

Article

Germany's UNESCO Global Geoparks and National GeoParks: Experiences from a Two-Tier System

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Abstract: Initiatives in Germany were among the pioneers of the international geopark movement. The Vulkaneifel Geopark was involved in the development of the first international geopark initiative at the end of the 1990s, establishing the European Geoparks Network in 2000. In addition, the national geoscientific community opted early, since the year 2000, for an additional national label, with the idea of establishing more geoparks than then possible if they had relied solely on the international certificate. Currently, eight geoparks in Germany are both National GeoParks and UNESCO Global Geoparks. A further ten geoparks are recognized as National GeoParks. After more than two decades, the two-tier system in Germany appears to be a successful approach. Opportunities as well as challenges of such a two-tier geopark system, are addressed in the article.

Keywords: UNESCO Global Geopark; National GeoPark; two-tier system; Germany; Swabian Alb; European Geoparks Network



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1. Introduction

Geoparks are regions with a high-quality geoheritage endowment, a unique geological and landscape history, and a strategy for sustainable regional development, linked to scientific research, environmental education, and education for sustainable development. Moreover, clearly defined boundaries and an institutional structure capable of territorial action are required. In addition to the existence of geosites of supralocal importance, archaeological, ecological, and cultural aspects should also be addressed. Although the naming might suggest this, geoparks are not a legal nature conservation category. However, as geoheritage is the crucial foundation, geoparks must ensure its preservation [1]. On the other hand, geoparks are also key areas for sustainable geotourism [2] as defined in the Arouca Declaration [1] and are seen by UNESCO [3] as model regions for sustainable development, which, with the help of a holistic concept, should combine both conservation and regional economic added value creation in an extensive bottom-up participation process [4].

Both nationally and globally, the geopark movement is characterized by a very high dynamic with strongly growing numbers. To date, however, on a global scale, there is a very uneven spatial distribution with clear concentrations of geoparks in Europe and China. This does not mean that other regions do not have sufficient geopotential; what they have usually been missing so far is corresponding initiatives, research, and geosite inventories. Meanwhile, the African Geoparks Network (AUGGN) [5] was founded in order to promote the rich geodiversity of Africa and the Middle East and to raise awareness among the local population as well as decision-makers in order to establish geoparks. Here, too, the initiators hope that this will lead to sustainable regional development through geotourism [6]. Analogously, other mostly continental networks exist worldwide.

Initiatives in Germany were among the pioneers of the international geopark movement [7]. In 1994, the first German geopark, the Gerolstein Geopark, was established in

the Eifel region [8]. This took place at a time when geoparks in today's sense did not yet exist. The Vulkaneifel Geopark was then also involved in the development of the first international geopark initiative at the end of the 1990s, establishing the European Geoparks Network in 2000. By 2004 another five German geoparks were recognized as European Geoparks and integrated into this Europe-wide network. In addition, since the year 2000 a national initiative began to develop in Germany, leading to the recognition of National GeoParks and a Germany-wide network in 2002. In 2015, six German members of EGN automatically received recognition as UNESCO Global Geoparks (UGGp) in 2015. Today, eight geoparks in Germany are both National Geoparks and UGGp. A further ten geoparks are recognized as National GeoParks. The following article presents the experiences from the German two-tier system, the opportunities as well as the challenges, embedded in general remarks on geoparks and geotourism.

2. Materials and Methods

The article is based on extensive literature research, analyses of the websites of all German National GeoParks and detailed interviews with various key players. Both of its two authors have accompanied the development of the German geoparks for more than two decades in positions of responsibility (one as secretary of GeoUnion, the other as vice-president of UGGp Swabian Alb), which has enabled them to gain essential insights into the historical development and current design of the German geoparks that would not have been possible for an outsider.

3. Theoretical Background: Geoparks and Geotourism

The historical development, tasks, and objectives as well as different geopark levels are presented in the following chapter.

3.1. Historical Development of Geoparks

Unlike national parks (1872) and biosphere reserves (1971), the geopark movement did not emerge until the late 1990s [9–13]. After the introduction of the Man and Biosphere Programme in 1971 and the UNESCO Convention concerning the protection of the World Cultural and Natural Heritage, it became apparent after two decades that geological heritage was significantly underrepresented [14]. The global value of geology, geodiversity, and geoconservation for the society was highlighted in 1991 by the ProGEO's Working Group with the 'Digne Declaration on the Rights of the Memory of the Earth' [15]. Therefore, already in the late 1990s, a UNESCO Global Geoparks Programme was proposed [16], intending to 'promote a global network of geoparks safeguarding and developing selected areas having significant geological features' [17]. At the same time, problems associated with an earlier form of geologically motivated travel became manifest. Tours to fossil and mineral sites offered for a special tourist demand segment were sometimes accompanied by a plundering of the visited destinations [18]. This affected, among others, the Réserve Géologique de Haute Provence (France) and the Lesvos Petrified Forest (Greece). Together with Gerolstein/Vulkaneifel (Germany) and the Maestrazgo Cultural Park (Spain), these four initiators, supported by the EU's LEADER funding program, started the geoparks movement in Europe, with the objectives of protecting the geological and geomorphological heritage of their areas on the one hand and promoting sustainable regional development through geotourism on the other hand [10,11,19–21]. The European Geoparks Network (EGN), set up in 2000, is now a protected trademark in all countries of the European Union [1]. The network ensures the exchange of expertise and experiences through regular conferences, as well as the development and monitoring of compliance with quality standards to safeguard the sustainability of geotourism offers [1]. Active participation of members in the network is obligatory [22]. The EGN served as the cradle organization for the process of global geoparks institutionalization in general and has seen a stunning success since its establishment, with actually 94 European Geoparks from 28 European countries [1].

Just one year after its foundation, the EGN signed an agreement with UNESCO to place the network under its patronage [1,14,19]. The original plans to establish an independent UNESCO geoparks program [16,17] had failed in 2001 for various reasons including financial problems, but also opposition by the Man and Biosphere program for fear of a potential ‘downgrading’ of the UNESCO Man and Biosphere designations [14,23]. Nevertheless, the Global Geoparks Network (GGN) was formed in 2004, through which the European geoparks cooperated with initially eight Chinese geoparks under the patronage of UNESCO. Autumn 2015 marked the date of geoparks finally becoming a UNESCO project or, to be more precise, one important column of the updated International Geosciences and Geoparks Programme (IGGP), a program managed by UNESCO and co-managed by IUGS (International Union of Geological Sciences) for the international Geosciences Programme.

UNESCO Global Geoparks must have an internationally significant geoheritage, produce a management plan that is accepted by all stakeholders, take into account the social and economic needs as well as the cultural identity of their inhabitants, ensure the protection of the landscape and include governance, development, communication and conservation measures. In addition, UNESCO Global Geoparks are required to provide relevant information both online and in hard copy, have a corporate identity and must be active as participants in both the Global Geoparks Network and the regional network which they belong to, in order to learn from each other and improve the quality of the label, but ultimately also contribute to a peace-building process [3]. The UNESCO program has prompted many countries to elaborate appropriate development strategies [24], especially in countries of the Global South where initiatives for geoparks are emerging [25]. In total, 177 UGGp are currently recognized in 46 countries, with significant concentrations in Europe and China [3].

The recognition of a UNESCO Global Geopark is based on strict rules and is subject to evaluation at regular intervals, which guarantees a high degree of fulfillment of the designation criteria. Failure to meet these criteria can result in the withdrawal of the designation; e.g., in 2019, Sardinia Geopark lost its status as UGGp [26] as well as the French meteorite impact L’Astroblème de Rochechouart (Aquitaine) before [27].

As a matter of fact, the use of the term “geopark” on its own is not and nowhere protected by law. As a result, there are also areas and even enterprises (e.g., a Latin American oil company [28]) that call themselves geopark without having gone through any recognition procedure. No quality standards can therefore be guaranteed for these areas.

3.2. Tasks and Objectives of Geoparks

Geoparks are based on a “new and pioneering approach” that is founded on linking sustainable regional development with regions that have outstanding geosite ensembles [8]. With the inclusion of the GGN geoparks into the UNESCO Geosciences and Geoparks Programme in 2015, UNESCO recognized the idea that sustainable regional development can also evolve from the conservation and enhancement of geoheritage [25]. Accordingly, the UGGp are to be established as model regions for sustainable development and take on a role model function for the regional anchoring and implementation of the Sustainable Development Goals (SDGs) [3]. The tasks of UGGp go far beyond conservation and marketing of the regional geoheritage. UGGp use their geological heritage in conjunction with the region’s other natural and cultural heritage to promote awareness and understanding of important societal issues, such as the sustainable use of our Earth’s resources, mitigating the effects of climate change and reducing the risks associated with natural disasters. By communicating the importance of regional geoheritage in the past and for today’s society, UGGp strengthen residents’ identification with and pride in their region. Geotourism opens up new sources of income, creates additional jobs and innovative local businesses, and stimulates education and training; at the same time, regional geological resources are protected [29]. In this respect, geoparks are equivalent to biosphere reserves, only with a geoscientific focus [30].

3.3. *The Two Levels of Geopark Certificates*

Since 2015, ‘UNESCO Global Geopark’ has been the unique international certificate for geoparks, and geoparks automatically become members of the corresponding regional geoparks network (Asia Pacific Geoparks Network, European Geoparks Network, Latin American and Caribbean Geoparks Network, African UNESCO Global Geoparks Network).

Several countries have also initiated national geopark programs, including Germany (see Section 4 for details). In East and Southeast Asia in particular, several countries have a two-level system with UGGp and national geoparks. Indonesia has, in addition to six UGGp, also thirteen national geoparks [31]. China has, besides 41 UGGp, also a comprehensive network of national geoparks [32,33]. Korea has six national geoparks [34]. Nine national geoparks now exist all over Taiwan, with none of them having currently a chance to be certified as UNESCO Global Geopark [35]. In Japan, thirty-seven national geoparks exist, in addition to nine UGGp and ten aspiring geoparks listed as associate members (Japanese Geoparks Network 2022). [36] discussed the potential of a national geopark in the Republic of Tatarstan (Russia). In contrast to the worldwide UNESCO program, which provides uniform guidelines for all countries, the national geopark programs vary greatly from country to country, which also makes the recognition procedures and quality standards of the national geoparks globally very heterogeneous.

4. National GeoParks in the Federal Republic of Germany

As in a number of other countries, there are, today, two levels of geopark categories in Germany—a result of the historical evolution: UGGp (which were EGN and GGN geoparks until 2015) and National GeoParks. On the one hand, German institutions were among the world’s pioneer geoparks [37]; on the other hand, the national geoscientific community opted early for an additional national label with the idea of setting up more geoparks than possible if they relied solely on the international certificate. Opportunities and challenges of such a two-tier regime are addressed in the following sections.

4.1. *Historical Development of Geoparks in Germany*

In Germany, as with many other countries (see Section 3.3), the emergence of geoparks may indeed be regarded as a bottom-up process par excellence. Distinctly separate from national political or administrative initiatives, geoparks emerged in specific regions with a high potential for geotourism and geoscientific outreach, where individual activists first heard of the notion of a “geopark”—or even invented it (along with other initiatives in other parts of the world). As early as 1993, geologist and geopark initiator Marie-Luise Frey published an essay on the first attempt to establish a geopark characterized by cenozoic volcanism in Germany, in the Gerolstein area of the Eifel uplands [38]. The Gerolstein Geopark in the Eifel, initiated in the early 1990s, was one of the forerunners of the international geopark movement and ultimately also the cornerstone of the Vulkaneifel Geopark [37]. Others joined the movement, establishing the first geoparks in Germany: FEMO, an environmental organization in the region north of the Harz mountains, created in 1997; the Netzwerk Erdgeschichte (Earth History Network) in South-west Germany with the Geopark Swabian Alb (see Section 5 and [39]); the nature park of Bergstraße-Odenwald, embracing and presenting a transect of the Upper Rhine rift valley and its hinterland; and ice age relics explorers in Mecklenburg in North-east Germany. As in other parts of the world, this process was greatly assisted by the then director of the UNESCO Division of Earth Sciences, Wolfgang Eder, a German researcher based in Paris.

With these bottom-up initiatives—and, as time advanced, more associations all over the country—drawn to the topic of geoparks, the administrative branch of the geoscientific community became in turn involved in the process, specifically the experts in the geological survey offices of the federal states of Germany (in the constitutional framework of the Federal Republic of Germany, geology is an issue to be governed by the federal states rather than by the federal government; nation-wide issues are dealt with in a committee where the representatives in charge of geology from both the national state and the federal states

administrations meet, the so-called BLA-GEO (Bund-Länder- Ausschuss Bodenforschung)). The dynamics of the geopark movement led to the geological surveys being “literally overrun with requests” [22], and a national certificate for geoparks was soon regarded as the adequate solution. To guarantee quality standards [22] it was BLA-GEO who seized the opportunity and created the certificate “National GeoPark in Germany” in 2002 [40]. The introduction of the seal of quality “National GeoPark” was also intended to curb the inflationary use of the geopark term at the time, which had “virtually mushroomed” since the end of the 1980s [8]. In addition, [41] also questioned the maximum number of designated geoparks and their spatial delimitation. They saw the danger that the “geopark inflation” in the mid to late 2000s as well as the partly existing geological overlaps (several designated geoparks mainly characterized by quaternary processes) could ultimately lead the geopark idea “ad absurdum”. The important criterion of unique selling points was no longer given. In addition, the lack of legal protection of the basic term “geopark” as such had led to small-scale exhibitions of boulders as well as selective geo-information (nature trails, display boards) without an overall underlying concept also being designated with the term geopark [42], including company names such as “Geopark Büro und Gewerbecenter” (Geopark Office and Trade Centre) in Reutlingen, which cannot show any correspondence with geology or tourism in terms of content. This is also the reason that the National GeoParks are written with a capital P as a brand symbol.

Guidelines for the geoparks’ qualifications and the assessment process were drafted by a special working group (commissioned by the BLA-GEO), comprising mostly representatives from the geological surveys of the federal states, most of whom at that time were also active in a working group on geoconservation and geosites of the German Geological Association (Deutsche Geowissenschaftliche Gesellschaft). The guidelines were adopted by the BLA-GEO in early 2003 [40]. In addition, GeoUnion Alfred-Wegener- Stiftung (the umbrella organization representing both the associations of the different geoscientific disciplines in Germany and the major research institutes involved in geosciences) was chosen as the institution to organize the certification procedure for the geoparks, i.e., to appoint an expert committee for the assessment and the evaluation of the geoparks, Zertifizierungskommission Nationale GeoParks (ZNG). The guidelines were designed very much on the basis of and in accordance with the EGN guidelines for geoparks [43]. There are, however, some minor differences between the two systems. For example, EGN stresses geoconservation and emphasizes the aspect of the protection of geosites, being rather critical with regard to collecting rocks and fossils and the economic exploitation of the geological resources, whereas the German national seal seeks to create a correspondence and active interplay between geoconservation on the one hand and the sustainable economic utilization of mineral resources.

The first German National GeoParks submitted their applications to GeoUnion in 2002 and 2003. They were promptly assessed, and on 1 July 2003, the first four German geoparks—Geopark Bergstraße-Odenwald, Geopark Harz.Braunschweiger Land.Ostfalen, Geopark Swabian Alb and Geopark Mecklenburgische Eiszeitlandschaft—received their certificates (Table 1) in a joint-venture ceremony of both the Federal Ministry for Education and Research and GeoUnion, and were awarded by the Minister for Education and Research and the president of GeoUnion.

In 2007, in order to increase the special brand recognition of the National GeoPark seal GeoUnion created a new specific logo for the German National GeoParks. This logo was designed for marketing purposes and represents the umbrella brand of geoparks in Germany in general. This emblem has since been used in Germany in communicating geoparks to the public (Figure 1).

Table 1. Geoparks with certification status in Germany (authors' design).

Geopark	Category	Year of Certification	Federal State	Main Features	Overlapping Territories	Homepage
Bayern-Böhmen	National GeoPark	2010	Bavaria (crossing the border with the Czech Republic)	Gneiss und Amphibolite (Precambrian); Franconian Jura Karst; cenozoic and quaternary volcanism of Eger Graben	Nature park	https://www.geopark-bayern.de/de/index.html (accessed on 22 December 2022)
Bergstraße -Odenwald	National GeoPark UNESCO Global Geopark	2003 2015	Baden-Württemberg, Bayern, Hessen	Upper Rhine Valley; crystalline basement overlain by Buntsandstein and Muschelkalk; Cretaceous and cenozoic volcanism	Nature park; 3 UNESCO world heritage sites	https://geo-naturpark.net/ (accessed on 22 December 2022)
GrenzWelten	National GeoPark	2009	Hesse; North Rhine-Westphalia	Rhenish Massif (Silurian, Carboniferous); Zechstein, Buntsandstein, Muschelkalk, cenozoic volcanism	Nature parks; Nationalpark	https://www.geopark-grenzwelten.de/ (accessed on 22 December 2022)
Harz. Braunschweiger Land, Ostfalen	National GeoPark UNESCO Global Geopark	2003 2015	Lower Saxony; Saxony-Anhalt; Thuringia	Sedimentary and igneous rock from paleozoic volcanism (Devonian, Carboniferous, Permian)Raw material deposits (coal, salt, iron ore) → rich mining history	Nationalpark 3 Nature parks	https://www.harzregion.de/de/ (accessed on 22 December 2022)
Inselsberg. Drei Gleichen	National GeoPark UNESCO Global Geopark	2008 2021	Thuringia	Crystalline basement; sediments and volcanism of Rotliegend; mining history	Nature park	https://www.geopark-thueringen.de/ (accessed on 22 December 2022)
Kyffhäuser	National GeoPark	2009	Saxony-Anhalt; Thüringen	“Pult-clod” (Pultschollen) mountains from Paleozoic rocks; Buntsandstein and sedimentary Muschelkalk; History and mythology (the legend of Barbarossa)	Nature park	https://www.geopark-kyffhaeuser.com/ (accessed on 22 December 2022)
Laacher See	National GeoPark	2005 (together with Vulkanneifel)	Rheinland-Palatinate	Center of the Eifel's cenozoic and quaternary volcanism	–	https://www.geopark-laacher-see.de/ (accessed on 22 December 2022)
Muskauer Faltenbogen	National GeoPark UNESCO Global Geopark	2006 2015	Brandenburg, Saxony; crossing the border with Poland	Glacial forms; push end-moraines from the Elster Ice Age	UNESCO World Heritage Site Fürst Pückler Park	https://www.muskauer-faltenbogen.de/ (accessed on 22 December 2022)

Table 1. Cont.

Geopark	Category	Year of Certification	Federal State	Main Features	Overlapping Territories	Homepage
Porphyryland	National GeoPark	2014	Saxony	Northwest Saxon's volcanic complex of 900 km ² , one of the largest areas in Central Europe from the Rotliegend period	–	https://www.geopark-porphyrland.de/ (accessed on 22 December 2022)
Ries	National GeoPark UNESCO Global Geopark	2006 2022	Bavaria; Baden–Württemberg	Meteorite impact crater; Karst landscape	Nature park	https://www.geopark-ries.de/ (accessed on 22 December 2022)
Ruhrgebiet	National GeoPark	2006	North Rhine–Westphalia	Mining region from the Devonian to the Permian; world's first metropolitan Geopark	Nature park	https://www.geopark.ruhr/ (accessed on 22 December 2022)
Schieferland	National GeoPark	2019	Bavaria; Thuringia	Paleozoic slate Underwater diabase volcanism (Devonian)	3 Nature parks	https://www.geopark-schieferland.de/ (accessed on 22 December 2022)
Schwäbische Alb	National GeoPark UNESCO Global Geopark	2003 2015	Baden–Württemberg	Central Europe's largest Karst landscape; cenozoic volcanism (Swabian Volcano)	Biosphere reserve; Nature Park	https://www.geopark-alb.de/ (accessed on 22 December 2022)
Terra Vita	National GeoPark UNESCO Global Geopark	2008 2015	Lower Saxony; North Rhine–Westphalia	Continuous sedimentary deposits since the Carboniferous period	Nature park	https://www.geopark-terravita.de/ (accessed on 22 December 2022)
Vulkanregion Vogelsberg	Nationaler GeoPark	2020	Hesse	Largest cenozoic shield volcano in Central Europe	Nature park	https://www.geopark-vogelsberg.de/ (accessed on 22 December 2022)
Vulkaneifel	National GeoPark UNESCO Global Geopark	2005 2015	Rheinland–Palatinate	Extensive cenozoic and quaternary volcanism; numerous maars	Nature park	https://www.geopark-vulkaneifel.de/ (accessed on 22 December 2022)
Westerwald-Lahn-Taunus	National GeoPark	2012	Hesse; Rheinland–Palatinate	Rhenish Slate Mountains; cenozoic volcanism with large basalt coverings; mineral and thermal sources	Nature parks	https://geopark-wlt.de/ (accessed on 22 December 2022)



Figure 1. Germany’s “National GeoPark” logo (Source: GeoUnion Alfred-Wegener-Stiftung).

Sixteen geoparks were awarded the label “National GeoPark” in Germany between 2003 and 2017. In 2010, one geopark, a member of the original pioneers, Geopark Mecklenburgische Eiszeitlandschaft, was unfortunately required to return the award (together with its EGN certificate) as it was no longer able to safeguard the financial basis for the project. The National GeoPark Vulkanland Eifel, managed by three different organizations in three specific spatial units, asked to be divided into two separate National GeoParks in 2016, given the differences in organizational backgrounds and the fact that one member of the group, Geopark Vulkaneifel, is an internationally certified Geopark (originally EGN, now UGGp) in its own right. These minor changes brought the total number of National GeoParks in Germany in 2017 to 16 once more. Meanwhile, two other regions have been accredited, resulting in 18 German National GeoParks. At present, a new National GeoPark is certified almost every year [9].

4.2. Geoparks in Germany: The Current Situation

The Federal Republic of Germany currently has 18 National GeoParks (see Figure 2 and Table 1). Due to its development from a grassroots movement, no superordinate planning exists until today, so that the spatial distribution of the Geoparks is primarily due to the randomness of individual regional decisions, and the forms of organization vary [9]. In contrast, all National GeoParks are subject to strict criteria to guarantee quality standards (see Section 4.2.1).

4.2.1. Administrative and Legal Context

Quite similarly to the UNESCO definition of a geopark, a National GeoPark contains: “geological sites of any size or an ensemble of several geosites, which are of regional and national geoscientific importance, rarity or beauty, representative of a landscape and its geological history. In addition to the geological ones, it should also include archaeological, ecological, historical, or cultural sites that can be opened up or developed for tourism. A National GeoPark has clearly defined boundaries and has a sufficiently large area to serve local economic development. It must be managed within a clearly defined structure [44].

Furthermore, a National GeoPark must fulfill the following criteria:

- Professional management plan as an integrated planning and action concept;
- Proof of sufficient personnel and financial resources to be able to operate and further develop the geopark in a professionally qualified manner;
- Sustainable economic development in cooperation with all relevant stakeholders;
- Public accessibility and networking of the individual attractions;
- Evidence of appropriate conservation measures for the geosites;
- Evidence of promoting socio-economic development sustainable for culture and the environment;
- Quality assurance for all areas of responsibility;
- Environmental education;
- Scientific teaching and research [44].



Figure 2. Geoparks in Germany (Source: Geo-Union Alfred Wegener Stiftung).

Since a National GeoPark is not a legally binding protection category in its own right, the legally binding designated protected areas and the legal and administrative responsibilities of the federal states on whose territory it is located are not affected [43].

As stated above, National GeoParks are distinctly bottom-up initiatives, organized as special-purpose associations or as cooperations of communal entities (districts or communities). The only existing institutional formalization is through the BLA-GEO's guidelines mentioned above. National GeoParks are not incorporated in the German nature conservation laws like national parks (Nationalpark, of which Germany has 16), or even nature parks (Naturpark; at present, there are 103 nature parks in Germany, covering approximately

28.7% of the surface area of the country). National GeoParks are therefore not official large-scale protected areas, even if the name, their geological heritage and the mostly large area might suggest otherwise. This special status of National GeoParks has the serious disadvantage of the state having no obligation to support them financially and in terms of personnel, and tends to side with the official protected areas in conflict situations. On the other hand, this gives geoparks, not bound by instructions from a higher authority, a free hand in designing their organizational form, etc. [9].

With regard to organization structure, there are no specifications in the guidelines; therefore, the organizational structure of National GeoParks varies. Many National GeoParks are organized as associations with municipal corporations, municipalities or counties as the main sponsors. Others are linked as parts or as subsidiaries to administrations, e.g., of counties [9]. Since recognition as a National GeoPark does not automatically mean corresponding public funding, as is the case for national parks, etc., long-term funding is not assured for the majority of National GeoParks. However, the municipalities and districts, and in some cases also the federal states, support the respective National GeoParks, supplemented by donations and sponsors [22]. The income generated by the National GeoPark's own revenue (possibly entrance fees for certain facilities, payments for guided tours, etc.) are usually relatively low and are not sufficient to finance the park itself.

German National GeoParks are re-evaluated every five years. In its twenty years of existence, Germany's system of geopark assessment and evaluation has substantially contributed to the high quality geoparks National GeoParks have achieved in this country, where quality refers to effective organization, the accessibility of geosites, on-site interpretative sign-posting, the design of geopark trails [45], the preparation of publications (print/online), and the organization of events and activities. On the one hand, continual assessment is, indeed, a demanding task and sometimes an obstacle for a geopark. On the other hand, it is a vital instrument for quality management and control. Additionally, it is a powerful means for the geopark to challenge its own (financing) member organizations to prepare the geopark as much as possible for the assessment process. The first certification is comprised of a lengthy questionnaire and a field inspection by at least two members of the expert group, the revalidation of the certificate requires a progress report set up by the geopark and, if the commission considers it necessary, a field inspection. It is interesting to observe how in Germany institutions, which do not have a formal assessment process for their category, are currently designing such a procedure. For example, nature parks, which are a legal category at both the federal and the federal-states level and usually do not undergo an evaluation, have created the new category of "Quality Nature Park", which involves an inspection by the association of German nature parks very similar to the evaluation of geoparks.

In the past, GeoUnion and the expert group also helped to promote the concept of geoparks in general through their website www.nationaler-geopark.de (accessed on 22 December 2022), print publications and special events. The first leaflet covering the entire selection of geoparks in Germany was produced by GeoUnion, with other publications following, including a special issue on geoparks by the renowned public-science journal "Bild der Wissenschaft" [46]. All these initiatives have been part of GeoUnion's commitment to communicate the tasks and achievements of the geosciences to the general public.

The National GeoParks themselves are organized in a network which can also be joined by regions as associate members that are preparing to be recognized as geoparks. The network has started a number of marketing initiatives for the geoparks and helps to organize the annual German conference on geoconservation issues in spring (held under the auspices of the subcommission "Geosites and Geoparks" of the DGGV, the German association for geological sciences, which also organizes the German "Tag des Geotops (Geosite Day)" in autumn [47].

In addition to the 18 geoparks with a National GeoPark certificate, there are a number of geoparks preparing themselves for the evaluation process and working on their application. Six of them, which have declared themselves as candidates for the evaluation,

are mentioned as “geoparks without certificate” in Figure 2. Additionally, there are more geoparks to come in the near future—either initiatives which are still in the process to find an institutional framework of their own, or existing nature parks which aspire to transform themselves into geoparks, or nature-geoparks for that matter.

Under the new UGGp governance in force since November 2015, the National GeoPark certification commission has also a role in the assessment of UNESCO Global geoparks, their acquired expertise on the geoparks in German is appreciated and used. To oversee the UGGp, the German government, here represented by the Foreign Office, has established a national committee for the German UGGp which monitors the required (pre-)selection and evaluation processes. The guidelines set up associated with these processes are rather ambitious and candidates wishing to become UNESCO Global Geoparks must undergo a pre-evaluation by the National Committee in the year before the UNESCO inspection. In this process of pre-evaluation, the ZNG contributes a statement on the quality and dynamics of the National GeoPark in question. Thus, GeoUnion’s expert group and assessment procedure functions as a kind of pre-screening phase for the selection of new UGGp in Germany. The UNESCO evaluators decide independently, of course, whether a geopark candidacy meets their criteria. However, the pre-screening in Germany ensures that only National GeoParks with a real chance to be recognized as UGGp are presented to the UNESCO evaluators.

4.2.2. Geoheritage and National GeoParks in Germany

The Federal Republic of Germany has a very diverse geoheritage (see Figure 3). While the north and north-east are characterized by the coastal landscapes of the North Sea and Baltic Sea and by glacial formations in the lowlands, most of Germany is occupied by low mountain ranges with Paleozoic or Mesozoic rocks of great geodiversity. In the extreme south, there are again glacial formations and a small part of the Alps [48,49]. Active volcanism is not found in Germany. The most recent documented volcanic eruption was about 11,000 years ago (Ulmener Maar in the Eifel) [50]. Forms of large-scale Cenozoic volcanism can be found in the Eifel, Siebengebirge, and Westerwald in North Rhine–Westphalia, in the Vogelsberg, Rhön, and Hessian Depression in Hesse, and in the Erzgebirge and Egergraben in Saxony [48]. These areas are part of the European Cenozoic volcanic province, which extends from the Massif Central in France to Lower Silesia and can be counted as intraplate volcanism [51].

Most of the UGGp and National GeoParks in Germany lie in the mountainous areas of the Hercynian ridge, which runs from west to east right through the center of Germany (Figure 2); they present the highly variegated uplands geology of Central Europe. Two existing geoparks to the north and east (Eiszeitland am Oderrand (Ice-Age-land on the Oder banks) and Muskauer Faltenbogen (Muskau Arch)), are outside this important threshold. Both belong to the North Central European Lowlands and are characterized by young glacial origins formed during the Pleistocene. To the south of the Hercynian ridge, the upland areas in South-west Germany consist of Mesozoic sediments. The Swabian Alb is essentially a Jurassic mountain range, and Ries is a major impact crater within the Jurassic environment.

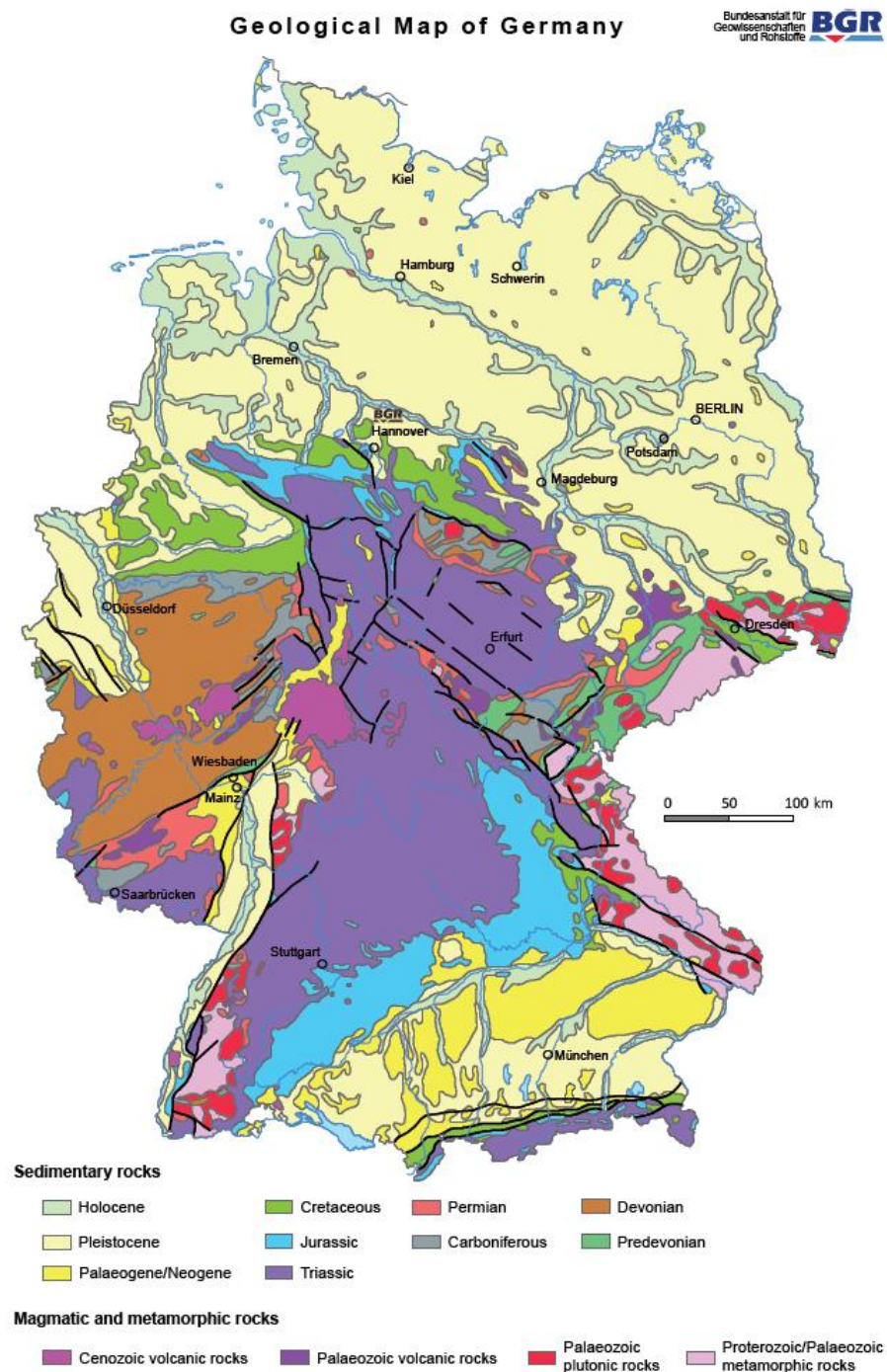


Figure 3. Geology of the Federal Republic of Germany (Copyright: Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) (Federal Institute for Geosciences and Natural Resources), Hannover).

4.2.3. Challenges, Opportunities and Risks of the German National GeoParks

The awarding of the National GeoParks was associated with the hope that this would establish itself as a trend-setting initiative for sustainable regional development within in the framework of Agenda 21 and thus also promote a responsible and conscious approach to the natural heritage [52]. The gap between a purely geoscientific approach and an integrative approach that is oriented towards the goals of sustainable development and also integrates social aspects, however, proved to be problematic. Opposition and criticism came in part from nature conservation institutions, which feared the beginnings of competition between protected area categories [52]. Another problem area turned out to be unclarified

responsibilities as well as parallel developments in national, European and UNESCO Geopark recognition procedure. Formerly areas in the Federal Republic of Germany were able to circumvent the German certification system, including its quality requirements, and apply directly for admission to the UNESCO network [53]. This problem had been solved by the Madonie declaration by UNESCO and EGN (in 2004) on the one hand and later on the German National Committee's guidelines for geopark certification on the other hand (see Section 4.2.1).

As the comparatively young geoparks are usually relatively large, they often overlap with other large-scale protected areas (see Table 1), mostly with nature parks (e.g., TERRA.vita, Bergstraße–Odenwald, Westerwald, Swabian Alb), but also with national parks (Harz, Kellerwald) or biosphere reserves, either completely or in parts (Swabian Alb). It is actually only three of the 18 certified geoparks that do not overlap with any large-scale conservation area of the categories mentioned above: Muskauer Faltenbogen, Porphyrland and Laacher See.

Positive aspects of these area overlaps are seen, for instance, in legal bases for nature conservation measures. For example, several Geo-Nature Parks now exist. In the case of the Volcanic Eifel, the Nature Park was only designated almost a decade after the region was recognized as a Geopark in order to benefit from the advantages of this cooperation. The Vogelsberg National GeoPark is considerably younger than the corresponding nature park, but with its stringent focus on volcanism it offers a unique selling point (feature or perceived benefit of a good which makes it unique from the rest of the competing brands in the market) that is positive for tourism marketing. Other nature parks are now interested in the National GeoPark label, as nature parks cover a considerable proportion of Germany's mainly rural areas (28.7% of the Federal Republic of Germany's surface area [54]), making them increasingly popular [55]. In cooperation with a National GeoPark, nature parks can secure a unique selling point that puts them in a better position to compete with other nature parks. The National GeoParks benefit from this cooperation in terms of nature conservation, better financial and personnel resources, which enables the construction and maintenance of tourist infrastructure (hiking trails, etc.), also guaranteeing the attractiveness of the geopark (e.g., Geopark Ries), and higher visitor numbers. Large protected areas in Germany act as visitor magnets (see [56]), while geoparks (both National GeoParks and UGGp) still show a low level of attention among the general public [9,57,58].

The differences in content between the German National Geoparks and the UGGp are comparatively small, as both schemes developed at relatively short intervals and served as templates for each other. It is therefore not easy to see where there are similarities or differences and what the advantages and disadvantages of the respective geopark classifications with their various networks and seals of approval are [59]. To outsiders, the multiple designations (the Swabian Alb Geopark is a National GeoPark, a European Geopark and an UGGp) are already hard to explain. The various certificates seem to play a surprisingly minor role for visitors, with the UNESCO seal also being considered the most important by the parks themselves [59]. In general, despite the now much more professional set-up, the still very low level of awareness of UGGp and the National GeoParks outside specialist circles is a significant problem.

Since permanent funding and support structures are not secured for National GeoParks in Germany, it is precisely these aspects of large-scale protected areas that could guarantee a permanent stabilization of geoparks in the event of a merger [60]. Some geoparks have also been integrated into LEADER areas (European funding program for rural areas), together with large-scale protected areas and could thus benefit from LEADER funding for projects (e.g., National GeoPark Westerwald) [61]. Only in one case is there joint marketing (National GeoPark Vogelsberg) with a focus on geopark and geoheritage as a brand strategy. This has seemed to work quite well so far (see Figure 4).



Figure 4. Marketing National GeoPark and Nature Park Vogelsberg (Copyright: Megerle 2021).

Challenges, competitive situations, and conflicts can arise from different territorial settings, responsibilities and funding sources. For local actors as well as the general public, the territorial overlaps and the different orientations of the parks are difficult to communicate. The cooperation of differently managed and financed areas with different objectives depends very much on the willingness of the actors involved to cooperate, but also on framework conditions such as the use of logos, financial resources, and responsibilities. For example, sovereign funds are usually earmarked for a specific purpose. The Swabian Alb Biosphere Reserve, which is predominantly state-funded, is therefore not automatically allowed to use these funds to co-promote the Geopark (e.g., joint signage) [45]. In other cases, the logo of the Geopark may not appear on materials of the large-scale protected area. It is very irritating for guests if, for example, there are two different logos on a hiking trail (National GeoPark Ries) or the Geopark does not appear at all (National GeoPark Grenzwelten). This in turn has a direct impact on the level of awareness and perception of the geopark, although most geoparks are aware that visitors, but also locals and even local and regional stakeholders, do not differentiate exactly between the different categories. Guests choose the offers that are attractive to them, usually without questioning, who is the originator of the offer [61]. Some geoparks also described competitive situations or at least ambiguities among the member municipalities regarding the differences and responsibilities, e.g., geoparks and nature parks [61]. This can play a role in particular if territorial authorities pay membership fees for the geopark (e.g., UGGp Swabian Alb), while this is not the case for the nature park.

However, especially if both areas are to be model regions for sustainable development, the area overlaps can also be used positively to convey the close connections between the biosphere and the geosphere through common narratives, which is already being implemented to some extent in an exemplary manner in the geo-nature parks.

5. Case Study Geopark Swabian Alb

The Swabian Alb is a low mountain range in South-western Germany, which stretches over a length of 220 km from the Upper Rhine in the south-west to the edge of the Nördlinger Ries in the north-east and thus covers an area of 6200 km² (see Figure 5).

With a total of five UNESCO designations, the Alb is of high international importance in conservation and tourism. The foundation of the Swabian Alb Geopark was initiated in 2000. In 2002 it was recognized as a National and European Geopark, and in 2015 as an UGGp, making it one of the oldest geoparks worldwide [62]. As shown in Figure 5, the Geopark integrates almost the entire Alb (6200 km²) including the biosphere area with currently 850 km² [63] ¹.

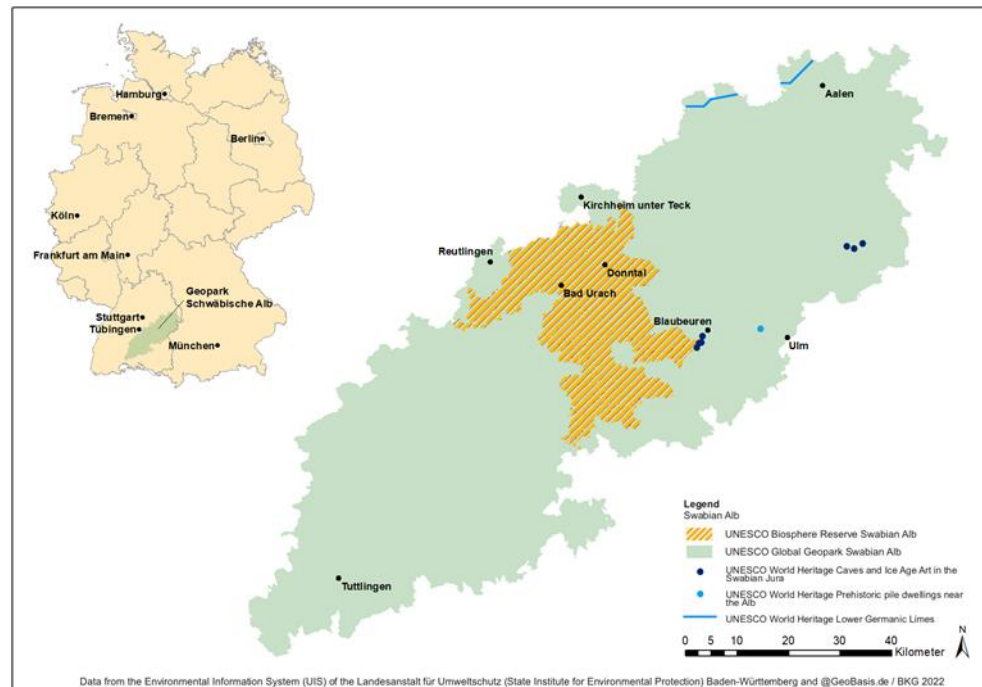


Figure 5. UGGp Swabian Alb and UNESCO designations (Author’s design based on UGGp Swabian Alb).

The beginnings of institutional geotourism development in South-west Germany correlate with the founding of the Earth History Network. This network was founded in 1997 by the Chair of Applied Geography at the University of Tübingen in order to use the outstanding geodiversity of South-west Germany for the development of high-quality sustainable tourism. A ‘one billion year journey through the history of the Earth’ was to be offered as a geotourism product package [39]. In 1999, a popular science brochure was published for the first time, presenting the complex geology of the Swabian Alb for a lay audience under the title “Abenteuer Geologie” (Adventure Geology) [64]. This brochure, now in its 11th edition with well over 100,000 copies printed, paved the way for increased public awareness of the regional geoheritage. In 2000, the first German Geotourism Symposium took place in Bad Urach (Swabian Alb), where the course was set for a Swabian Alb Geopark.

In 2002, the Swabian Alb and Bergstrasse–Odenwald Geoparks in Baden–Württemberg were recognized and a separate “Geotourism” department was set up at the State Office for Geology, Raw Materials and Mining. Almost simultaneously, the book “Erlebnis Geologie” (Experience Geology) was published in 2002 [65], a geotourism map with accompanying booklet for the Swabian Alb Geopark [66] and for the Black Forest [67]. By now, both Geoparks in Baden–Württemberg are National and UNESCO Global Geoparks [62].

The UGGp is organized as an association and pursues non-profit purposes and no profit-oriented economic activities. However, the manifold geodiversity is put to value in various ways by the UNESCO Geopark office, the members, the working committee and the advisory board of the Swabian Alb Geopark Association as well as municipalities and tourism organizations.

A total of 28 information points convey the great geological, geomorphological, biological and cultural diversity of the Geopark. Existing museums, educational institutions and adventure sites have been integrated into the regional Geopark network, with each information point dedicated to a specific feature of the Swabian Alb.

In order to make outstanding geoscientific phenomena recognizable in the terrain, 35 individual geosites have been designated as so-called geopoints so far (Figure 6). In the long term, a total of 100 geopoints will enable visitors to take a journey into the history of the earth in the Swabian Alb.



Figure 6. Geopoint Swabian Alb (Copyright: Megerle 2020).

For the UGGp Swabian Alb, integrative offers in both formal and informal education, but also the consideration of the (intangible) cultural heritage and comprehensive participation are particularly important concerns.

Informal geoeducation takes place in the UGGp in the information points, at the geopoints, geotrails, and landscape tours. Numerous educational and adventure trails have been and are being developed as municipal projects, but also partly with the cooperation of geopark committees. Probably the most effective multipliers of geo-topics are the landscape guides who have been trained since 2001. Since 2015, they have been explicitly trained on geo-topics as well as soils, and since 2017, the Geopark has been integrated into the landscape guide training of the nationwide working group of state-supported environmental education centers (BANU). The information points, a touring exhibition, temporary special offers (e.g., Geosite Day) and the geopark's homepage offer further information opportunities.

A project at the interface between formal and informal education and between geoeducation and participation are the Geopark Schools. The aim of the project is for the now

eight certified Geopark Schools to network with each other in order to promote synergies between the schools. Furthermore, this project shall raise the regional identity and create an awareness of the interactions between people and the environment. The schools can therefore sharpen their profiles. The geopark provides support in the form of materials and inputs and regularly monitors implementation.

Broad participation in the UGGp is ensured by the integration of the ten districts, three municipalities and associations in the Geopark Association. They each send one person to the working committee, which in turn develops ideas and projects for the geopark. These ideas are then taken back to the respective local authority and implemented there. Some members of the working committee or the association have also established steering committees in their local authority and thus follow the bottom-up approach in an exemplary way. The association members themselves decide on the development of the geopark for the coming year at the annual general meetings. In accordance with the statutes, the advisory board ensures compliance with the national and international guidelines for geoparks. The scientific accompanying research is guaranteed by the cooperation with numerous universities and research institutions. The Geopark Advisory Council is chaired by three university professors. They advise the geopark from a scientific point of view and supervise research projects, the results of which are essential for a well-founded work of the geopark.

Every five years, the geopark's development program, the master plan, is revised. This is done in a very broad-based participation process with idea workshops and seminars to identify project ideas and development potentials from the region.

A significant challenge at the moment is still the low visibility of the geopark even among locals (Figure 7). This was attributed to the very large area, but also to the variety of topics without a clear focus [68]. The low visibility of the geopark may also be due to insufficient marketing and public relations activities to date. In contrast to the Swabian Alb biosphere reserve, which is advertised by large-format signs at its borders, these are lacking for the geopark [61].

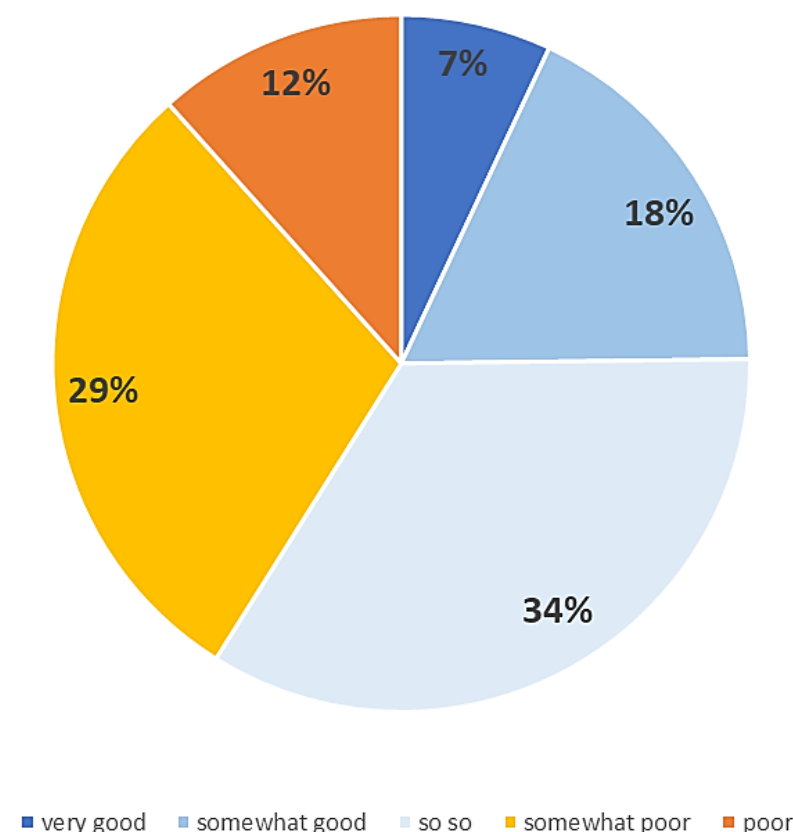


Figure 7. Visibility of the Geopark Swabian Alb ($n = 129$) (Author's design; data basis [68]).

6. Discussion and Outlook

In the past two decades, the geopark movement has undergone a very dynamic development worldwide. While many countries only have UGGp (one-level system), Germany has developed a two-tier system with 18 National GeoParks, eight of which are also recognized as UNESCO Global Geoparks. Some other German areas with high-quality geoheritage are preparing their applications for recognition as National GeoParks in Germany, the basis for a possible later integration into the UNESCO Global Geoparks Network.

The criteria for National GeoParks were developed from the criteria for EGNs and UGGp, and in this respect are very similar [43,44]. In contrast to insiders, the different labels are difficult to distinguish for outsiders, e.g., visitors, but also tourism experts or local and regional politicians. This concerns the 8 UGGp, which are also National GeoParks and belong to the EGN [43]. A major problem affecting both the German UGGp and the National GeoParks is the generally low level of attention that geoparks receive outside of specialist circles [9,57,58].

Conflicts may arise—and have in fact occasionally overshadowed the cooperation between the German National GeoParks—from a point of view that the two-tier system is also regarded as a distinction in geopark quality. This is rather not the case in Germany, as the criteria of the National GeoParks were developed from the criteria of the EGN and UGGp. Many of the National GeoParks are also high-class, as evidenced, among other things, by the recognition of the Ries National GeoPark as an UGGp in 2022. Given the newly established and rather rigorous guidelines set up by the Foreign-Office-led national committee for German UGGP; however, it now seems that the German geoparks community will pull together more unanimously in representing their common interests. Each of the German geoparks is different, like the landscape they represent, each “opens a window to new exciting experiences in the world below our feet” [69].

On the whole, the two-tier system of geopark certificates in Germany has strongly contributed to the substantial dynamics of German geoparks with regard to both quantity and quality. In retrospect, the two-tier system in Germany can be considered successful in the following respects: The very diverse geodiversity of the Federal Republic (see Figure 2) can be better represented by a higher number of Geoparks. Those of the National Geoparks that aspire to become an UGGp can gradually build up the necessary structures and offers and are comprehensively supported and advised by the experts of the GeoUnion. The geological authorities, which were rather skeptical on geotourism and geoeducation offers at the beginning, could be won over by their integration into the national network. The public relations work on geoheritage can be communicated more broadly through a higher number of geoparks. In France for example, which has only one level, the total of 7 UGGp are all concentrated in the south and southeast of the country, the north and west of the country—despite of their interesting geoheritage—integrate no geopark up to now.

As in most other countries, the term “geopark” is still a rather weak category in Germany. It is not based on a legal foundation but on the soft governance approach of the BLA-GEO guidelines. Some of the geoparks continue to struggle acquiring sufficient financing to perform their duties, be they UGGp or not. Even after geoparks have become (part of) a UNESCO program, the situation is still difficult. UNESCO, of course, is a very attractive label, but this does not mean that financial sourcing becomes easier. After all, UNESCO (together with EGN/GGN) even demands an annual contribution (1.500 €) from the geoparks.

Nevertheless, geoparks in Germany have become a well-established and continually growing array of attractive geospaces, competently administered, with increasing importance for both their inhabitants and their visitors, successfully working for geoconservation, regional development through geotourism, geo- and environmental education, and campaigning for the geosciences, their potential and achievements: “Altogether they are representing and protecting Germany’s rich geodiversity at its best” [7]. There is, however, the astonishingly low level of attention geoparks have received in German geoscientific research to date [70]. Therefore, numerous research gaps and open questions offer a wide

range of opportunities to intensively address Germany's geoparks and the German two-tier system of geoparks again.

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Notes

- ¹ The Alb biosphere area is to be extended. The 850 km² refer to the currently existing area.

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