



More wilderness for Germany: Implementing an important objective of Germany's National Strategy on Biological Diversity



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ARTICLE INFO

Keywords:

Wilderness

Germany

National Strategy on Biological Diversity

ABSTRACT

There are numerous reasons for the establishment of more wilderness areas. The issue is becoming more and more important worldwide, considering the increasing natural disruption. This also applies to densely populated countries like Germany. The National Strategy on Biological Diversity (NBS) sets goals for preserving and establishing more wilderness areas in Germany: 2% of the national land territory shall be designated to become large-scale wilderness areas and 5% of the forested areas in Germany are to be preserved as permanently unused woodland (areas). There may be partial overlaps since large forest areas of unused woodland qualify for both wilderness targets.

The implementation of these wilderness objectives is achieved within the political framework through public administration activities, scientific work and communication.

As a result of these activities a definition for wilderness areas in Germany as well as quality criteria for large wilderness areas in Germany have been developed. Furthermore, the potential for large wilderness areas was identified on a surface-oriented basis. These potential areas cover approximately 3.5% of Germany's land territory and can be found in woodlands, watercourses, coastlines, peatlands and high mountain ranges as well as in former military training grounds or mining areas.

To support the wilderness targets, the Federal Government has made 156,000 hectares of federal land available as 'National Natural Heritage'. To date, approximately 0.6% of the national land territory is protected as large-scale wilderness areas and approximately 1.9% of the forested area is designated to be permanently unused woodland; however, there is still a gap of 1.4% (large areas) and 3.1% (forests), to fulfill the targets of the NBS.

It is shown, that no starting point of the natural state can be defined for 'wilderness areas'. For a particular area to be classifiable as a wilderness area, natural processes without or with very slight human influence must be ensured.

Our analysis reveals that the goals for more wilderness areas in Germany are ambitious, but achievable. The first steps for their realization, like the establishment of specific goals, the development of specific strategies and programs by the federal states and the demonstration of a realistic potential for more wilderness areas in Germany have been taken. However, the road to reach these goals is still long, and in the following years there is a continual need for numerous concerted activities by the relevant stakeholders in the field of wilderness.

1. Introduction

1.1. General overview

The perception of wilderness is a human figure of thought, which can only be perceived in relation to cultural landscapes (e.g. Callicott & Nelson, 1998; Hoheisel, Kanger, Schuster, & Vicenzotti, 2010; Jessel, 1997; Nash, 2001; Spanier et al., 2013; Trommer, 1997) or 'in contrast

to areas where man and his works dominate the landscape' (U.S. Wilderness Act 1964).

The wilderness idea has its conceptual roots in the U.S.A. of the 19th century (Kathke, 2010). With the Wilderness Act of 1964 the US government manifested a growing awareness of the value of wilderness in the U.S.A. with a distinct definition of wilderness and the designation of the first wilderness areas. In Western and Central Europe, nature conservation in the 19th century was focused on the preservation and

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management of cultural landscapes or selected species with a focus on mammals and birds (Brüggemeier & Engels, 2005). Not before the 20th century, the importance of unused land and its values for the preservation of the whole set of biodiversity was more and more understood (e.g. Schenck, 2015; Schuster, 2010; Vancura, 2012). Since then, numerous wilderness initiatives in several European countries have been launched (Martin et al., 2008). One main reason for this development was the increasing extent and intensity of land use with the consequence that natural landscapes in Europe became more and more rare. Hence, the main objective for the protection of wilderness in large areas is to counteract the prevailing use and destruction of nature by preserving unspoiled nature and providing space for natural dynamic processes.

Wilderness protection is usually understood as *‘protecting large, relatively undisturbed natural areas that are free from buildings, roads and other human-made artefacts and where natural forces and processes predominate’* (Bastmeijer, 2016). According to the IUCN, wilderness areas (management category I b) should be *‘unmodified or slightly modified land and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to reserve its natural condition’* (Dudley, 2013).

There are ecological, social, economic and also aesthetical rationales for the protection of wilderness (e.g. Kropp, 2010; Martin, 2012). Wilderness protection can be particularly justified by the protection of biodiversity, observation and mitigation of climate change effects, ‘the chance to learn’ (i.e. outdoor laboratory), the consideration of future generations, the possibility of education for sustainable development and the recreational function of wilderness areas (e.g. FZS, 2016; SRU, 2016). Thus, there is a variety of arguments for allowing or establishing (more) wilderness.

Similarly, there are numerous obstacles for tolerating more wilderness areas, especially in the largely cultivated and densely populated landscape of central Europe. It is obvious, that the demand for additional, large wilderness areas as well as smaller sites can compete with established land use and the interests of land-owners. Economic interests such as agriculture, forestry and wood industry as well as hunting and fishing are often opposed to more wilderness areas (SRU, 2016). In addition, ecological challenges like climate change and the demand for renewable energy have to be taken into account. Further challenges arise within the field of nature conservation considering the German situation: Former military areas are on the one hand particularly suitable for the establishment of wilderness areas, because they are largely free of settlements, overall relatively unfragmented and unaffected e. g. by intensive agricultural use. On the other hand, those landscapes often provide equally important and rare refuges for management-dependent habitats and their typical often rare and endangered animal and plant species. Often there is a (legal) obligation for their preservation (e.g. Natura 2000 species and habitats; Ellwanger & Ssymank, 2012; Schumacher & Johst, 2015). Thus, the implementation of wilderness and wilderness areas needs political will, scientific substantiation and the ability to compromise. In large areas, zonation can help to follow both targets. In other places, priorities have to be defined taking into account larger landscape contexts. But apart from all compromises, it must be clear, that all activities permitted in wilderness areas must not *‘undermine the fundamental wilderness quality of the protected area’* (Kormos, 2008).

1.2. Wilderness in Germany in an international context

For further considerations, it is important to take a closer look at the German situation. Germany is a densely populated country in the center of Europe. The situation is widely different from many other European countries, especially in northern Europe with large, almost unsettled areas or areas with low population density. Germany is a federal republic with 16 federal states with their own administrations and laws.

The German federal states are responsible for a wide range of nature conservation issues. This also applies for the designation and management of large nature conservation areas (e.g. national parks, biosphere reserves).

Except for parts of the Alps and the Wadden Sea, there is no primeval wilderness left in Germany (EEA, 2016; Riecken & Finck, 2015). Germany was originally covered almost completely with woods. Nowadays, only one third of Germany is covered by woodlands which are predominantly shaped by centuries of forestry. There can be no doubt, that forests not used by man are an important element for the preservation of their characteristic biodiversity. Therefore, the establishment of (secondary) wilderness areas is the most important approach and a particular challenge for many stakeholders having different ideas and objectives for the use of land in mind. How can these obstacles be overcome? How can opportunities be created and used? In this paper the German approach is presented and discussed.

2. Fields of action

There are four fields of action that have been particularly addressed to put wilderness targets on the German conservation agenda:

- **Legal framework and political process:** Developing strategies and visions and setting long-range goals are major objectives for politics. The aim is to create suitable political conditions for promoting and adopting appropriate concepts and leveling the path for the implementation of declared targets. In particular, human and financial resources must be allocated to political objectives, because otherwise their implementation cannot be guaranteed. Also, decisions have to be made to provide state owned estates, mainly state forests or former military properties for the implementation of (new) wilderness areas.
- **Scientific work:** The political goals and objectives are usually outlined in general terms. For their detailed understanding and therefore the clarifications and implementation, more specific definitions and guidelines are necessary. Scientific knowledge is often needed to prepare and support their development. In this context a comprehensive landscape analysis was conducted to provide information on the potential for wilderness areas in Germany.
- **Administrative work:** Public administrations are responsible for the implementation of political commitments and targets into practice. This also applies to the realization of wilderness targets. Federal states and regional/local administration have to designate wilderness areas. The national government can, however, create a content-related and financial framework to help the federal states in establishing wilderness areas. This may include the support of projects to acquire wilderness areas as an important aspect. The financial support for the purchase of land is a crucial factor in this context.
- **Communication:** An appropriate political framework, comprehensive administrative activities and scientific research are important for the successful implementation of wilderness targets. However, an accompanying communication strategy to support these wilderness targets is also essential. This communication should address relevant stakeholders, multipliers and the general public to generate and spread acceptance and support. Non-governmental nature conservation organizations play an important role in this context in Germany.

Especially the political and administrative objectives to implement wilderness targets are strongly influenced by the German federal structure. In the following chapters, current results in implementing more wilderness areas in Germany in those four fields of action are presented and discussed.

3. Results

3.1. Legal framework and political process

The Federal Act on Nature Conservation and Landscape Management (Federal Nature Conservation Act, BNatSchG) sets the legal framework also with regard to wilderness. In article 1, it contains as a general provision, that ‘*protection shall include management, development and, as necessary, restoration of nature and landscape*’. Moreover, actions are to be taken that ‘*certain parts of landscapes shall be permitted to undergo natural dynamics*’ as well as ‘*development of self-regulating ecosystems, in suitable areas, is to be permitted, and sufficient space and time are to be allowed for such development*’.

With article 6 of the Convention on Biological Diversity (CBD) of 1992 the contracting parties agreed to ‘*develop national plans for the conservation and sustainable use of biological diversity*’ (United Nations, 1992). To implement this target, the German government adopted a ‘National Strategy on Biological Diversity’ or National Biodiversity Strategy (NBS) in November 2007 (BMU, 2007). It comprises 28 visions, 330 concrete targets and 430 fields of action. Vision B 1.3.1 concerning wilderness says: ‘*Germany again boasts fascinating areas of wilderness which are left to develop naturally and undisturbed. Our aims: By the year 2020, “Mother Nature” is again able to develop according to her own laws throughout at least 2% of Germany’s national territory*’ [corresponding to approx. 714,000 ha].

Vision B 1.2.1 in the NBS focuses on woodlands and says: ‘*By 2020, forests with natural forest development account for 5% of the wooded area*’ [corresponding to approx. 554,000 ha]. Furthermore, there are specific wilderness targets in the NBS for coastal areas and the sea, watercourses and peatlands as well as high mountain ranges. According to the NBS, wilderness areas should be integrated into ecological networks, which shall – according the German Nature Conservation Act – cover at least 10% of the terrestrial area of Germany.

The wilderness targets of the NBS correspond to the European Strategy on Biological Diversity of 2011, especially Target 3, Action 12: ‘*Integrate biodiversity measures in forest management plans*’ and as one focal point: ‘*preserve wilderness areas*’ (European Commission, 2011). The wilderness targets of the NBS also meet increasing public acceptance, as a survey on nature awareness in Germany revealed in 2013 (BMUB/BfN, 2014).

With the adoption of the NBS in 2007 and its quantified wilderness targets, the German government laid – for the first time – an essential political basis for more wilderness areas in Germany. Additionally, in October 2015 ten priority objectives and 40 actions were set in the ‘Nature Conservation Offensive 2020’ by the German Ministry of Environment (BMUB, 2015), which has the political leadership in implementing the NBS targets. In this political program, wilderness is one of ten fields of action with two measures: In addition to an initiative by the federal government for more wilderness areas in Germany, more public awareness for wilderness should be generated. The first measure aims to intensify the exchange and cooperation between the national and the federal state level, since the federal states are responsible for establishing wilderness areas. This can be reached by enhancing communication efforts. Due to the consideration of NBS wilderness objectives in the Nature Conservation Offensive 2020, these targets were strengthened and became a political focus. As a result, nowadays more political backing exists for the administrations in their future work on the topic of wilderness. Since 2011, the national government has also implemented new funding opportunities to promote biodiversity that can be used for the establishment of more wilderness areas in Germany. Another important instrument for the implementation of the wilderness targets is the establishment of the ‘German National Nature Heritage’. Under this heading about 156,000 hectares of land originally owned by the national state are transferred to federal states, public and private foundations and private nature conservation organizations for exclusive conservation purposes (BMUB/BfN, 2015). Some 33,000 ha will

continue to be owned and managed by the German national government itself (i.e. federal forest and nature conservation administrations). The woodland areas of the ‘National Nature Heritage’ are basically designated – possibly after a multi-year transition period – for wilderness establishment with the exception of those sites, where an ongoing habitat management is compulsory due to legal obligation to preserve Natura 2000 habitats (Reiter & Dörpinghaus, 2015).

3.2. Scientific work

3.2.1. Wilderness definition for Germany and current situation

For the identification and implementation of forests with natural development and wilderness areas clear definitions as well as concrete (quality) criteria are essential. Based on the specific German situation (see ch. 1.2) and regarding the targets of the German NBS as well as international definitions for wilderness areas of the IUCN, the Wild Europe Initiative or the European Wilderness Society (Dudley, 2013; WEI, 2013; EWS, 2015), the following definition for ‘wilderness areas in the sense of the NBS’,¹ in Germany has been developed:

‘Wilderness areas in the sense of the NBS are sufficiently large, (predominantly) non-fragmented areas free of intrusive or extractive human activity. They serve to permanently provide for the ecological functioning of natural processes without human interference.’ (Finck, Klein, & Riecken, 2013)

This definition was developed in 2012 as a result of a scientific workshop, organized by the German Federal Agency for Nature Conservation (BfN/Bundesamt für Naturschutz, 2016).

At present most of the wilderness areas in Germany are found in core areas of national parks (NP) and within a few larger nature conservation areas. Considering the terrestrial landscape within the 16 NP and further large nature conservation areas, their established and designated areas add up to roughly 210,000–225,000 ha. This corresponds to about 0.6% of the total area of Germany (35,712,350 ha). Therefore, a considerable gap can be stated to the 2% wilderness target called for 2020 by the NBS.

3.2.2. Potential wilderness areas

To fulfill the 2% target of the NBS, new wilderness areas have to be established and protected in wilderness-suitable ecosystems. In Germany, these are woodlands, watercourses, coastlines, peatlands and high mountain ranges (Rosenthal et al., 2015). Furthermore, large potential wilderness areas were identified in post-mining landscapes and former military estates, which often consist of and develop into different ecosystems (Fig. 1). The 2% target set in NBS ‘*is an invitation to restore many such often degraded habitats into large functional ecological units*’ (Finck & Riecken, 2013).

To promote the establishment of wilderness in Germany, BfN has launched and funded a number of Research and Development (R & D) projects and expert consultations on wilderness related topics.

In 2012 the Universities of Kassel and Freiburg started a study, funded by BfN, to elaborate search areas for potential wilderness areas in Germany. These search areas should fulfill essential requirements for wilderness areas (e.g. minimum continuous area size, absence of permanent settlements). A major part of this project was a landscape analysis. In this study, the following criteria were applied to identify potential wilderness areas:

- (almost) no permanent settlement or infrastructure
- no dissection of the area by roads and railroad lines
- little disturbance by adjacent infrastructure or settlement
- compactness of the area

¹ hereafter only called ‘wilderness areas’ containing large ‘wilderness areas’ (> 3,000 ha) and ‘wild areas’ (1,000 – 3,000 ha) as defined by e.g. the Wild Europe Initiative (WEI, 2013)



Fig. 1. Areas with wilderness character in Germany. Top left: Old growth forest on the Isle of Vilm (Mecklenburg Western Pomerania); top right: alpine floodplain of the river Isar (Bavaria); down left: former military training area Lieberose (Brandenburg); down right: coastal dunes on the island of Amrum (Schleswig-Holstein). All photos by U. Riecken.

- minimum continuous area of 500 ha (for fens, bogs, coastal areas and riparian zones) and 1000 ha (for high altitude mountains, woodlands and forests, former military and mining areas).

‘Degree of naturalness’ was not included into the set of criteria, because this study addressed both areas already considered wilderness as well as areas, which can evolve into wilderness in the future and which are far from a pristine natural state. This resulted in a first – rather rough – framework for the identification of search areas for actual and future wilderness areas in the sense of the 2% wilderness target of the NBS.

As a result of the R & D project approx. 517,292 ha of potential wilderness areas with a high proportion of retained pristine character (WP) were identified as a search area for the establishment of future wilderness areas. Additionally, about 738,904 ha, which have been obviously altered by (former) human utilization (WNP), were found including former military and mining areas. In total, this amounts to approx. 1,256,196 ha corresponding to 3.5% of the German terrestrial area (Opitz et al., 2015; Rosenthal et al., 2015). This is well above the target value of 2%. However, in this analysis land ownership and permanent protection of wilderness targets on these areas have so far not been considered, due to lack of data at the national level. Furthermore the potential wilderness areas are heterogeneously distributed over the federal states (Fig. 2).

Nevertheless, the main message is that in Germany the spatial potential for fulfilling the 2% target does exist.

Especially on large former military or former mining areas, great opportunity exists for future wilderness areas (Table 1, Fahlke, Rauhut, & Stöcker, 2015; Riecken & Finck, 2015; Schumacher & Johst 2015). Also, floodplains and fens should be target areas for the establishment of wilderness areas. In both cases, synergies with other environmental targets like addressing climate change and contributing to flood control occur. This should facilitate future discussions and public relation work (ch. 3.4). Currently, on former mining areas access is severely restricted by the authorities for tens of thousands of hectares of land due to risks of landslides. Since adequate restoration required to make land use

possible again will probably cost some seven-digit sums of Euro per hectare, the state authorities of the concerned federal states, esp. Brandenburg and Saxony, have started to consider non-conventional restorations, like allowing for large-scale wilderness establishments on parts of the former mining areas. Although budget consideration should not be the main argument for a modification of nature conservation targets, this situation offers the possibility for the establishment of further wilderness areas in Germany.

Already in 2010 BfN launched a study to get a first overview on existing woodlands and forests corresponding to the 5% target of the NBS. The definition and criteria for areas eligible for the 5% target are different from those of the 2% target: A minimum size of 0.3 ha and the permanency of the ecological designation and the protection that affords are the crucial criteria in this context (Wildmann et al., 2014). It is obvious, that an overlap between the two targets exists, as forests with natural development exceeding the minimum area of to the 2% wilderness target are contributing to both targets.

As a result from a study on existing permanently unused woodlands and forests (5% wilderness target; Engel et al., 2016) it can be stated, that in the year 2013 approx. 213,000 ha out of roughly 11,000,000 ha of forested area in Germany could be addressed as naturally developing woodlands or forests without human interference. This study furthermore assumed that by 2020 the area of uncultivated forests will increase by about 44,000 ha. In these areas, it is legally or contractually defined, that no (further) utilization of forest resources will occur in the future. However, only approx. 87,000 ha of these 213,000 ha accounted for continuous and non-fragmented woodland or forests areas fulfilling the basic criteria of the R & D project for wilderness areas according to the ‘2% wilderness target’ of NBS (see above) and therefore can be addressed as wilderness areas (Fig. 3).

A large part of potential wilderness areas is covered by forests (about 700,000 ha, Table 1). Future efforts to reach the 5% natural forest target should therefore mainly be concentrated on large forests, which also fulfill the criteria for the 2% target (see above). To complete the system of large wilderness areas, an additional focus should be brought on suitable landscapes outside of forests.

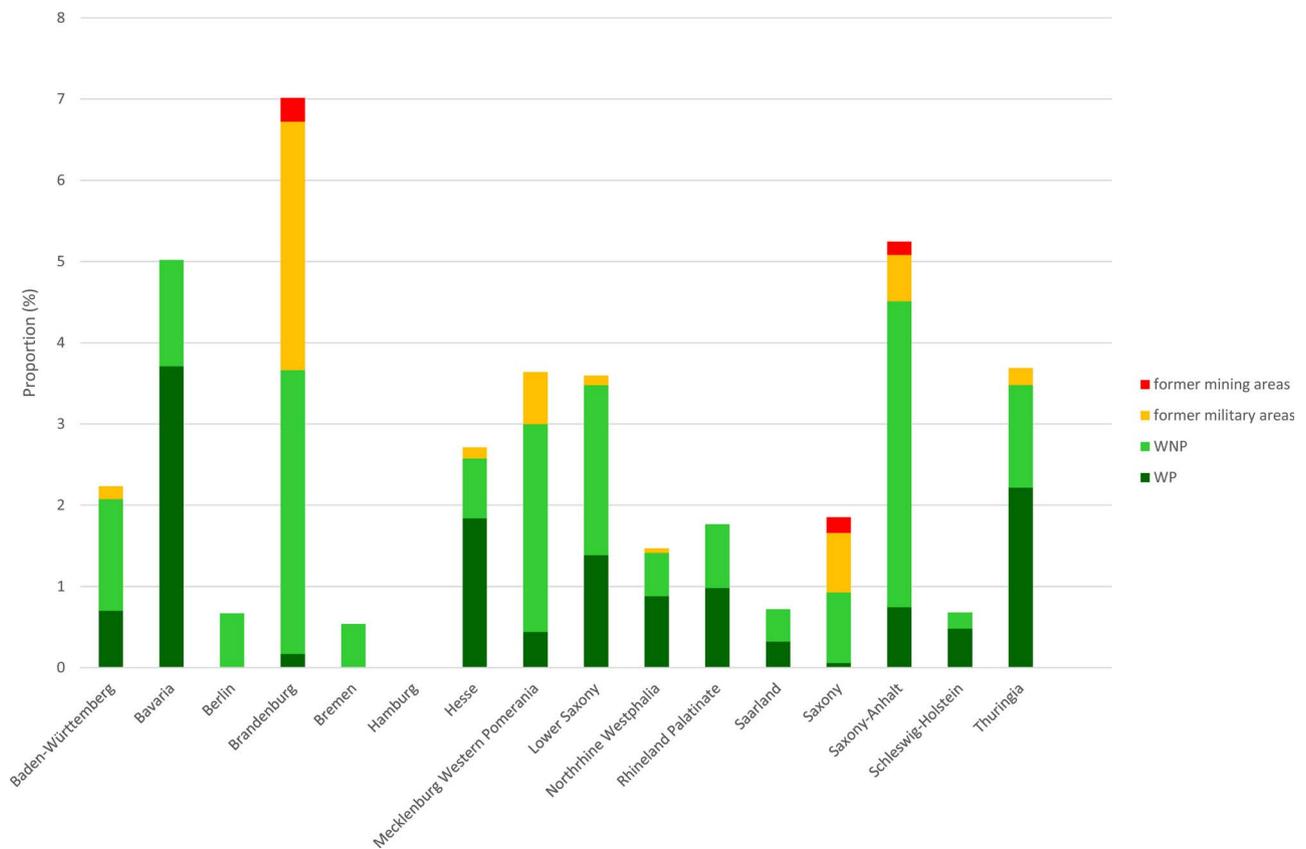


Fig. 2. Proportion of wilderness areas in the federal states, differentiated between ‘wilderness areas with a high proportion of retained pristine character’ (WP), ‘wilderness areas with little retained pristine character’ (WNP), former military areas and mining areas (modified after Rosenthal et al., 2015).

Table 1
Distribution of potential wilderness areas in various landscape types in Germany.

landscape types	ha	% ^a	number	minimum size (ha)
coasts	26,276	0.07	24	500
peatlands	85,870	0.25	103	500
woodlands and forests	702,961	1.97	342	1000
high altitude mountains	103,036	0.29	9	1000
floodplains	172,047	0.48	170	500
former military areas	150,417	0.42	61	1000
former mining areas	15,589	0.04	10	1000
sum	1,256,196	3.52	719	

^a Percentage of total German landscape.

3.3. Administrative work

In addition to an accepted definition for wilderness areas (ch. 3.2.1), there is the need for developing criteria to identify existing and potential wilderness areas in the sense of the 2% target. Due to the German situation – especially the lack of spacious pristine nature – it was not possible to unconditionally adopt existing international criteria (e.g. WEI, 2013; EWS, 2015). For a valid review of wilderness areas it is, however, indispensable to have a system of criteria and standards mutually agreed on by the responsible administrations at the national and federal state levels. Preferably, these criteria and standards should also be supported by the relevant nature conservation NGOs. In 2014 Europarc Deutschland was commissioned to work out a first draft of quality criteria for wilderness areas in Germany in collaboration with GOs and NGOs (Europarc Deutschland e.V., 2015). Europarc Deutschland has also developed the existing quality criteria for the evaluation of the German national parks (Europarc Deutschland e.V., 2008 a,b).

This proposal was further elaborated by BfN in cooperation with the corresponding unit of the German Federal Ministry of the Environment and discussed with the responsible administrations of the federal states as well as a broad alliance of nature conservation NGOs. It resulted in a basic set of criteria for the selection of wilderness areas in Germany that was published in 2017 (BMUB/BfN, 2017).

The establishment of wilderness areas can currently be funded under several federal programs (see Box 1). The programs are equipped with an amount of two-digit million Euro of total funding per year. In addition to German national funds listed in Box 1, more funding options are available at the EU level, such as the Life Plus program, which is co-financed by the member states of the EU.

As mentioned before, the task to implement the objectives of the wilderness targets of the NBS lies mainly with the administrations of the federal states. They have continued to fulfill this task by the recent designation of new national parks (e. g. Black Forest in 2014, Hunsrück-Hochwald in 2015, a memorandum of understanding for a third national park in Bavaria 2016) or the inclusion of wilderness provisions in the federal states’ nature conservation acts (e.g. North Rhine-Westphalia and Schleswig-Holstein).

3.4. Communication

In 2015, the Frankfurt Zoological Society has started a special project for ‘wilderness communication’ in cooperation with several NGO partners, which is financially supported by the German Federal Ministry of the Environment. The main objective of this project is to raise more awareness for the NBS-targets to establish more wilderness areas in Germany. This is crucial in the effort to achieve the 2% wilderness target of NBS.

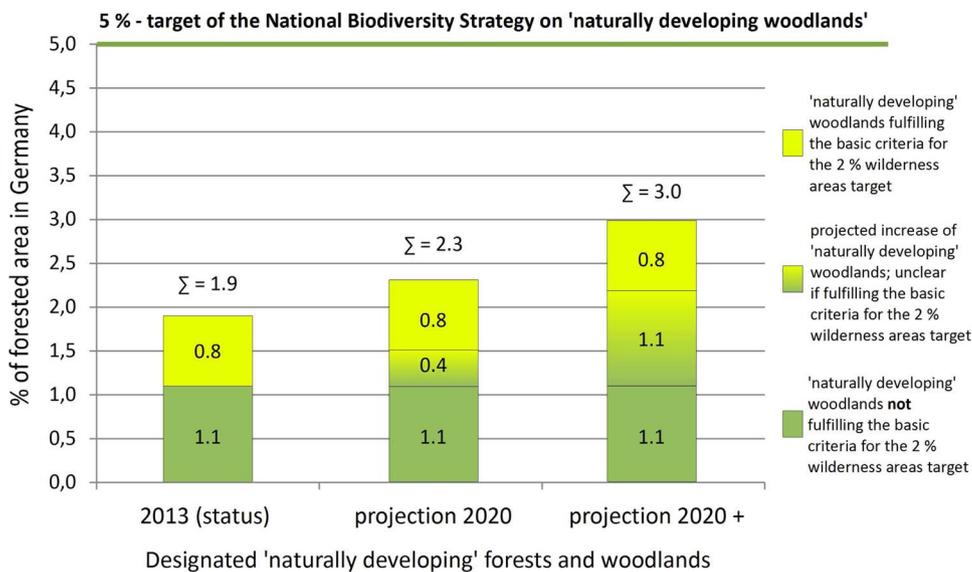


Fig. 3. Projected development of the area of uncultivated forests in Germany and overlap with areas fulfilling the 2% wilderness area target of the NBS.

Box 1

Project funding of German national state with wilderness components (BfN, 2016)

- Large-scale conservation projects
- National program for biodiversity
- Research and development projects
- Testing and development projects
- National flood protection program
- National program on waterways and flood plains (Bundesprogramm Blaues Band)
- Climate program (e.g. for peatland)
- Promotion of nature conservation associations

Essential elements of this project are:

- development of a viable concept for wilderness communication
- preparation and publication of important arguments for wilderness in specialized publications and targeted communication to decision-makers, relevant multipliers and stakeholders such as local and regional authorities, nature conservation organizations and consultants
- close monitoring of the wilderness debate with respect to the discussion in the European context
- creation of a website as a central platform for the national wilderness debate
- organization of discussions and symposia
- provision of materials to be utilized by various local and regional wilderness initiatives

Several of these elements to enhance 'wilderness communication' in Germany have already been finalized: The website www.wildnis-in-deutschland.de has been launched in January 2016 and a short image film (<http://wildnisindeutschland.de/film/>) has been produced. The integration and coordination of the wilderness-involved NGOs in Germany is of particular importance in the framework of this project. By now already 18 of the most important German environmental associations and foundations support the shared goals for more wilderness areas in Germany (see www.wildnis-in-deutschland.de).

In order to promote professional exchange between authorities and the most important NGOs, BfN has also launched a series of workshops. For this purpose, representatives of several relevant GOs and NGOs as well as from scientific institutions have met several times since 2012 at the International Academy for Nature Conservation of the BfN on the

Baltic island of Vilm (Finck et al., 2013, Finck et al., 2015). The first series of workshops ended in 2016 but will be continued, since these workshops have proven to be a very effective platform for communication and the establishment of joint activities.

4. Discussion and conclusion

4.1. Some important aspects of wilderness and wilderness areas

A comprehensive and accepted definition of wilderness exists neither globally nor for Europe or Germany. All previously published rough definitions of wilderness (see also ch. 1. and 3.) represent merely different approaches. This is not really surprising, since the term wilderness is multi-faceted and allows different interpretations depending on the rationales of the approach (Voigt, 2010). Nevertheless, wilderness 'as an object of rational politics should be free of desires and myths as much as possible' (Spanier, 2015). It is at best possible to describe wilderness as dynamic processes in a more or less broad frame. The same is true for the term 'wilderness areas', even if the perspective changes from the theoretical level of wilderness as an idea to the concrete area related perspective. To operationalize the target of the German National Strategy on Biodiversity on wilderness areas, a clear definition has been developed and is widely accepted (Finck et al., 2013;).

The central purpose of protecting wilderness areas allows natural processes without human interference. To make this general target more concrete, quality criteria will function as an operative frame (ch. 3.2). The members of the Wild Europe Initiative have described natural processes from their perspective (WEI, 2013). They divide those dynamic processes in abiotic (wind, water, fire, boulders / avalanches,

climate) and biotic (animals, habitats, nutrients) natural processes. The scope and quality of these self-determined processes depend on various factors such as the scale or external influences.

If nature can function without any (intentional) human influence and if thus dynamic processes widely unaffected by humans are possible, a defined target state is obsolete and impossible to formulate. However, since the protection of biological diversity is an argument for the establishment of wilderness areas (ch. 1.1) scientific monitoring should be allowed in wilderness areas. Its objective is not assessing 'good' or 'bad' qualities of wilderness areas, but to gain a snapshot of the state of wilderness areas and to use it in the context of an 'instrumental process protection' (sensu Böhnert et al., 2015). There is a good chance, that plants and animals with high nature value will develop in wilderness areas, but we will never know beforehand, what exactly will happen. Thus, natural processes may fulfill many conservation aims, but in wilderness areas these aims will have to be reached without active human interference.

Prevention, control and management of invasive species are regulated in Article 8 (h) of the CBD as a task for the contracting states. Since 2015 there is also an EU regulation on invasive alien species (European Union, 2014) and by July 14th, 2016 the first EU list of invasive alien species of union-wide importance was published. However, appropriate management to control invasive species in wilderness areas should be executed only in strictly regulated exceptional cases to ensure the widely undisturbed course and overarching aim of natural processes in the core zone of wilderness areas. While allowing for appropriate management measures to control the spreading of listed invasive alien species from the wilderness area into their surroundings, the spread of invasive alien species within the wilderness areas should be tolerated. This leads to the conclusion, that the 'degree of naturalness' as an exclusive criterion for the quality of wilderness areas is not an appropriate one, at least in central Europe. Consequently, even areas that currently do not show a high degree of naturalness have the potential to evolve into a 'new' wilderness. The necessary condition for these areas is that *natural processes* without or with very little human interference are permanently secured in the future. This will eventually lead to more naturalness.

4.2. Conclusion and outlook

In 2007 the German government adopted ambitious targets in the NBS concerning the establishment of wilderness areas. These objectives were recently affirmed by the 'Nature Conservation Offensive 2020'. Steps to intensify the effort to implement the NBS wilderness targets were launched from 2010 onwards. These are comprehensive and cover politics, administration, scientific work and public relations. Considerable resources are provided for these targets in human, structural and financial terms. Concerning the implementation of NBS wilderness objectives relating to awareness, strategies, programs and plans, good progress can be stated.

Several research projects have shown that the NBS wilderness targets in principle are achievable even in a densely populated country like Germany. However, it is the public sector, which is typically required to implement the NBS wilderness objectives, even if some private owners of large estates are also willing to contribute to these tasks (Opitz et al., 2015).

The wilderness targets of NBS have actually been included in many programs and strategies of the federal states. In some federal states, there are wilderness concepts in preparation with specific ideas and steps for their implementation.

Nevertheless, it is still a long way to achieve the wilderness targets of the NBS in Germany. Obstacles include conflicts between stakeholders, which often occur during the process of establishing new wilderness areas - not only in Germany. Land users, in particular, see their interests endangered in this process. In Germany, e.g. the forest sector and timber industry doubt the necessity of large areas to

adequately protect wilderness. They claim that the wilderness target could be just as well fulfilled with many small areas. Some even challenge in principle the wilderness targets of the NBS, especially the 2% target for large wilderness areas. Also regarding the sustainability of the protection status, the positions differ fundamentally. This makes the existing sets for quality criteria for both wilderness targets of the NBS (BMUB/BfN, 2017; Engel et al., 2016) particularly important as a basis for further discussion.

The implementation of plans and programs to establish more wilderness areas in Germany requires especially the following activities in the years to come:

- evolution of further appropriate areas of the National Nature Heritage towards wilderness areas
- search for further potential forests with natural development and wilderness areas (e. g. former mining or military areas)
- provision of suitable areas by the German federal states
- advancement of conceptual aspects (e. g. quality criteria, fitting concepts for Natura 2000 and wilderness)
- evaluation of the contribution to climate change mitigation e. g. by peatland wilderness projects
- creation of new funding opportunities for the establishment of forests with natural development and wilderness areas using synergy effects
- enhancement of wilderness communication with stakeholders of other sectors as well as the general public
- intensification of communication between national government and federal states with respect to the wilderness targets
- establishment of a monitoring system with standardized methods and parameters as a kind of 'outdoor laboratory'

Acknowledgement

We thank two anonymous reviewers for their valuable suggestions to improve the manuscript and Samuel Heisterkamp for coediting the final text. We are also grateful to Annika Seelen and Dan Cunningham for revising the English text.

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