



Nutrient cycles in agricultural systems at sub-catchment scale within the UK and China

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Diffuse water pollution from agriculture (DWPA) represents a significant challenge in both the UK and China. The UK has developed policies and practices which seek to mitigate DWPA, yet the risks and adverse impacts of DWPA remain widespread. In contrast, China's past priorities have largely focussed on food security, with an emphasis on increasing food production through high fertiliser application rates with little attention being paid to enhanced nutrient export from land to water and to air. This has contributed to severe environmental problems which are only now beginning to be recognised and addressed. We have prepared nutrient balances (phosphorus and nitrogen) in contrasting agricultural production systems at sub-catchment scale within China and the UK. These draw from a variety of sources ranging from general yearly statistics collected by the respective government to farm surveys. Our aim is to use the resulting nutrient balances to underpin the sharing of knowledge and innovation to mitigate DWPA in both nations. In the UK, the case studies focus on the three Demonstration Test Catchment locations, covering a range of livestock and arable production systems across England. Here, the high frequency monitoring of phosphorus river loads enables the cross-validation of the simple nutrient budget approaches applied in this study. In China, our case studies span kiwi orchard, fruit and vegetable solar greenhouse systems, double cropped rice-wheat and wheat-maize production systems. Substantial differences in nutrient stocks and flows exist between individual production systems both across and within the two countries. These differences will be expressed along the source-mobilisation-delivery-impact continuum that underpins our budgets for both phosphorus and nitrogen. We will present the phosphorus cycles of some case studies and highlight their challenges and relevance at sub-catchment scale. Based on our nutrient budgets, general recommendations can be formulated to mitigate DWPA from farm to policy levels.