Online supplement to:

Towards a Rights Based Approach in EU International River Basin Governance? Lessons from the Scheldt and Ems Basins

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The Ems-Dollard estuarine system and its governance regime

The Western Scheldt and the Ems-Dollard are the only remaining estuaries with open river connection in the Netherlands. Both are transboundary river systems, but they differ in physical properties, governance and ecological problems. It is therefore interesting to consider how a custodianship would differ between them. This supplement provides more detail on the Ems-Dollard and its governance regime The Ems basin is situated in the international border area of Germany and the Netherlands. The location of the international border within the estuary is still a matter of disagreement between the Netherlands and Germany. According to the 1960 Ems-Dollard-treaty, the countries respect each other's legal positions on the location of the border, recognize their communal interest in the area and agree to cooperate in practical matters "in good neighbourship". The estuarine system comprises the lower Ems River (or Tideems) in Lower Saxony (Germany) and the Ems-Dollard estuary that connects northward to the Wadden Sea (UNESCO World Heritage). Besides its ecological value, the Ems-Dollard is of great economic importance for the region, with harbours (e.g. Eemshaven (Netherlands) and Emden (Germany)) and a major inland shipyard in Papenburg (Germany).

Estuarine (eco)system

The Dollard was formed through a series of dike breaches in storm surges during the 13th and 14th centuries AD (Stratingh & Venema 1855; RWS 1966). On both sides of the Dutch-German border dikes were constructed, breached, repaired, abandoned and relocated. Multiple weirs and sluices were built to control drainage of the hinterland.

In 1872 the 'modern' Ems construction works began. Of these, the Geise dam (1872 and 1930-1939), the weir at Herbrum (1899) and the Ems storm surge barrier (2002) are among the most significant. The channel was deepened in stages during the 20th to more than twice its original depth to accommodate navigation in both the German and Dutch areas. Straightening works removed bends from the main channel (De Jonge et al. 2014) and large scale dredging kept channels navigable (Van Maren et al. 2015a). The Ems was reformed into a single (main) channel, while a multiple channel system is characteristic for natural estuaries and also had been for the Ems-Dollard up to the 1950s (Bos et al. 2012).

The consequences of the works in the river and estuary are extensive, but cause-consequence relations in the estuarine processes have only recently become the focus of research (Schuttelaars et al. 2013; De Jonge et al. 2014; Van Maren et al. 2015a). The most prominent changes in the estuarine system are (i) the reduction of the tidal basin surface area, (ii) an increase in suspended sediment concentration (SSC), (iii) the estuarine turbidity maximum (ETM), (iv) the morphology (v) the tidal range and protrusion of the tidal wave, (vi) the development of a fluid mud layer on the bed, and interactions between these factors.

The surface area of the estuary (sediment sink) has decreased by 40% since 1650 through natural processes and anthropogenic land reclamation, while the sediment supply

from the Wadden Sea and North Sea remains fairly constant. Even though large amounts are extracted through dredging, the SSC has increased from 10s-100s mg/l in the 1950s to 10s-100s g/l presently (Van Maren et al. 2015a, 2016).

In a healthy system, the SSC would decrease upstream from the ETM, as it did up to the mid 1990s, but since then it has remained elevated up to the Herbrum weir near Papenburg. The ETM (usually located at the interface of salt water with fresh water intrusion) itself has moved 25 km upstream and has broadened and elongated to an ETM zone of 30km. Since 1994, the system is no longer able to flush out sediment from the upper estuary, resulting in permanent trapping at a point upstream from the salinity inflection point, which is most pronounced at low river discharge (De Jonge et al. 2014). The straightened and deepened channels combined with the reduction of tidal channels essentially form a highway for water flow, that propels the tidal wave further upstream. The tidal wave amplitude at Papenburg has increased from 1.6m in 1950 to 3.6m in 2010. For comparison, the natural increase of the tidal amplitude at barrier island Borkum for the same period is ~0.10m.

The tide in the Ems-Dollard is asymmetric by nature, with a longer high water slack, and a higher amplitude thus increases the already netto inland directed transport of sediment (Van Maren et al. 2015b). Moreover, the position of the Hebrum weir reduces the length of the estuary to cause resonance with the tidal wave. This not only increases (decreases) inland high (low) water levels, but also induces inland sediment transport and moves the sediment trapping location further upstream (Schuttelaars et al. 2013). The fluid mud layer that has started to develop since dredging at Emden Port seized in 1994, strongly reduces the hydraulic roughness of the bed and further accelerates flow, contributing to the tidal amplitude (De Jonge et al. 2014; Van Maren et al. 2015b). Tidal amplification regularly causes dangerously high water levels inland (PRW 2012).

The hydromorphological changes have been causing a strong degradation of the valuable estuarine ecosystem. The turbidity of the water and extent of the zone with high SSC reduce the amount of light available for micro-organisms, causing a decrease in primary production by ~50% compared to the 1970s, especially in the seaward area of the estuary (Taal et al. 2015).

Primary production is the basis of the food web and a reduction is therefore disruptive for other estuarine populations (PRW 2012). Flora and fauna living under the water surface struggle with the murkiness of the water, anoxic conditions and the abrupt salt-fresh water transitions caused by the weirs and sluices in the river and its tributaries (PRW 2012).

Governance of the Ems-Dollard

As a transboundary river system, the Ems-Dollard is subject to legislation in two countries and the EU. Central to the governance of the system are the European Water Framework Directive, Flood Directive and Bird- and Habitat Directives of Natura2000.

The Permanent Dutch-German Ems committee was installed to govern and settle practical matters relating to the use of the disputed border area (Ems-Dollard Treaty 1960), but management for compliance with WFD, FD, BD and HD is in the hands of national and subnational authorities. For the WFD and FD, the competent German authorities according to subsidiarity in German administration, are the Umweltsministeriums (Ministries of Environment) of states North Rhine-Westphalia and Lower Saxony, cooperating in Flussgebietsgemeinschaft Ems. International cooperation with the Dutch competent authority (Dutch Ministry of Infrastructure and Environment) on the first level is the Steering Group Ems and for operational matters on the second level, the Coordination Group Ems.

The IRBD is subdivided into three coordination areas for which Gemany (Ems North, Ems South) and Netherlands (Ems) are responsible (SGD Eems 2015). The ecological state for the WFD was considered poor and difficult to ameliorate, especially in the Tideems, therefore, an extra 5-year management cycle was decided upon in order to reach the WFD standards by 2021 (SGD Eems 2013). As is practise in German policy, an Integral Management Plan was drawn up by the competent authorities for the Ems-Dollard and Tideems areas within the IRBD, where the situation and possible plans for compliance with WFD as well as HD and BD are explicated along with views and interests of other parties and stakeholders.

The Ems-Dollard, including Tideems in the Nederlands and Lower Saxony, is home to twelve Special Areas of Conservation or -Protection under the Habitat Directive and Bird directive of N2000, including the Wadden Sea. The competent authorities for N2000 are the German state Lower Saxony and its environment office NLWKN and Dutch province Groningen.

The national governments are involved only for decisions in the disputed area and law making (Netherlands), or when it touches upon national matters of water management and navigation (Germany). On lower administrative level the water boards (Netherlands), Landkreise (districts, Germany), municipalities (NL and Germany) are involved. The IMP explicitly does not weigh interests for decision making nor is it legally binding, however it does provide the specialist grounding for further management and facilitates international cooperation (IMP, 2016).

In the Ems-Dollard area, economy and nature conservation conflict in managing the estuarine system, exemplified by the desire to further deepen channels to accommodate larger ships for growth of economic activities, versus the aforementioned effects on the natural system. However, all stakeholders involved agree on the benefits of

working together, and this has led to the 'Masterplan Ems 2050' (Germany), 'Economy & Ecology in balance' (E&E) and Eems-Dollard 2050 (Netherlands).

In the German Masterplan Ems 2050 the competent authorities, lower authorities, NGOs and the economic stakeholders (e.g. agriculture, industry, harbours) have committed to working towards a healthier aquatic system and sustainable economic development, whereby the Masterplan forms the legally binding basis for management of the Ems system in cooperation with the Dutch partners. Similarly, the Dutch counterparts E&E and ED2050 express cooperation between authorities, NGOs and economic partners in the Cooperation Agreement (Eemsdelta, 2014), but the legal basis in the Netherlands is grounded in the MIRT (Multiannual program Infrastructure, Spatial planning and Transport) from the Ministry of Infrastructure and Environment and province Groningen (Ministry I&M & province Groningen 2015).

The policy documents are primarily focussed on management within the own territory, although the need and desire for transboundary cooperation is expressed on both sides of the border. E&E is the platform where the international partners and stakeholders come together for coordination and harmonisation for project ED2050. The linguistic boundary has proven to be difficult and time consuming (IMP 2016) and the matter of the disputed border area requires a delicate approach. It is up to the competent authorities in both Germany and the Netherlands to weigh the needs of economy against those of nature for decision-making on management of the estuarine system.

The Ems-Dollard region is still in the process of defining strategies for implementation of WFD and N2000. Meetings between stakeholders and organisations (national and international) shed light on synergies and conflicts of interests. For example, representatives of economic stakeholders of Lower Saxony have expressed their doubt over the value and importance of nature conservation within N2000 (IMP 2016),

restoration measures may not hinder the functioning of the waterway or Papenburg shipyard, and NGOs committed to forgoing any appeals against the operational period of the Ems Storm Surge Barrier (Masterplan Ems 2050 2015). Dutch economic stakeholders are more inclined towards cooperation when it comes to economic and ecological function of the estuary (IMP 2016).

Dutch NGOs have agreed to be reticent at making appeals against plans further deepening of the approach waterway to Dutch harbours, pending conclusions of ongoing research and MIRT evolution (Eemsdelta 2015). Because economic interests and use of the waterway as the situation is now, are very much tied to the altered hydromorphology and because of the assurances given to economic stake-holders, it is not certain that the 'needs' of the river system will be sufficiently upheld in the decision-making process.

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