

EGU21-15172, updated on 20 Apr 2021  
<https://doi.org/10.5194/egusphere-egu21-15172>  
EGU General Assembly 2021  
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## **Nitrogen water pollution trading: A sustainable solution for future food production**

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Current change in dietary preferences brings an increase in food production. A high demand can lead to food security challenges and pressure on the agriculture sector. The agriculture sector has the largest environmental impact on water pollution due to its fertiliser usage, therefore better water management is essential to maintain its quality and availability. This research proposes a nitrogen water pollution trading model that addresses the above challenge. It incentivises farmers to continue making profit whilst reducing pollution simultaneously. We model a mathematical mixed-integer program that simulates farmers behaviour in participating in nitrogen trading based on the catchment regulation as well as their own pollution license. We apply the model amongst four local farms in the agricultural county of Suffolk, Eastern England. Emphasis has been implemented on the total oxidised nitrogen exhibited by each farm, predominantly nitrate. The nitrogen water pollution residue cost of the crops grown on each farm was applied into the model. We discuss how the trading platform can help the framers to participate in trading, increase their crop growth while maintaining the pollution regulation.