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Overcoming Coordination Gaps Between Water, Energy and Agriculture: Future Paths to Water Protection in Weser-Ems

Summary

This paper constitutes one of six analyses of cross-sectoral challenges in water governance. These have been conducted as part of the STEER research project and results are published in separate analyses and position papers.

While the agricultural sector and food industry of the region of Weser-Ems in Lower Saxony have brought about economic prosperity, they have also posed challenges to the environment, and water quality in particular. Intensive animal farming is considered the main source of nitrate pollution in groundwater, a trend that has been further reinforced by the promotion of non-fossil fuel energy sources and increased biogas production in the region. Against this backdrop, coordination of the water, (bio)energy and agricultural sectors is key to establishing Integrated Water Resources Management (IWRM) in the region and thereby reducing nitrate levels in the groundwater.

This paper is based on the analysis of coordination and cooperation among local and regional stakeholders which takes account of i) legal and regulatory structures, ii) water management processes and iii) the socio-ecological conditions. It shows that groundwater protection in the region of Weser-Ems has for two decades been characterised by the same trade-off between the barely coordinated policies of the water, (bio)energy and agricultural sectors. The problem thus remains as pressing as ever. The lack of sufficient coordination between Germany's Renewable Energy Act (EGG) and its Fertiliser Ordinance (DüV) is inconsistent with growing international recognition of the need for coherent and integrated policy solutions to the management of natural resources such as groundwater. For many years, the German agricultural policy, of central importance for water resources management, was geared solely to profitability in agriculture, neglecting the considerable social and environmental costs of this approach. It is not yet possible to gauge the extent to which the amendment of the Fertiliser Ordinance in 2020 and the designation of nitrate vulnerable zones have led to effective integration. In order to reduce nitrate pollution in the region of Weser-Ems and similar regions of Germany in the long term, we make the following recommendations in this paper:

- improve legislative coordination in the water, energy and agricultural sectors,
- expand and promote successful (local) projects (e.g. whole-farm approach),
- transform intensive farming into business models combining profitability with ecological compatibility (e.g. organic farming),
- support this by integrating practical knowledge into the development of new policy instruments, and
- elevate water protection issues in agricultural training.

Nitrate pollution in the region of Weser-Ems

The region of Weser-Ems is situated in the northwest of Lower Saxony and is characterised by intensive farming, which has brought economic prosperity to the region. However, intensive animal husbandry also poses a challenge to the environment and to water resources. It is considered the main source of high levels of nitrate pollution in the groundwater, as the volumes of farm manure it generates exceed the nutrient requirements of regional food crop production. As a result of state funding of non-fossil fuel energy sources, an increasing amount of fermentation residues have been generated from biogas production in the region since 2004, exacerbating the nitrate problem (Meergans & Lenschow, 2018). As such, the nitrate limit of 50 mg/l specified in the EU Nitrates Directive has been exceeded for several years. In Germany, the DüV and the Fertiliser Act (DüG) are the central regulatory mechanisms for managing fertiliser application in the agricultural sector. They are supplemented by voluntary instruments such as the 'Niedersächsisches Kooperationsmodell Trinkwasserschutz' ('Lower Saxony Cooperation Model for Drinking Water Protection'). This action framework proved insufficient, resulting in the Court of Justice of the European Union ruling in 2018 that the German Government had violated the EU Nitrates Directive.

Coordination between the water, (bio)energy and agricultural sectors, and consequently IWRM, is a key factor in reducing nitrate levels. This Briefing Paper discusses the need for action and new approaches to water resource conservation.

Analytical framework

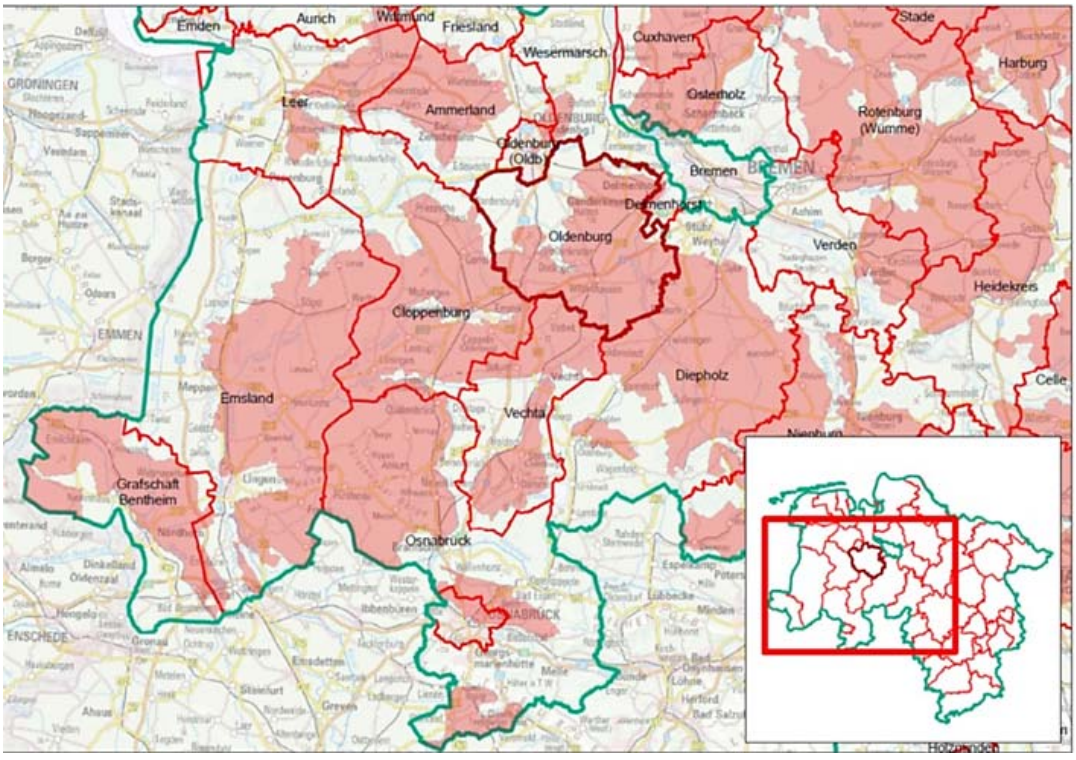
Our research findings are based on an analytical framework developed by the STEER project. This framework focuses on complex coordination challenges in water resources management in terms of legal and regulatory structures on the one hand and processes of water management planning and the use of water resources on the other (Pahl-Wostl et al., 2020). The study in the region of Weser-Ems is based on a systematic analysis of 17 sub-processes from the water, agricultural and bioenergy sectors. The processes include, for instance, the Lower Saxony Cooperation Model for Drinking Water Protection, monitoring and control of fertiliser law, and the impact of organic and conventional agriculture on groundwater quality.

The data was based on relevant legislative texts, scientific literature, 22 interviews with local and regional stakeholders from the relevant sectors, and two stakeholder workshops for developing solutions.

New approaches to water resource conservation: Need for action at all levels

The results of the analysis of the STEER project point to a need for action in terms of formulating as well as implementing and monitoring the fertiliser legislation. On this basis, new approaches to water resource conservation will be outlined below, from national down to local level.

Figure 1: Overview map of nitrate vulnerable zones in the Weser-Ems case study region



Source: Excerpt from the geodata of the State Office for Geoinformation and Land Development of Lower Saxony (LGLN), © 2020, LGLN, de/by-2-0. Lower Saxony Ministry of Food, Agriculture and Consumer Protection - Service Centre for Rural Development and Agricultural Promotion. All rights reserved, used with permission.

Shaping coherent policy in the water, (bio)energy and agricultural sectors

The water, (bio)energy and agricultural sectors are closely interlinked through their use of natural resources. Coherent policy, that is, policy coordinated within and between these sectors, is the prerequisite for effective water management. This is based on the understanding, also shared internationally, that water resource issues cannot be resolved in the water sector alone, but rather require an integrated, cross-sectoral approach to water resources management. With the adoption of the Water Framework Directive (WFD) in 2000, the European level took account of this insight.

In Germany, however, striking inconsistencies were observable for many years between water, bio(energy) and agricultural policy, the effects of which are still felt to this day. The analysis shows that the growing of biomass for biogas facilities, funded by the EEG, contributed to a failure to achieve the environmental goals formulated in the WFD, the Nitrates Directive and the EU Biodiversity Strategy. The lack of coordination between the EEG and the DüV resulted in a situation whereby the funding of biogas facilities led to a noticeable rise in nitrate pollution in the groundwater of the agriculture-intensive region of Weser-Ems (Meergans & Lenschow, 2018).

While this incoherence was remedied by including fermentation residues from biogas facilities in the annual upper limit of 170 kg N/ha as part of the 2017 amendment to the fertiliser legislation, it was only the threat of fines to the tune of several million euros as part of the EU infringement proceedings that led German lawmakers to move towards integrating water, (bio)energy and agricultural policy by amending the DüV in 2020 and designating nitrate vulnerable zones. This initial long-term approach to IWRM must now be supported with further reforms.

Implementing fertiliser legislation

The current legislative deficits have been exacerbated by the insufficient implementation of fertiliser legislation. More specifically, effective monitoring and sanctioning mechanisms have been lacking for years. If fertiliser legislation is to be implemented effectively on a broad basis, then it is necessary to expand monitoring efforts and tighten sanctions. The fact that there are often several agricultural enterprises in Lower Saxony operating on a single site or linked with one another through the transport of farm manure makes it necessary to establish extensive official control mechanisms. Greater monitoring and controls in turn require the Lower Saxony authorities to step up the deployment of financial and human resources.

Lower Saxony Cooperation Model for Drinking Water Protection to the rescue (or not)

Attempts have been made for years to rectify deficits in regulatory legislation and achieve urgently needed progress in drinking water protection using regional, voluntary instruments such as the Lower Saxony Cooperation Model for Drinking Water Protection. Financed from the water extraction fee, the model comprises voluntary agreements and advice for farmers on water resource protection. In this way, it promotes dialogue and the formation of a common understanding of the issue among participating water suppliers, farmers and authorities. However, it has not been possible to achieve across-the-board improvements in water quality with the Lower Saxony Cooperation Model for Drinking Water Protection. This is due to the limited financial options for compensating farmers for their voluntary measures. Additionally, the voluntary nature of the partnerships means that only a fraction of farmers, and consequently only a limited number of agricultural fields, can be reached. Although progress was achieved with the cooperation model, it is being seen that local projects of this kind cannot and should not serve as a corrective to insufficient regulatory legislation and implementation deficits. Rather, they should aim to achieve protection goals that go beyond the scope of regulatory legislation.

Expanding innovative local projects

There are other local projects in the region of Weser-Ems that are pro-actively driven by local stakeholders. For example, the whole-farm approach to groundwater protection is being successfully tested at selected farms as part of the EU-funded TOPSOIL (https://northsearegion.eu/topsoil) project.

In order to enhance the reach of these innovative projects, however, it is necessary to create a conducive institutional and financial framework and safeguard its long-term viability if the efforts to support farmers are to be economically worthwhile. Only in this way can innovative pilot projects that have proven their effectiveness at local level reduce nitrate pollution on a large scale. The forthcoming audit of EU agricultural policy and the greater scope sought for national implementation provide a good opportunity to create the corresponding framework conditions. This would then allow innovative projects to not only play a niche role, but also serve as a starting point for transformative change (Pahl-Wostl, 2019).

Transforming agriculture

In order to reduce long-term nitrate pollution in the region of Weser-Ems and Germany as a whole, a transformation is needed from intensive farming to business models that combine profitability with ecological compatibility for water resources and thereby protect these resources in the long term. Even after two amendments to the DüV (2017 and 2020), water resource protection requirements have only led to corrections, rather than a fundamental rethink regarding the foundations of business activities. It is not yet possible to gauge the effects of implementing the regulations on fertiliser reduction in areas with high levels of excess nitrate and eutrophic water bodies, which are due to come into force from 2021.

One example of a successful transformation that has resulted from a niche activity and had a demonstrably positive impact on water quality and soil diversity is organic farming. Nonetheless, the expansion of land for organic farming in Lower Saxony, necessary for achieving water resource protection goals, is insufficient, showing that political goals alone are not enough. Rather, the ecosystem services, defined as direct and indirect contributions of ecosystems to human

well-being, that are provided by these farms must be better remunerated, also taking account of the upstream and downstream areas of agricultural production.

Integrating practical knowledge into planning processes

In addition to a regulatory framework that takes account of the issue of water resource protection and the provision of the necessary administrative and financial resources, the transformation of agriculture will also depend on the integration of expertise from agricultural practice. Analyses of the STEER project show that the practical knowledge of farmers has so far played only a subordinate role in the development of new policy instruments and voluntary measures (e.g. agri-environmental measures). There are many complex reporting requirements and control mechanisms within fertiliser legislation that are not coordinated with one another (e.g. the current nutrient balance, assessment of fertiliser requirements and material flow balance). Farmers and the authorities alike are concerned that users will be overwhelmed and are calling for the monitoring and control mechanisms of fertiliser law to be simplified. Involving practitioners at an early stage in the process of planning and developing these instruments could ensure that requirements are designed to be practicable and realistic and that new measures are accepted by farmers. Farmers who were involved in the project via stakeholder workshops indicated a willingness to play an active part in this process.

Strengthening water resource protection in agricultural training

However, practical knowledge is also learned. Therefore, if farmers are to be effectively involved in the transformation process, it must be ensured that the requirements of water resource protection are addressed even at the training stage. The evident water resource protection issue has not been reflected sufficiently in the agricultural training curricula to date. Water resource protection must not be communicated on a sporadic basis only, but also as an overarching concern for agricultural enterprises. It cannot be a matter of individual interests or the priorities of individual higher education institutions, but rather must be promoted across the board in agricultural training at vocational colleges and universities.

Conclusions and outlook

The region of Weser-Ems is typical of regions across Germany with insufficient water resource protection. In order to achieve a long-term reduction in nitrate pollution, required not least under EU law, there is a need for a transformation of intensive agricultural practices. Innovative projects at local level can serve as a starting point for such transformative change, but must also be supported by legal, institutional and financial framework conditions at national level.

The challenge is great, as viable strategies for protecting water quality must also take account of new developments. For instance, the experience of the summer droughts of 2018 and 2019 show that, against the backdrop of climate change, even the region of Weser-Ems, with its water-rich climate and hydrology, faces future challenges in terms of water quantity that are closely connected to those of water quality. Now is the time to face up to these challenges

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