

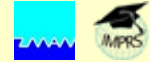
Potential impacts of agricultural land use changes on the Eiderstedt peninsula (Schleswig-Holstein, Germany) on important bird habitats and species abundance



P. Michael Link¹, Christine Schleupner^{1,2}

¹ Research Unit Sustainability and Global Change, Center for Marine and Atmospheric Sciences, Hamburg University

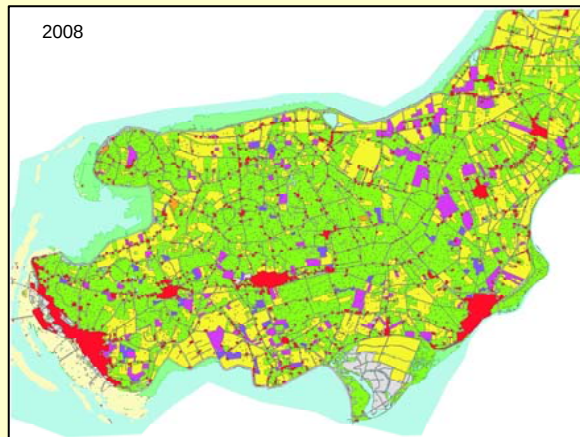
² International Max-Planck Research School on Earth System Modeling, Hamburg



Agricultural land use on Eiderstedt

The Eiderstedt peninsula has a long agricultural tradition dating back several centuries. Most of the time the dominant feature of the landscape on Eiderstedt has been extensively used grassland, which is generally utilized for cattle and sheep grazing. These anthropogenically managed wetland areas are also valuable resting, feeding and breeding habitats of many (endangered) bird species.

Currently, the landscape on the peninsula is subject to massive changes. Administrative plans to declare Eiderstedt a bird sanctuary based on the *NATURA 2000* guidelines are heavily opposed by local farmers. They attempt to intensify the agricultural production in order to improve their competitive position within the EU. During the last few years the share of grassland has declined considerably in favor of arable farm land and efforts to drain areas for crop production have been intensified. It is expected that two thirds of the grassland areas are lost within the next two decades.



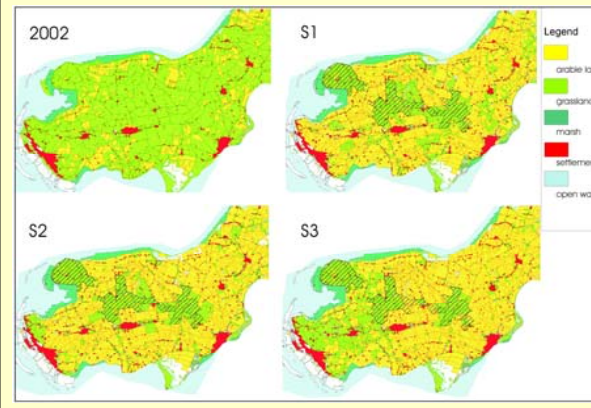
year	agriculturally used land (ha)	share of grassland	share of arable farm land
1949	23 691	80%	20%
1960	23 264	84%	16%
1970	25 771	90%	10%
1979	25 973	80%	20%
1983	25 943	75%	25%
1987	25 504	74%	26%
1991	25 698	76%	24%
1995	25 504	78%	22%
1999	24 668	77%	23%
2003	24 016	73%	27%
2008	25 705	60%	40%

Source: Statistikamt Nord (1950-2004), own empirical survey

Scenarios of future agricultural land use

The local farmers' union plans to increase the share of arable farm land on Eiderstedt to two thirds of the overall agriculturally used land within the next two decades. Such a step is considered necessary to satisfy the increased demand for forage crops for an intensified dairy production. Additionally, a number of biogas plants are currently built or planned on Eiderstedt that need large amounts of biomass for operation, which should ideally be grown locally.

The impacts of such land use change are determined for three possible scenarios. In all scenarios, the share of grassland declines to approximately one third by 2025. The conversion takes place either mainly along the already existing infrastructure on Eiderstedt (S1), originates from already existing arable farm land (S2), or progresses from east to west (S3).



Impact on breeding bird populations

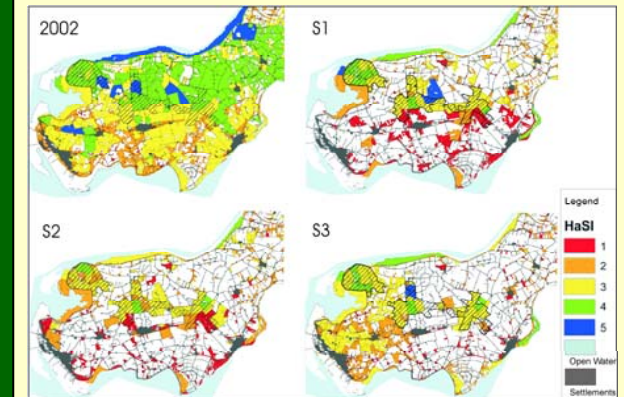
Density assessments of the breeding bird abundance of Northern Lawping, Black-tailed Godwit, Common Redshank, and Eurasian Oystercatcher are related to the results of the *HaSI* analysis for 2002. The results indicate that the breeding bird density mirrors the quality of the grassland: the higher the *HaSI*, the larger the breeding bird density. This not only confirms the validity of the *HaSI* assessment, it also allows predictions of future potential breeding bird abundances based on the three scenarios.

A continued conversion of large areas of grassland to arable farm land is likely to result in a disproportionately high reduction in the breeding populations of the four species covered. The reductions in breeding bird abundance are particularly pronounced in the scenario in which the land use change originates from already existing arable farm land, as the deterioration of habitat quality in the remaining grassland area is greatest due to the large degree of habitat fragmentation resulting from this scheme.

Evaluation of the habitat sensitivity

An index of habitat sensitivity (*HaSI*) is developed for this assessment. It is based on various parameters and is a measure to quantify the possible consequences of the land conversion for the breeding bird habitats. The index combines information on the proximity of the areas in question, the environmental quality of the surrounding areas, as well as size and fragmentation of the breeding habitats.

An initial assessment is conducted for the base year 2002 and for all scenarios for the year 2025. A comparison of the three scenarios shows large discrepancies in the geographic structure of the resulting *HaSI*. In all scenarios, however, a distinct reduction in the quality of the remaining grassland areas can be observed. This is particularly the case in the eastern part of the peninsula and in the three bird sanctuaries on Eiderstedt.



Expected breeding bird abundance on Eiderstedt

HaSI	density	2002	S1	S2	S3	HaSI	density	2002	S1	S2	S3
1	0.03	3	64	47	15	1	0	0	0	0	0
2	0.12	292	158	224	266	2	0.03	86	40	56	67
3	0.31	2973	838	860	1195	3	0.08	732	216	222	308
4	0.52	4804	373	200	328	4	0.19	1652	136	73	120
5	0.65	740	207	0	85	5	0.37	420	118	0	48
Eurasian Oystercatcher		8812	1640	1331	1889	Black-tailed Godwit		2890	510	351	543
1	0	0	0	0	0	1	0	0	0	0	0
2	0.02	58	26	37	44	2	0.09	230	119	168	200
3	0.06	564	162	167	231	3	0.24	2208	649	666	925
4	0.13	1160	93	50	82	4	0.34	3148	244	131	215
5	0.23	265	73	0	30	5	0.67	765	213	0	88
Common Redshank		2047	354	254	387	Northern Lawping		6351	1225	965	1428