BUND Pilot Project: Biotope network at the municipal level – From Planning to Implementation, Baden-Württemberg (Germany)

In Germany, the legal and planning framework for the establishment of a biotope network h as been in place since 2002 through inclusion in the Federal Nature Conservation Act. Nevertheless, there is a gap between theory and practice at all levels of planning. This article describes the framework conditions for the implementation of a state-wide biotope network at the municipal level and the steps from planning to implementation. It highlights challenges and successes and shows the opportunities for further municipal commitment to a state-wide biotope network.

Framework conditions for the planning and implementation of the biotope network

In addition to habitat loss, the fragmentation of habitats is one of the main causes of threat to numerous plant and animal species in Germany, including the southern German state of Baden-Württemberg. Climate change is exacerbating the situation for countless species, as climate-induced migration movements end at the nearest road, settlement or intensively used agricultural and forestry land (Hallmann *et al.,* 2017; Reck and Kaule, 1993). For various species this leads to small, isolated populations between which no genetic exchange can take place (Andersen *et al.*, 2004). In the long term, such populations cannot survive and biodiversity is lost (Max Planck Society, 2019). It is therefore essential to create a green infrastructure that links isolated protected areas sensibly and reliably with corridors and stepping stones.

This problem was recognized in Germany and in 2002 the legal framework for the implementation of a nationwide biotope network and the strengthening of connectivity between biotopes was created (§§ 20, 21 BNatSchG). Since the BNatSchG was amended in 2009, it has also been stipulated that at least ten percent of the area of each German state should be part of the biotope network. The development of the biotope network systems in the individual federal states is spatially specified according to national guidelines. A biotope network system is therefore made up of various components:

- core areas that are intended to represent permanent habitats and already possess a semi-natural character,
- connecting elements that can be developed as stepping stones or corridors and are intended to ensure spreading and migration movements,
- the surrounding landscape matrix that should be hospitable to life and permeable to species movements.

In Baden-Württemberg, the biotope network was legally enshrined in the State Nature Conservation Act in 2015 (§22 NatschG); its further development in the State's nature conservation strategy was decided as a goal and focus (of strategy) (LUBW, 2014a). The "Sectoral Plan for the State-wide Biotope Network" was developed as a comprehensive planning basis (LUBW, 2014b). The biotope network in Baden-Württemberg is enshrined in the landscape planning, so that it must be taken into account in land-use and development plans at the municipal level. However, despite the legal and planning

framework, there is a discrepancy between theory and practice at all planning levels. In Baden-Württemberg, the implementation of the sectoral plan has so far only taken place selectively at the municipal level. To advance implementation, the State of Baden-Württemberg initiated several pilot projects in 2015, which have largely been completed in the meantime.

The Federation for the Environment and Nature Conservation Germany (BUND) – one of the largest nature conservation associations in Germany – applied for and carried out one of these projects, because the loss of habitat of countless plant and animal species in Baden-Württemberg is increasing. In order to ensure the survival of many species in Baden-Württemberg, an ecological network must be created that connects isolated habitats. It is still unclear how the legislator's mandate to valorize and secure this ecological network should be implemented. This is where the BUND project comes in. The project was divided into three fields of action:

Field of action 1

The aim was to implement and secure concrete biotope network measures in the pilot municipalities. To this end, various measures and project approaches were tested that can be transferred to other municipalities.

Fields of action 2 and 3

These deal with communication and public relations and the related dissemination of the project results. The Baden-Württemberg Ministry for the Environment, Climate and Energy funded the project to a considerable extent. The implementation of the project started on July 1st, 2015. At the beginning and middle of 2017, the biotope network plans were available and the implementation of the measures could begin. Various measures were implemented by the end of the project in April 2020.

Planning and implementation at the local level

For the selection of the pilot municipalities, research was carried out across Baden-Württemberg. The selection criteria were:

- The classification of areas amongst those recognized as being of specific ecological interest, for example with regard to the core area sizes and their position in space (barriers, connecting potential, etc.) in the "Sectoral Plan for the State-wide Biotope Network";
- The existence and status of planning guidance documents;
- Local contacts that support successful project implementation, for example from the administration or association sectors.

With the help of these criteria, the two pilot municipalities of Nürtingen and Stockach were ultimately selected and a cooperation agreement was reached.

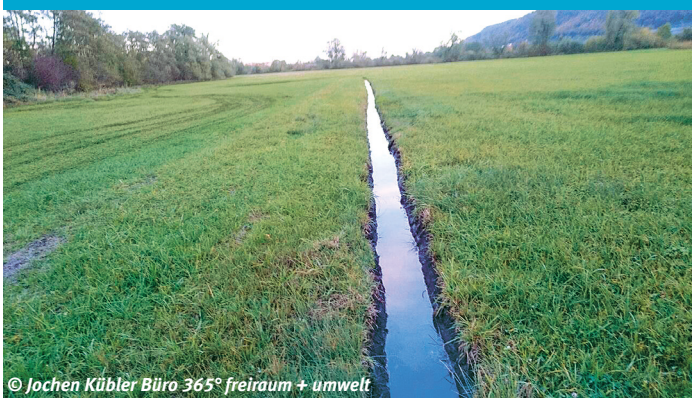
The Nürtingen planning area is located in the Esslingen county in central Baden-Württemberg and is approximately 46.80 km² with 42,048 inhabitants in 5 urban districts. The Neckar river flows through the municipality from south to north. The planning area is located in the Swabian Keuper-Lias-Land and partially covers the natural areas Filder and the Middle Alb Foreland. Land use in Nürtingen is divided into 27% settlement and transport infrastructure, 30% forest and approx. 40% open countryside (63% arable land, 33% permanent grassland, 2% orchards). Protected areas occupy 54% of Nürtingen's area.

The Stockach planning area is located in the Constance county in the south of Baden-Württemberg and is approximately 69.3 km2 in size with 17,000 inhabitants in 10 (urban) districts. Stockach is located west of Lake Constance between the natural areas of Hegau and Lake Constance. In addition to species-poor cultivated grassland, there are also moderately (species-) rich wet meadows. In the southwest of the district there is the nature reserve "Schanderied", which is home to a remarkable variety of species in the moor grass meadows that can still be found there.

One planning office was commissioned for each pilot municipality to prepare the municipal biotope network plans. It identified priority measures to strengthen the state-wide biotope network in the pilot municipality. The planning offices used several materials and documents for this purpose: biotope network planning, biotope mapping, Fauna-Flora-Habitat (FFH) hay meadows mapping, geodata (municipal boundaries, data from the official land register information system (ALKIS), orthophotos), map services of the Baden-Württemberg State Institute for the Environment, Survey and Nature Conservation (LUBW) and the FVA (Forest Research and Testing Institute Baden Württemberg), and the sector plan for the state-wide biotope network. In addition, expert knowledge from local actors was consulted and own overview inspections were carried out. A biodiversity check (LUBW, 2013) was only carried out by the planning office in Stockach at the beginning of the project; this was already available in Nürtingen. The focus for defining the priority measures was on species with high potential and specific needs for protection or action. It was also placed on securing and optimizing existing habitats in the core areas, rather than developing new areas.

Action plans were drawn up for precisely delimited areas; these plans also represented the availability and ownership of the parcels. In addition, animal and plant species were listed, the occurrence of which was to be promoted by the implementation of the measures.

❶ Reopened, once silted up ditch for the enhancement of wet grassland in a protected biotope in the municipality of Stockach. Various species can colonise the edges of the ditch, including the Great Burnet (*Sanguisorba officinalis*).



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❷ Great Burnet (*Sanquisorba officinalis*). The Great Burnet serves as food plant for the caterpillars of the Dusky and Scarce Large Blue and is therefore essential for the development of these specialized butterfly species.

These are less mobile, mostly flightless species. In order to develop suitable measures to strengthen the biotope network for these special species, it was important to examine which target species could potentially occur in the area or would benefit from corresponding measures. Special protected areas and a description of the soil structure (loamy, sandy, etc.) supplemented the plans, which also reflected the development goal, the associated measures and a cost estimate that took into account initial and follow-up costs. The measures were planned as detailed as possible, but the municipalities still had to make additional plans and take care of the implementation of the planned measures.

In both pilot municipalities, two round tables and several meetings took place in the field, supported by various experts. Together with the pilot municipalities, planning offices and other actors, BUND decided which of the proposed measures could be implemented, if possible, within the project period of five years.

An example of a successfully implemented measure is the upgrading of wet grassland in a protected biotope and thus in a core area of the local biotope network of the pilot municipality. The area concerned is owned by the pilot municipality and has a size of 2500 m². Target species on the measure area are the Dusky and Scarce Large Blue (*Phengaris nausithous* and *Phengaris teleius*), amphibians such as the European Tree Frog (*Hyla arborea*) and birds such as the White Stork (*Ciconia ciconia*) or the Stonechat (*Saxicola rubicola*). This is an area of low-lying marshland, which was damp in places, but showed potential for improvement. Using the action plan as a basis, the pilot municipality was able to reopen silted up ditches in sections, create ponds and develop damp tall forb meadows along ditches and hollows (Photo ❶).

The implementation of these measures was realized according to the estimated costs of about 5,000 € plus 500 €/year for the maintenance mowing and leads to the development of species – and structure-rich wet grassland. The European Tree Frog can now settle in the ponds and the Great Burnet (*Sanguisorba officinalis*, Photo ❷), an important food plant for the caterpillar of the Dusky and Scarce Large Blue, develops along the edges of the ditches.

Challenges, successes and opportunities of the biotope network

Individual measures were successfully implemented in both pilot municipalities. However, since it was a five-year project and many actors were involved, there were some challenges.

Firstly, it is necessary to have a network of committed people, associations or other institutions on site. Ideally, there is even a permanent contact person on site, who will support the measures even after the project has ended. However, the involvement of many actors in the project is no guarantee of successful planning and implementation. It is extremely important that also the authorities concerned recognize the importance of the biotope network and work on constructive solutions. Another challenge is the location of the potential areas concerned. Land owners are sometimes unwilling to make their areas available or to cooperate in implementing measures or it is simply too time-consuming to be in contact with several land owners of sometimes very small areas. This is an argument in favour of concentrating during planning on municipal areas or those that can be acquired by the municipality.

Despite the challenges, there have been many successes. In one pilot municipality, each core area was assigned a conservation measure that corresponds in its demarcation to the core area and thus ensures its permanent conservation. Development measures were assigned to the development areas (potential core areas). In one of the pilot municipalities, a contribution was thus made to biotope connection and the state-wide biotope network on a total area of approx. 9.5 ha, and six biotope network measures were implemented. In the second pilot municipality, five biotope network measures were implemented, of which about 1.5 ha were initial planting and 4.5 ha adaptation of upkeep.

The project promoted the cooperation of individual local actors from the fields of nature conservation, agriculture, hunting, local government and many others. The topic of the biotope network was not only examined within the pilot municipalities, but also through (high-profile) public events, both inter-municipal and state-wide. Effective tools for communication were, for example, the biotope network travelling exhibition created as part of the model project, which can be borrowed by interested parties. Other examples include press events for the groundbreaking ceremonies, and excursions to the areas concerned. In addition, a film was produced for a better understanding of the project (**www.bund-biotopverbund.de**).

Conclusion

This biotope network planning initiative is certainly considered as a useful support and development framework by the pilot municipalities. Nevertheless, there are still a few points to be worked on. On the one hand, various authorities and municipalities have to pull together much more in order to ensure the project runs smoothly and avoid delays. On the other hand, it is of utmost importance that projects for the purpose of the state-wide biotope network receive higher prioritisation within the county funding programmes and that more funds are made available as a result.

Through the BUND project "Biotopverbund Offenland" (Open Countryside Biotope Network), the biotope network gained a higher profile in both pilot communities. The population and the project participants perceived the (maintenance) measures of the individual biotopes as positive. In addition, there is great interest in the municipalities in continuing to maintain the areas concerned and to implement projects for the purpose of the state-wide biotope network. This will also help to achieve the legally required ten percent. In addition to the increased interest in the biotope network, progress in the flora and fauna has already been observed in certain fields of action. For example, only one year after the establishment of certain small water bodies, Stoneworts (Charophyceae) were detected. The FFH habitat type 3140 (hard oligo-mesotrophic waters with benthic vegetation of *Chara spp.*) has thus developed well. This habitat type is usually rather rare in Baden-Württemberg as well, since most small still water bodies are fed with nutrients from surrounding agricultural land. Furthermore, the occurrence of water frogs was observed at a reopened ditch, which could not have found a suitable habitat there before the implementation of the measure. Further successes will certainly appear in the coming years. The biotope network is essential for the preservation of valuable animal and plant habitats. In Baden-Württemberg, first steps were taken to establish the biotope network by initiating various pilot projects. However, successes have so far been achieved rather intermittently at the municipal level. The BUND - Regional Association Baden-Württemberg was able to contribute and further expand its biotope network expertise in the project described. One thing is clear: if the biotope network is to be implemented in the area in a timely manner, intensive involvement is required, if necessary right up to an actual legal obligation on the part of the municipalities. In view of the devastating extinction of species, the biotope network must imperatively also receive financial support. ■

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Acknowledgments

The presented project is supported by:

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