

## Article

# How Can We Promote Sustainable Regional Development and Biodiversity Conservation in Regions with Demographic Decline? The Case of UNESCO Biosphere Reserve Elbe River Landscape Brandenburg, Germany

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**Abstract:** This paper analyzes the relationship between out-migration from rural areas, sustainable regional development and the conservation of biodiversity. Urbanization is a key challenge for sustainable development. Will the move to cities reduce land use pressures on rural areas, and thus provide opportunities for biodiversity conservation? This paper reviews the literature on the relationship between rural out-migration and biodiversity. Generalizing statements or even predictions are rarely possible, as regional contexts differ greatly and a multitude of factors are at work. It is apparent, however, that traditional land use practices, in particular, are in decline as a result of out-migration. In some cases, this can lead to intensification, in others to abandonment, while some studies do not show any link at all. The paper then considers the case study of a peripheral biosphere reserve in Germany that is characterized by strong out-migration. Here, the urbanization tendency is evident on a smaller scale; the regional urban center consolidates, and the small communities face great challenges. At the same time, new innovative actors are emerging. It is essential for new and established actors to collaborate and jointly develop new narratives for “shrinking” regions.

**Keywords:** migration; urbanization; extended urbanization; demographic decline; depopulation; biodiversity; sustainable development; regional development; UNESCO biosphere reserve



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## 1. Introduction

Urbanization is a key sustainability challenge [1–3], and urban land expansion is increasing at a rate faster than the urban population [4–6]. At the same time, many rural areas in the European Union and other nations at the end of demographic transitions [7] show declining populations [8,9], and have been described as “shrinking regions” [10,11]. Urban growth and rural shrinkage both bring specific challenges for sustainable development. McDonald et al. have quantified the impact of urban growth on protected areas and biodiversity globally, and conclude that 88% of all protected areas are likely to be negatively affected by urbanization [12]. At the level of the European Union and with regard to biosphere reserves, Harris et al. found that about half of the European biosphere reserves are at least partially located in functional urban areas [13], while a global analysis by Seto et al. indicates that urban land extension growth rates are not lower in cities close to protected areas [4].

While the term urbanization draws attention primarily to growing cities, Brenner and Schmidt propose the concept of extended urbanization [14] to focus on the interconnectedness of urban and rural spaces. Rural–urban migration connects cities and rural spaces functionally, and is the main driver of urbanization in many regional contexts [15]. At this point, it is necessary to distinguish between urban population growth and urbanization. Urbanization describes the (globally growing) share of urban versus rural population. However, urban population growth can also take place without urbanization if there is equal natural population growth in rural and urban areas [15,16]. While some studies

suggest that urbanization and rural out-migration might reduce land use pressures in rural areas [17,18], the concept of extended urbanization assumes an increasing operationalization of rural areas for urban purposes, that is, landscapes far from urban centers are operationalized (e.g., for food production, other ecosystem services or energy production) and constitutive for urban growth [2,19–21].

In the following sections, this paper describes the concept of extended urbanization, as it provides a theoretical starting point that can guide reflection on the links between urbanization and rural out-migration and their consequences for biodiversity. The current scientific literature is then used to present the state of knowledge on the relationship between rural out-migration and biodiversity. Finally, this paper considers a concrete case study, the UNESCO Biosphere Reserve Elbe River Landscape Brandenburg, which is located in the most sparsely populated region of Germany. Using this example, the paper illustrates some of the interrelationships and challenges of population decline for sustainable development and biodiversity conservation. At the same time, the case study shows innovative approaches to meet these challenges.

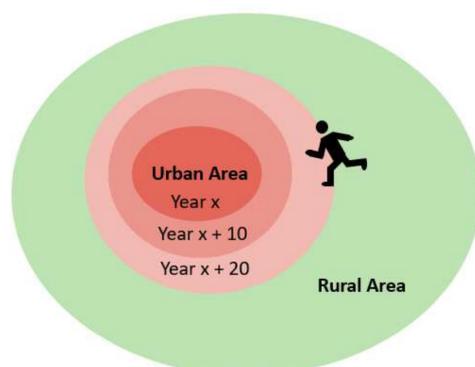
## 2. The Concept of Extended Urbanization according to Brenner and Schmid

Brenner and Schmid’s concept of extended urbanization provides an inspiring theoretical starting point for relating urbanization and the development of peripheral regions. Extended urbanization means that urban and rural areas are intertwined, and draws attention to the relationships and interdependencies.

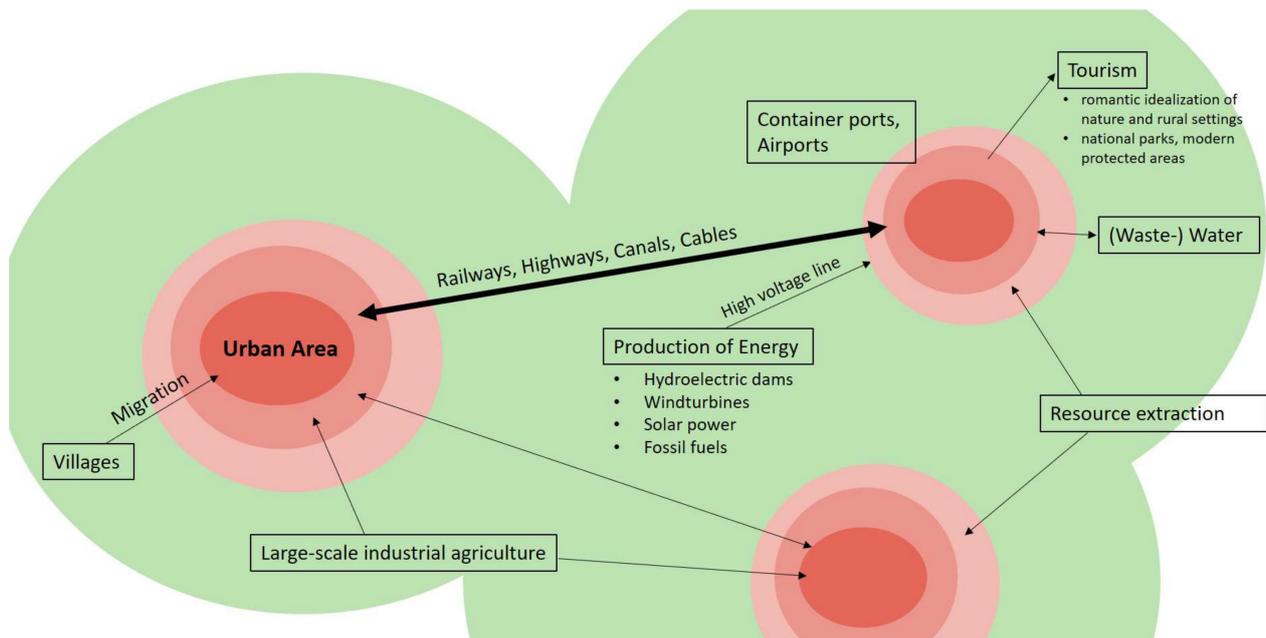
According to Brenner and Schmid, “extended urbanization involves, first, the operationalization of places, territories and landscapes, often located far beyond the dense population centers, to support the everyday activities and socioeconomic dynamics of urban life” [14]. The supply of cities with water, food, energy and building materials gives examples of this connection, as does the disposal of waste. An important aspect of this functional interdependence is the mobilization of labor and resulting rural–urban migration [22–25].

Second, extended urbanization involves the construction of infrastructural links for the transportation of people and goods, and for communication. The result is an uneven expansion and concentration of urban forms over ever-larger parts of the planet. The presence or absence of such transport axes affects the development prospects of peripheral areas away from urban centers.

Third, extended urbanization involves changes in access to land and opportunities for land use, for example, through changes in tenure. Brenner and Schmid refer to this as “enclosure of land from established social uses in favor of privatized, exclusionary and profit-oriented modes of appropriation, whether for resource extraction, agro-business, logistics functions or otherwise” [14]. The following two figures (Figures 1 and 2) illustrate the concept of extended urbanization. The keyword urbanization usually refers to processes related to the growth of cities. Extended urbanization helps to focus on the connections and interdependencies between urban and rural change processes.



**Figure 1.** When we think of urbanization, our focus is often on growing cities.



**Figure 2.** Extended urbanization conceptualizes urban–rural interlinkages and the operationalization of rural places for urban needs. Illustration based on Brenner and Schmidt (2014).

For peripheral regions, the following questions arise: How can the relationship between peripheral and urban spaces be analyzed, understood and managed? Protected areas are playing an increasingly important role in the development of rural areas. The current debate on the expansion of the global protected area estate (30 by 30) illustrates this. UNESCO biosphere reserves and other protected areas usually elaborate strategies and define objectives for the development of regions. By prioritizing some development options over others and communicating these processes and decisions, they create narratives for regional development [26]. Social impacts of protected areas have been studied in a variety of regional contexts and from different perspectives [27–29], including their relation to rural depopulation [30]. Where protected areas put nature conservation legislation in place, they restrict the operationalization of landscapes for commercial or infrastructural uses. Nature conservation laws limit what Brenner and Schmidt’s concept of extended urbanization describes as urban demands on rural areas. As a protected area management agency, the biosphere reserve, thus, plays a role in mediating urban demands on rural areas. On the other hand, protected areas can also be understood as expressions of urban ideas about ideal nature [27,31], especially if they are planned and managed by administrative structures outside of or above local politics, and are, therefore, not directly subordinate and accountable to local politics. From this perspective, protected areas themselves could be conceived as part of extended urbanization.

### 3. Methods

This paper is inspired by the repeated observation that biosphere reserves in rural areas are often characterized by out-migration, especially of young people, to cities. This migration to cities contributes to urbanization, which is considered one of the most important developments of our time, with far-reaching, but difficult to predict, effects on the possibility of sustainable development [2,19]. Since biosphere reserves, similar to other protected areas, aim to preserve biodiversity, the question arises as to what impact urbanization has on this objective. This paper reviews the scientific literature to address the question of how rural out-migration affects the biodiversity of rural out-migration areas. Thus, the work does not target the effects of urban land expansion, but focuses on out-migration areas. The objective is to highlight the key messages of scholarly articles in order to provide an overview of the topic and the main arguments and explanatory approaches.

A literature search was conducted on the Web of Science. The search string used was as follows: (“rural urban migration” OR “demographic decline”) AND (“Biodiversity” OR “Nature conservation” OR environment). The search in the Web of Science yielded 333 results. A review of the abstracts was used to decide whether the articles contributed to the content of the research question, and thus should be included in the analysis or not. Many papers deal with the motives and drivers of migration, and these were sorted out, as were papers dealing with completely different topics, such as population decline in animal species. This left 59 papers. To find more papers that are relevant but not displayed under the keyword combination, a snowballing system was used, and articles were included that were cited by the retrieved articles. Additionally, Google scholar was searched for additional relevant papers. This produced a text corpus of 82 papers in total.

In a second step, the biosphere reserve Elbe River Landscape Brandenburg was considered as a case study. The aim here is as follows: (1) to outline the development of this peripheral region in Germany and to describe the demographic situation, (2) to explain causes for the historical decline in the population and the impact this development has had on biodiversity, and (3) to identify regional development initiatives and to analyze them with regard to their goals and visions. The main aim is to clarify the role of the biosphere reserve in this context; for example, whether it is a driving actor in the initiatives, whether the protection of biodiversity plays a role in current ideas and initiatives for regional development, or whether the biosphere reserve as a nature conservation actor is perceived rather as a brake on development.

For this purpose, an online media analysis and qualitative interviews were conducted. In the media analysis, websites that are specifically dedicated to the region, such as tourism websites, and offers by state and municipal institutions, such as the state support program for returnees to rural areas in Brandenburg, were included. In addition, articles, documentaries and other publications of regional and supra-regional media were included in the corpus. Methodologically, this paper followed Bryman [32], Nam [33] and Brooks and Waters [34] in the content analysis, and focused on “the extent to which certain themes were mentioned and represented” [34]. In a second step, 12 qualitative interviews were conducted with managers from the biosphere reserve administration, local politicians, the head of a municipal economic development organization, and the nature conservation NGO “Friends of the Earth”, which is an important actor in conservation and tourism. The responsive interviewing model of Rubin and Rubin [35] and the perspective of responsive interviewing, as conceptualized by Girtler [36], were used, making use of several follow-up interviews of different lengths and intervals [26]. Interviews were conducted between February 10 and 14 July 2022. The results section refers to an interview with the mayor of the city of Lenzen. This interview was organized by students of the University for Sustainable Development Eberswalde, and conducted during a field trip. The author of this paper was present at this interview and used the opportunity to ask the mayor questions after the end of the student interview. Finally, this paper discusses how the results correspond to the concept of extended urbanization.

## 4. Results

### 4.1. Urbanization, Rural Outmigration and Biodiversity Conservation

Urbanization is particularly important for sustainable development because it involves the creation of long-lasting infrastructures, and thus path dependencies, especially with regard to the energy and resource consumption of societies [37]. Urbanization forecasts have proven reliable, to the extent that we can expect urbanization to continue in line with United Nations projections. Above all, urbanization has always been a driver of social change, whose influence on the development of societies can hardly be overestimated [38,39]. Humility and restraint are, therefore, called for when estimating the future consequences of impacts. Climate change also brings uncertainties, because migration is, and always has been, one among several possible strategies for adapting to changing environmental conditions [40,41]. Therefore, it seems likely that rural out-migration and urbanization will

be exacerbated by climate change [42–44], with higher temperature and extreme events, in particular, appearing to have a significant impact [44].

#### 4.1.1. Urbanization: A Chance for Biodiversity Conservation?

For the question of how urbanization affects the conservation of biodiversity, it is not only crucial to look at how cities are built and how much land is needed for them. Another important question is what happens to rural areas that are affected by out-migration? The assumption that migration from rural to urban areas would reduce environmental pressures in rural areas is relatively common [17,18]. To illustrate the argument, this paper refers to Sanderson et al.'s provocative opinion piece on urbanization and biodiversity conservation [18]. Sanderson et al. argue demographically, and understand cities as drivers of the demographic transition. Additionally, they argue with reference to consumption, which would be lower in cities in the long term, despite higher per capita income. Here, the authors base their argumentation on assumptions that are currently hardly provable, such as a future decoupling of economic growth, resource consumption and environmental degradation, as suggested by concepts such as the environmental Kuznets curve hypothesis [45,46]. Above all, however, they deal almost exclusively with urban cultural change. The authors do not take a closer look at the well-documented effects of (extended) urbanization on rural areas, as there are already many regions with declining populations, and the effects on environmentally and socially sustainable regional development have been described in a number of case studies (that are reviewed below). It is undisputed that urbanization offers opportunities for resource-efficient living—depending on the development of existing, and the design of future, urban neighborhoods [47–49]. However, the notion that urbanization will more or less by itself bring about positive ecological consequences in rural areas cannot be sustained in view of the existing literature.

#### 4.1.2. Forest Transition

An established concept that at least partly refers to the effects of rural–urban migration is that of forest transition [50]. Forest transition was introduced by Mather [50] and describes the empirical observation of a “change from decreasing to expanding forest areas that has taken place in many developed countries” [50]. Rudel et al. contrast two forms of forest transition in the following manner: “In some places economic development has created enough non-farm jobs to pull farmers off of the land, thereby inducing the spontaneous regeneration of forests in old fields. In other places a scarcity of forest products has prompted governments and landowners to plant trees in some fields” [51]. This perspective assumes that in the course of economic development, deforestation would occur up to a certain point, and then reforestation would take place. Regarding the predictive aspect of the forest transition, Geist and Lambin have found that changes in rural land use can be the result of very different factors, with no universal direction or path [52].

Delang and Yuan look at the relationship between rural–urban migration and reforestation in rural areas in their evaluation of the Chinese “Grain for Green” program, and their findings correspond to the forest transition concept. The program aimed at reforestation, especially of steep slopes, to improve erosion control and flood protection. Strong migration from rural areas and from agriculture has facilitated the abandonment of agricultural uses in steep slopes, where agriculture was very labour-intensive [53]. The financial efficiency and various other important aspects, such as its impact on grain production, are discussed by Delang and Yuan, and in other studies [54], but cannot concern us here.

Where forest transition occurs, the effects on biodiversity are not always clearly determinable. Robson and Berkes argue, using a case study from Mexico, that a mosaic landscape of farmland and forest has higher biodiversity than areas whose use has been abandoned [55]. Marull et al. use a case study from Italy to show how rural out-migration and land abandonment leads to forest recovery and decreasing biodiversity in cultural landscapes with a long history of use. The authors use butterfly assemblages as an indicator for biodiversity [56].

#### 4.1.3. Traditional Land Use on the Decline

Rural–urban migration is particularly pronounced in mountain areas. MacDonald et al. have assessed the environmental consequences of land abandonment in European mountain areas, and found many undesired effects. The abandonment of agricultural land use in the mountains usually means that extensively used grassland is initially overgrown by scrub and gradually develops into forest [57,58]. The loss of this specific cultural landscape form with high biodiversity is often viewed critically [59]. However, as land abandonment is ongoing in European mountain areas [60], the classification of this development raises new questions of evaluation, because ecosystem services, such as slope stability and water storage, may be valued more highly in the future against the background of climate change, and do not necessarily deteriorate, or might even increase in the long term, after the abandonment of agricultural practices in the mountains [57]. Whether and which ecosystem services are promoted by use, or arise even without use, depends on the ecosystem and also on the societal perspective. Traditional land use systems with a long history are often particularly well adapted to local environmental conditions [61] and function with low resource inputs, as Sarlak et al. document with reference to traditional irrigated agriculture in Iran. They argue that land abandonment in drylands contributes to desertification if irrigation systems are no longer maintained [62]. At the same time, traditional land uses are often strongly linked to cultural identity. Acebes et al. report on the decline in extensive livestock farming in rural areas around Madrid, and how this is perceived as a threat to cultural heritage and rural culture [63]. Schmitz et al. also observe the decline in traditional livestock systems in the Madrid region, but in a slightly different study area. The authors criticize the approach of the state to nature conservation, which reacts to the decline in traditional land use forms with a rewilding approach and the foundation of a national park. In the authors' view, this concept is unsuitable for preserving the values of traditional livestock systems and is also not very compatible with cultural identity and traditions, which the authors refer to as rurality [64]. There are numerous initiatives to keep traditional farming practices alive, for example by promoting the return to rural areas [65,66]. Reyes et al. describe how traditional agriculture in Japan has been discontinued, and is now being promoted for biodiversity conservation reasons [67]. The following question of "Who will tend the farm?" is asked by Rigg et al. in their case study on aging farmers in Thailand and other Asian countries [68]—a question that many traditional farmers across the world are confronted with.

#### 4.1.4. Intensification and Other Use Patterns

Migration from rural areas can also lead to the intensification of agriculture. Here, close attention must be paid to the regional context and direction of causality, as for example, state-led intensification projects can also trigger displacement and rural out-migration [69–71]. For a detailed understanding of a specific region, the causes and consequences of migration must be considered together.

A recent study reports cultivated land expansion under conditions of rural population decline for a region located in China's farming pastoral-ecotone and explains this with regard to specific land use policies [72]. In a case study from Argentina, Izquierdo et al. note that, if rural–urban migration leads to the abandonment of small farms, at least where relatively fertile soils and supportive policy frameworks (subsidies) are available, it is mainly large-scale industrial agriculture that will take hold [73]. In addition to the spread of industrial agriculture, which capitalizes on the gap that can result from out-migration, Caulfield et al. describe another mechanism by which out-migration can lead to the intensification of agriculture. In their case, out-migration led to remittances that enabled those who stayed to buy pesticides, which led to their increased use, i.e., to an application of industrialized farming techniques, to which the authors attribute a negative impact on agro-ecosystems [74]. Li et al. also found negative environmental effects of monetary remittances [75]. We must remember, however, that this analysis of the literature has a narrow focus on biodiversity and nature conservation effects, and does not allow

a fundamental assessment of remittances in terms of sustainable regional development. We need to take note that, for example, case studies from Mexico [76], Bangladesh [77] and Ghana [78] have found that remittances increase food security, to mention just one substantial positive effect of remittances.

Intensive use that impacts biodiversity can also occur simultaneously with forest transition. For tropical forests, Wilkie et al. note that hunting remains a threat to many species, with cascading effects on all forest biodiversity, even if forest cover increases again [79]. Torres et al. also found, in a case study from the Amazon, that hunting pressure on overhunted species does not necessarily abate with increased rural urban migration [80].

#### 4.1.5. Uncertainty, as a Multitude of Factors Are at Work

Most, but not all, of the studies examined find relationships between out-migration and biodiversity. The exact nature of the relationships depends on many factors, and is hardly predictable. Gray and Bilsborrow describe how in a region of rural Ecuador, out-migration does not lead to agricultural abandonment, and thus forest transition. The assumed biodiversity effects could not be confirmed either [81]. Grau and Aide concluded for the Latin American context that rural–urban migration led to land-abandonment, especially in marginal farming locations that are difficult to cultivate for modern agriculture, such as mountain slopes, deserts and poor soils. However, these ecosystems are often of disproportionate importance for biodiversity or watershed conservation [82].

Greiner and Sakdapolrak [83] reviewed the literature on the ecological effects felt by the sending regions of rural out-migration in Kenya. Depending on a variety of factors, such as remittances of money and ideas, losses of labor, socioeconomic stratification, gender dynamics and cultural variables, the ecological effects of out-migration on rural areas can differ substantially. The authors conclude that “it is inadvisable to rely too heavily on generalized assumptions about the directions of these relations as they are likely to fail to account for the complexity of the phenomena. The impact of rural–urban migration on other environmental resources, such as forests, water or biodiversity, is largely unaccounted for and constitutes a critical research gap” [83]. Robson and Nayak come to similar conclusions and “question the assumption that rural–urban migration necessarily simulates ecosystem recovery and aids conservation”, based on a case study of rural out-migration in Mexico [84]. A look at the existing literature confirms this statement. There is little reason to believe that out-migration of rural populations would automatically result in positive effects for biodiversity and nature conservation.

#### 4.1.6. Some Preliminary Conclusions on Rural Out Migration and Biodiversity

Thus, there is no clear picture of the ecological effects of demographic decline in peripheral regions. However, some preliminary conclusions are possible. Due to rural out-migration, traditional agricultural systems often do not survive. They lose influence in terms of area, or disappear completely from landscapes. With respect to biodiversity conservation, this constitutes a problem for the protection of species that benefit from or are even tied to traditional forms of land use. The reason for the change is that labor-intensive and economically less attractive land uses often do not continue after generational changes—especially because young people move to the cities. This is evidenced by the literature from different parts of the world [23,57,62,63,84]. The question, then, is what will replace these traditional land uses?

Plieninger et al. observe a polarization between intensification and abandonment [61]. This pattern has also been described by Antrop [85], and a comparable picture emerges here, that is, some case studies indicate an intensification of agriculture, either by new actors or resulting from additional financial resources for those who stayed. However, other case studies also show that marginal farming locations, in particular, are being abandoned, for example, on mountain slopes that are very labor-intensive to cultivate. Looking at this development, Segar et al. suggest opportunities for passive and active rewilding due to agricultural land abandonment [86]. Navarro and Perreira [87] also

explicitly advocate considering rewilding as a land management option, especially in remote and less profitable locations. They argue that traditional farming systems are by no means always environmentally friendly, and usually provide only a low standard of living. Policies to preserve traditional agricultural landscapes regularly underestimate the costs and labor required for maintenance measures. However, approaches that frame conservation as “rewilding” or “wilderness” often struggle with acceptance problems in rural contexts [64,88]. Most landscapes have a long history of use that is linked to traditions, and to which rewilding and wilderness concepts are less able to connect. Plininger et al. call for a dual strategy; on the one hand, mechanisms to preserve traditional land uses are necessary. On the other hand, the core elements of traditional land uses that constitute their ecological values have to be identified and integrated into modern land uses [61].

In the preservation of some traditional cultural landscapes, it becomes apparent how much nature conservation can also be linked to questions of regional identity, and how it is an expression of the contingent and a form of culturally shaped appreciation of certain species and landscapes. The concept of biodiversity as such does not provide clarity here, as at one location, either the species of the cultural landscape or the course of natural processes can be the focus of nature conservation, while both positions can be oriented towards the preservation of biodiversity. Such internal nature conservation conflicts about how and when to intervene in natural processes are common issues in many protected areas [89–91]. Protecting species tied to traditional management practices can be costly because either traditional management practices are heavily subsidized, or their landscape effects must be replaced by maintenance practices. In the case of abandonment of use, losses of biodiversity or at least changes in the species composition are to be expected. For such cases, a general judgment is difficult; they need to be considered individually. However, it is important to include the possible positive effects of self-willed natural processes in the consideration. Against the backdrop of climate change, it appears expedient to fundamentally review nature conservation priorities and, in particular, the proportionality of costly and permanently necessary maintenance measures.

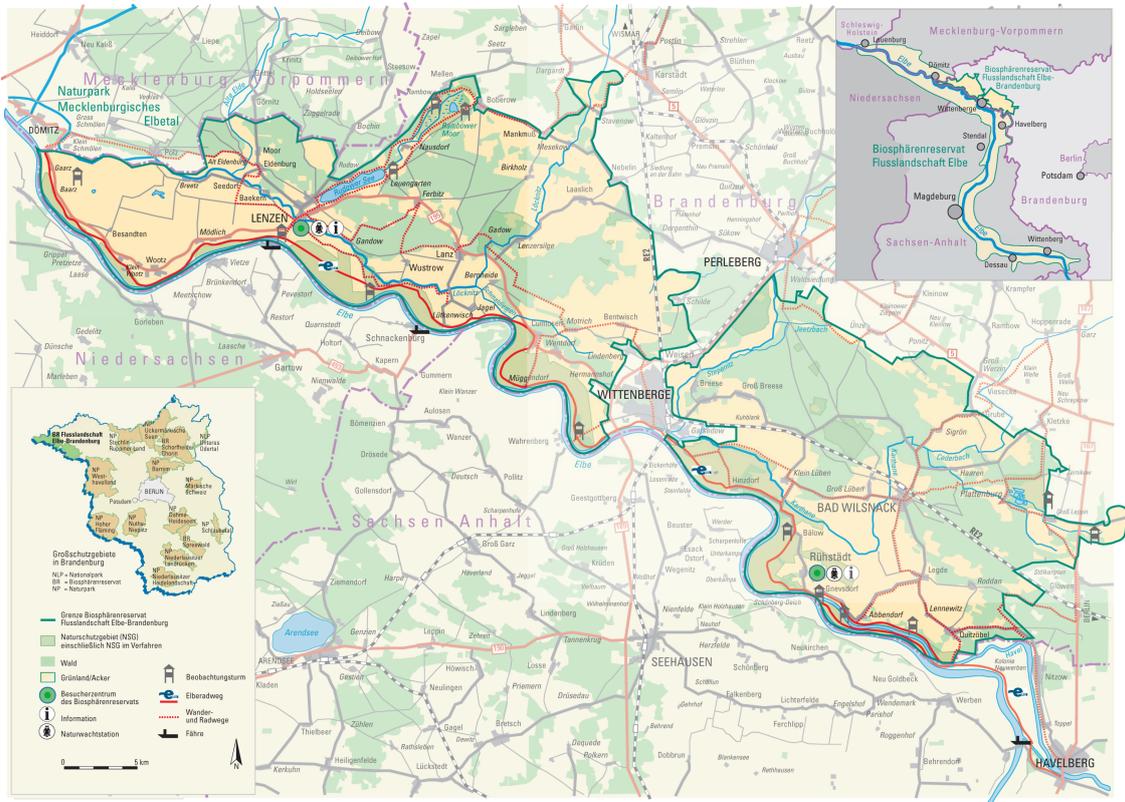
#### 4.2. Case Study: UNESCO Biosphere Reserve Elbe River Landscape Brandenburg

The Elbe River Landscape Biosphere Reserve was chosen because it is located in a peripheral region of Germany, which is characterized by high out-migration and currently has the lowest population density of all German counties, while, at the same time, large-scale nature conservation measures, especially river restoration, are taking place here. There is also interesting development in the field of economy. Currently, the city of Wittenberge, which is located in the middle of the biosphere reserve, is experiencing economic growth. Are these regional development processes connected to each other? What is the relevance of the biosphere reserve and other nature conservation actors to regional development? These questions will be addressed in the following sections.

##### 4.2.1. Demography and Development

The economic and political effects of German reunification led to strong migration from the East German to the West German federal states. According to the German Federal Institute for Population Research [92], Brandenburg alone lost an estimated 800,000 inhabitants between 1992 and 2015. This loss mainly affected the peripheral rural areas, while an influx of people into the areas surrounding the city of Berlin stabilized the absolute population of Brandenburg. The Biosphere Reserve Elbe River Landscape Brandenburg is located in the county of Prignitz, and touches the areas of 13 municipalities along the river Elbe (Figure 3). Among all German counties, Prignitz is currently the one with the lowest population density (35.6 persons per km<sup>2</sup>) [93]. The official demographic forecast for the state of Brandenburg assumes a further decrease in the population by 8.1% in the period 2019–2030 for Prignitz county [94]. Centrally located in the biosphere reserve is the city of Wittenberge, which is excluded from the area of the biosphere reserve. All municipalities of the biosphere reserve, as well as the city of Wittenberge, have shown a

decrease in population since German reunification. Today, Wittenberge has about 17,000 inhabitants, while in 1985, it had more than 30,000.



**Figure 3.** Biosphere Reserve Elbe River Landscape Brandenburg. Source: Trägerverbund Burg Lenzen e.V. (o.J.) [95].

In the following sections, a brief outline of some of the historical developments of the town of Wittenberge and its surroundings is provided, especially the development after German reunification, and then current developments in a larger town (Wittenberge) are contrasted with those of a smaller town (Lenzen). The city of Wittenberge grew through industrialization; in 1823, an oil mill was founded in the town, and a little later, a port was developed on the Elbe. In 1846, the railroad line Berlin–Hamburg opened, as well as the station Wittenberge, which is located almost exactly in the middle of this line. Later, other industries settled, including a sewing machine factory. Soon after the reunification of Germany, the oil mill and the sewing machine factory, which were the center of the economic and social life of the town, closed. The collapse of large parts of East German industry after German reunification drove migration to the West German states. As a side effect of this dramatic economic development, the discharge of pollution into the Elbe decreased almost instantly, and led to a sudden and lasting improvement in the water quality of the river [96].

In 1997, the region became a UNESCO Biosphere Reserve. Biosphere reserves are designed by UNESCO as model regions for sustainable development. German nature conservation law considers biosphere reserves as large protected areas, comparable to national parks and nature parks. Therefore, biosphere reserves are legally designated according to nature conservation law, and their administration is organized by the state administration responsible for nature conservation. In the Elbe River Landscape Biosphere Reserve, major river- and floodplain restoration projects are being carried out in collaboration with the nature conservation association “Friends of the Earth”, and by other environmental associations, with government funding. In densely populated Germany, all large rivers have been heavily modified. The flow of the Elbe is directed by groynes, which are intended to control

the sediment transport evenly, and thus create reliable conditions for navigation. Flood protection dikes run parallel to the river, reducing the active floodplain. Along the Elbe River, 68% of the formerly active floodplain is now inactive, i.e., largely decoupled from the river [97]. During floods, the water cannot spread over the area, which on the one hand was intentional, but on the other hand, brings with it the risk of dike failure and great destruction during extreme events. Two extreme floods in 2002 and 2013 created political pressure for action, which was followed by the provision of large sums of money for dike relocations as natural flood protection measures. However, large-scale floodplain restorations are spatially restricted to peripheral regions in a densely populated country [98]. Floodplain restoration aims to relocate flood control dams that were built close to the river in the past. These projects can benefit flood protection and nature conservation at the same time; hence, some of them are flood protection projects, such as the dike relocation near Sandau [99], while others are nature conservation projects funded by the German Federal Agency for Nature Conservation, such as the dike relocation near Lenzen [100] or the restoration of the Hohe Garbe [101]. In the meantime, however, despite negligible freight ship traffic, the navigation administration has also repaired the traffic infrastructures (bank shoring, groynes) that had fallen into disrepair during German separation.

#### 4.2.2. Initiatives and Turning Points in the Regional Development of the City of Wittenberge

A social science study from 2012 described Wittenberge as a prototype of the declining industrial city in the province of the former East German states [102]. This study received much media attention in the region and beyond, but was criticized locally for merely describing the decline and not showing any development prospects [103]. Since 2010, however, Wittenberge has recorded rising tax revenues, and the population decline seems to have stopped. Although the city of Wittenberge appears to remain in the midst of a transformation process, there have been important successes, such as the number of residents has remained roughly constant since 2017, and the number of resident businesses has increased slightly since 2016 from 1157 to 1199 in 2020 [104]. The city's revenue from the trade tax, which is important for municipalities in Germany, was just over EUR 2 million between 2000 and 2015, but has risen sharply, especially between 2015 and 2018, and has been over EUR 4 million since 2018 [104], and has not declined so far during the COVID-19 pandemic.

The mayor of Wittenberge localizes the low point of the development around the year 2000. In the 1990s, he said, parents would have told their children the following: "If you want to become something, you have to leave here as soon as possible" (translation from the author). The mayor described the overall mood in the city towards the end of the 1990s as very negative, but considered 2002 as an important turning point. In 2002, the 700th anniversary of the city was to be celebrated. At that time, some people said that the town was finished and that a celebration was pointless anyway, while others pursued the idea of organizing a large town festival in the ruins of the old oil mill. This required a lot of courage—a festival in a ruined city and then in the ambience of the ruin, which was once the most important industrial building in the city. This festival took place and, from today's perspective, became the starting point for a turnaround in the city through the participation of many actors and associations. From that year on, the festival continued each year, and today, the old oil mill has been restored through a private sector initiative and with the help of major public funding, and is used as an event location with a diving pool and climbing hall in old oil tanks. This process of change is described in German by the word *Altindustrie* (old industry). Questions about the re-use of old industrial sites arose as a result of economic structural change in many areas, and have been discussed in the context of postindustrial landscapes [105–107]. In many places, these were reinterpreted [106] by creative follow-up uses from symbols of decline to symbols of regional identity, and symbols of a confident connection between the future and the past [108].

In order to reduce the number of empty residential buildings following the demographic decline, Wittenberge faced the question of which residential buildings should be

demolished and which should be retained. In the 1990s, the quality of life in a central Gründerzeit district (Gründerzeit refers to the great economic upswing from around 1870 until the First World War, and the area contains buildings mostly in a historic style) was much worse than in the socialist housing estates according to the mayor, which is why it made sense to demolish the historic buildings. However, things turned out differently, and the Gründerzeit buildings were redeveloped and parts of the socialist prefabricated buildings were demolished. Since 2002, EUR 6.6 million in federal and state subsidies have been spent on the demolition of housing units that are no longer needed. In addition, urban development subsidies amounting to EUR 27 million were provided in the same period, triggering considerable private follow-up investments. For the period 2021 to 2024, the federal and state governments granted funding of EUR 12.8 million for the urban redevelopment strategy [104]. So, the development of the city depends critically on government funding, and the ability to access and direct that government funding into the city.

In 2019, the city of Wittenberge launched the “Summer of Pioneers”, a co-working and co-living project to attract “digital workers”. The city provided twenty scholarships, which included free shared-housing, as well as a co-working space for one year. Applicants had to submit plans for their year in Wittenberge, and had to elaborate how their skills would contribute to the city community. The project brought the city significant media attention, and indeed some of the “Pioneers” stayed in Wittenberge even after the project ended. As a continuation of the “Summer of Pioneers” project, a group called “elblandwerker\*” has formed as a cooperative for “work, life and change” [109].

The mayor, as well as the head of economic development, view the city of Wittenberge as being on a consolidation course, which, in the coming years, might turn into moderate growth of the population. In the view of these actors, the biosphere reserve does not seem to play a decisive role in the positive development of the town. From the point of view of the economic development organization, it is above all the favorable infrastructural connections that currently enable economic development. Quality of life, broadband access and intercity transport links by means of local public transport will be particularly important as location factors in the future [104]. The mayor emphasized openness to new ideas as a key success factor; even if they initially seemed odd from his own perspective, he always tried to open up space for new ideas and allow experimentation.

#### 4.2.3. The Smaller Municipalities: Example Lenzen

In the smaller municipalities of the biosphere reserve, the situation looks completely different. An interesting example is the town of Lenzen. Lenzen is located on the Elbe, and has about 2000 inhabitants and a historic building stock, with currently (2022) very high vacancy rates in the town center. The mayor of Lenzen describes the economic situation of the city as difficult, and believes the greatest opportunities for economic development can be found in nature-based tourism. The tourism marketing of the Prignitz region focuses strongly on nature. The homepage shows the meandering river, and describes vastness, tranquility and an ancient cultural landscape. Long-distance cycling along rivers has been very popular for some years, and the Elbe Cycle Route is among the most popular long-distance cycle routes in Germany; hence, the tourism marketing of Prignitz also focuses on cycling, demonstrated by the following statement: “The most intensive way to explore the Prignitz is by bike” [110]. Rural out-migration and “hollowed villages” are faded out and not discussed, as is common in tourism marketing [111].

In Lenzen, there are interesting initiatives in the field of regional development and tourism, which are explicitly related to biodiversity conservation. Here, after German reunification, the nature conservation association “Friends of the Earth” received the town’s old castle building as a gift from a private owner. The environmental association renovated the buildings and today operates a Biosphere Reserve visitor center, a floodplain ecology center from which river restoration projects are planned and carried out [112], and a hotel that is operated by an external tenant. For the development of tourism, the presence of Friends of the Earth appears to offer huge potential for the community, since

the environmental association has built up enormous capacities with its visitor center, the hotel, and other tourist infrastructure. However, there are challenges in this cooperation, which will be illustrated in the following example of the vegan hotel.

The Friends of the Earth hotel is currently operated by tenants as a high-priced vegan hotel, which explicitly focuses on customers from the large cities Berlin and Hamburg in its marketing. For example, while in the past, the city's butchers operated stands at festivals in the environmental education center, this is currently no longer desired, as it runs counter to the concept of a vegan hotel. Likewise, the environmental education staff were surprised to find that guests of the vegan hotel were bothered by environmental education activities in which children identified invertebrates living in water bodies, as the animals could potentially come to harm.

From the mayor's perspective, there are too few connections between the hotel, the castle and his community. While he is a member of the board of the local "Friends of the Earth" association, he feels that the offers are not aimed at the inhabitants of the city of Lenzen—due to the high prices and different preferences. The biosphere reserve's management adds that although the renunciation of meat can contribute to the protection of natural resources, a region with a long tradition of extensive cattle grazing offers the best opportunities for sustainable meat consumption. Different worlds seem to meet here, whereby the openness appears to be limited in both directions. While the city of Wittenberge is trying to cultivate openness to metropolitan forms of work and life with projects such as "Summer of Pioneers", this seems to be working less well in Lenzen.

With regard to the numerous major nature conservation projects of Friends of the Earth, the mayor of Lenzen is ambivalent. With large projects, the change in land ownership plays a role, and here, he finds, the community has not always benefited. However, he emphasizes that the municipality should work more closely with the environmental association in the future. In particular, he points out that the association brings young, committed people to the region, referring to employees, interns and volunteers, which he wishes to be further developed. He also evaluates the installed tourism infrastructure positively, although he would like the municipality to be more closely involved in planning processes.

#### 4.2.4. The Biosphere Reserve and Current Demographic Developments

The biosphere reserve administration is faced with the difficult task of being a nature conservation authority on the one hand, and on the other hand, of creating a positive and realistic vision for the sustainable development of the region. In doing so, it must take into account the interests and opportunities of the communities, whose political representatives have no formal decision-making authority over the biosphere reserve, since it is a state authority.

The biosphere reserve does not have an explicit positioning or agenda on demography, which is understandable insofar as this could not be derived directly from its state mandate as a nature conservation authority. From the biosphere reserve administration's point of view, there is no clear connection between population decline, regional economic development and nature conservation. When farms are abandoned, for example, unknown owners often take control. Contact persons are then often more difficult to find, but according to the biosphere reserve management, it cannot be said that new owners have less interest in nature conservation. In some cases, new users are more open to measures of contractual nature conservation than some long-established farmers. When farms change ownership, many sellers are careful to hand over their land to buyers who intend to use it in a way that considers regional development. A challenge on the part of the buyers is that agribusinesses, acting as buyers, would have interest in the land, but not in the preservation of historic buildings. Private buyers, on the other hand, would often have a special interest in historic buildings, but not in the associated agricultural land.

One particular change in the agricultural structure that the biosphere observes is a decrease in the number of dairy farms to almost zero due to their lack of profitability. Even though cow-calf operation is still prominent in the biosphere reserve's grasslands,

the question might eventually arise as to how grasslands should be used. Should they continue to be artificially preserved as a cultural landscape element by mowing, or will there be incentives for the owners to allow natural forest development? In the past, floodplain forests have been turned into agricultural land along the Elbe, as along many other major rivers [113]. One of the prime nature conservation goals in the biosphere reserve is the restoration of floodplain forests—a goal that seems particularly necessary in the context of climate change—as carbon reservoirs, and as natural flood protection and water storage areas during dry periods. According to the biosphere reserve, a change would depend on incentives provided for farmers in order to change land use in this direction. Representatives of the lower nature conservation authority put forward similar arguments. The grassland has always been the focus of the work of the lower nature conservation authority, and the most pressing question is what will happen with it in the future.

## 5. Discussion and Conclusions

What added value does the consideration of extended urbanization bring to the analysis of regional change processes and their implications for conservation goals? The literature shows many cases that prove connections between rural out-migration and biodiversity in out-migration areas. However, depending on social factors, these effects can be very different, and sometimes opposing. One conclusion is that, as a result of the move to cities, traditional agricultural systems are in decline in many parts of the world. In some cases, there is an intensification of agricultural use, while abandonment is observed in others. From a nature conservation perspective, abandonment is either problematized because traditional land use systems and associated species are disappearing, or it is viewed as an opportunity—for example, in the rewilding discourse. The concept of biodiversity is too vague to be helpful at this point, as most researchers refer in detail to the presence of species or ecosystem services.

We looked at the case-study of the UNESCO Biosphere Reserve Elbe River Landscape Brandenburg to shed light on the relationship between out-migration, regional development and biodiversity conservation. For the protection of biodiversity, it is clear, on the one hand, that the collapse of East German industry had a direct impact on the water quality, and hence ecosystems of the Elbe River. However, the migration, which was also a consequence of the economic collapse, is not viewed by any of the interviewed actors as beneficial to the goals of nature conservation, however different these may be in individual cases. An overall picture emerges from the case study that is consistent with the general urbanization trend. The regional urban center is consolidating, although this follows a sharp decrease in population. The rise and current consolidation of the city is made possible mainly by the favorable location of various transport infrastructures that connect larger centers. Actors in the city have developed a new narrative, and in particular, the successful reinterpretation of old industrial buildings became the starting point, and then a symbol, for changes in the city after the population decline that followed German reunification. A significant success factor was successfully communicating narratives for urban development and directing government funding to the city.

However, if we consider the whole biosphere reserve, we find that many smaller municipalities continue to experience out-migration, and when in-migration happens, it does not lead to the revitalization of village centers. Thus, there is an urbanization trend also on the scale of the biosphere reserve. What is the perspective of these rural towns and villages? Polèse and Shearmur emphasize the primary importance of geography and exogenous factors, such as location and connection to larger cities, for regional economic and population development versus local strategies [9]. This position is confirmed by the example of Wittenberge. The location between large cities and important infrastructure links was also named here as a necessary prerequisite for development. If local strategies cannot stop population decline, do we need them at all? Yes, say Polèse and Shearmur; their difficult task is to develop positive shrinkage scenarios. As can be observed from the example of Lenzen, this seems to be a very difficult process, indeed. The long-term

and substantial engagement of the “Friends of the Earth” in Lenzen would be a promising starting point for new narratives—provided that there is a certain openness towards a new and common narrative among all actors involved. The city of Wittenberge shows how crucial it is to be able to acquire large amounts of government funding. This business is also controlled by many environmental associations, and especially by Friends of the Earth, meaning that nothing should stand in the way of joint projects between the city of Lenzen and Friends of the Earth.

What role can the biosphere reserve play in this process? As a nature conservation authority, it is a relevant player. Nature conservation law limits what Brenner and Schmidt’s concept of extended urbanization describes as urban demands on rural areas. As a protected area management agency, the biosphere reserve plays a role in mediating urban demands on rural areas. At the same time, in practice, it is never easy to clarify what constitutes an “urban” demand. Local “rural” actors may have similar demands, for example, with regard to restrictions on building infrastructure imposed by nature conservation law. From this perspective, the argument can be turned around, and the protected area appears as an external actor that limits the opportunities of the rural population.

Local politicians emphasize less the contribution of the biosphere reserve to economic development; it appears more as a nature conservation actor that sets limits and offers little creative impetus. Its spatial layout, which excludes all settlement areas, limits the biosphere reserve’s ability to fully expand its development function. Additionally, the biosphere reserve is not considered a “local tool”, i.e., a tool that local politicians use to coordinate and implement their ideas regarding regional development. This is to be explained by the governance structure. The biosphere reserve is a state administrative unit of the state of Brandenburg, and is, therefore, not directly accountable to local politicians. Organizing nature conservation at the highest state level guarantees permanence and resources. At the same time, it is not easy to initiate the development of local narratives for shrinking regions at this level.

Regarding the participatory creation of new narratives, it is interesting to note that the biosphere reserve, “Friends of the Earth” and the Green Party are sometimes perceived as a single entity. These are, collectively, the “Greens”. As the mayor of Lenzen said, some think that the “Greens” want to prevent development here, so that people move away and only nature remains. In regional development processes, it is necessary for large conservation organizations to reflect that they also act, and are perceived, as potent land buyers and owners. They can shape leases and decide on land use—in short, they have power. When considering whether population decline can also provide an opportunity for biodiversity conservation, this possibility of reversing the narrative should be considered. Population decline is perceived primarily as a problem, and it is normal to become sceptical when someone views one’s problem as an opportunity. This is especially important for approaches such as rewilding that positively frame abandonment of use and natural processes, thereby breaking with tradition. The following statement is written by Wynne-Jones et al.: “Rewilding, it would seem, is about who we think we are and how we co-constitute our sense of self”, who discuss the issue of rewilding conflicts with farmers [88]. Conservation approaches should, therefore, explicitly adapt to local conditions, at least where actors want to create joint narratives for regional development that actively include biodiversity conservation.

The concept of extended urbanization aims to point out links between urban and rural developments, and to dissolve the dichotomy. This seems fruitful for the analysis of regional development processes. A dissolution of the dichotomy, while maintaining the terms, leads to ambiguities, for example, when it comes to the question of what actually constitutes an urban claim to rural areas, since actors, claims and processes often resist a clear classification according to the rural/urban scheme. However, since the terms rural and urban are so firmly anchored in everyday language, it does not seem to make sense to operate without them. Rather, it is important to recognize their fuzziness, and to understand the connections between the phenomena they describe. In order to shape rural spaces, established and new actors must work together.

There are also specific conclusions for the UNESCO MAB programme. The United Nations Educational and Scientific Organization (UNESCO) wants to create model regions for sustainable development, with its Man and the Biosphere Program (MAB). One of the core topics of sustainable development is urbanization. So far, however, this has not been systematically addressed within the framework of the MAB program, despite a number of attempts to do so. This may be due to the fact that most biosphere reserves are located in rural areas, so urbanization might seem a distant prospect. The concept of extended urbanization can build a bridge here, as it directs attention towards the effects of urbanization, which are very much of importance in many biosphere reserves. One goal of the UNESCO MAB program is exchange and mutual learning. Since many biosphere reserves face demographic challenges, an institutionalized exchange on this topic would be beneficial.

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