested as a new method for the identification of drainage outlets. It was assumed that drainage water and stream water would have different temperatures, especially during the winter season (drainage water is warmer than stream water) and in the summer (drainage water is colder than stream water). Monitoring water temperatures along the stream course allows for the identification of places with changed water temperature, which usually represent the drainage outlets location. Based on the results presented in this paper, it can be concluded that thermography is a useful method for identifying the locations of drainage outlets.