Monitoring of peat bog restoration

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In pre-Roman times, about half of the Netherlands was covered with peat bogs. In past centuries, they have been dramatically degraded and transformed as they faced heavy peat cutting and encroachment from agriculture. Currently, out of remaining several thousands of degraded peat bogs, only about 15 ha are the living peat bogs.Fochteloerveen, in the north of the Netherlands, is one of the degraded remnant peat bog ecosystems. It is encroached by dry grass species, Molinia caerula, while some living bog with peat mosses remained.Rewetting was carried out for restoration of the Fochteloerveen peat bog site. It was performed in two phases (1982-1984 and 1999-2002). It is assumed, that once the suitable hydrological condition is achieved, the characteristic species of peat bog vegetation dominated by Sphagnum spp. will take over.Traditionally field sampling methods have been used to assess the result of such restoration efforts. Those efforts, however, are labor intensive and increasingly become difficult as the bogs are rewetted. The management authority of the area, Natuurmonumentem, therefore, welcomed a study to explore the possibility of assessing the impacts of rewetting with the use of remote sensing.This research was aimed at monitoring the shift of vegetation cover dominated by Molinia to Sphagnum spp. as a result of management action (rewetting) that synthesizes methods from landscape ecology, remote sensing, and modelling.The species abundance data and multi-spectral data retrieved from Landsat imagery were analysed using canonical correspondence analysis (CCA). Species responses to the CCA axis were explored for Sphagnum spp. and Molinia with application of a Gaussian regression model in general linear modelling (GLM). The spatial variation in water level as a result of two phases of rewetting was studied using time series of a temperature vegetation dryness index (TVDI). Thus, monitoring of vegetation cover change from Molinia dominated to Sphagnum spp. dominated vegetation as a result of rewetting was explored using species response models and TVDI data.Surface water level was found to be a significant factor in relation with the regeneration of Sphagnum in the study area. The optimum growth of Sphagnum was observed in water saturated conditions. However, it was restricted in the areas with dry condition and also in open waters.Resilience of Molinia to rewetting was observed to be significant in rewetted areas. Distributions of Molinia in relatively dry areas as well as in almost open water conditions were observed. However, gradual decline in its cover was also observed in the parts where a high water level was consistent for relatively longer period of time.This study shows that the effect of rewetting on re-establishment of vegetation representative of peat bogs can be successfully monitored using satellite remotely sensed data.