

# Demographic Change: Impacts on Rural Landscapes

*Stefan Heiland, Silke Spielmans, and Bernd Demuth*



---

## ABSTRACT

The article examines the relevance of demographic change for the development of rural landscapes, especially in Germany's shrinking regions. To date, no empirical investigations have undertaken the matter. Thus, the article is mainly based on literature analysis and the findings of expert workshops. The research indicates that demographic change does not have as strong impact on landscapes as other factors such as agricultural policy, climate change, and the promotion of renewable energies. Nonetheless, from the perspective of nature conservation, there might be some indirect effects caused by structural and institutional changes of administrations, which could lead to a decline in importance of landscape-related concerns. In addition, changes in environmental consciousness due to rising cultural diversity could lead to a different societal attitude toward landscapes and their values.

## KEYWORDS

agriculture, demographic change, environment, Germany, landscapes, nature conservation

---



Demographic change in Europe has increasingly become a subject for debate in public, political, and academic spheres. Special attention has been given to its impacts on national and regional tax revenues, on the supply of goods and services for primary needs, on pension schemes and on the maintenance or modification of shrinking cities and regions. A report of the European Union (EU; 2007: 110) on "Europe's demographic future" mentions the impacts of demographic change on the environment as an important issue, but has not dealt with the issue. In fact, with minor exceptions, little is yet known about the effects of demographic change on landscape and environmental concerns (Heiland and Moorfeld 2008; Heiland et al. 2004; Müller, Artner, and Khierim 2008; Müller et al. 2007; Wolf and Appel-Kummer 2005). That might be surprising as population growth is seen a major driver of environmental exploitation and devastation. Therefore, demographic change in Europe, where population is decreasing, could be



seen as an opportunity to relieve pressure from the environment and from landscapes. Such assumptions can often be heard, but in many cases they are based on very poor scientific evidence.

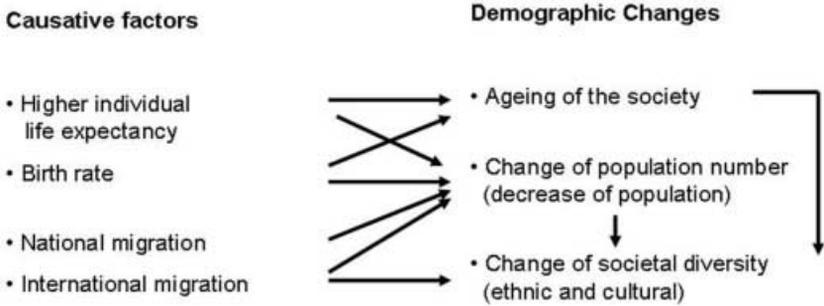
Unfortunately, no field studies have been undertaken to explore the connection between demographic change and landscape transformation, especially from the perspective of nature conservation or landscape research. Consequently, the results of this article are based on literature analysis, a literature-based research project (Heiland et al. 2004) and on the results of a series of expert-workshops on “Nature conservation and demographic change” in 2008 and 2009 funded by the German Federal Agency for Nature Conservation.

After a short introduction into the features of demographic change in Europe and in Germany, the article examines general relationships between demographic change and the environment in order to provide a deeper insight into the difficulty of drawing a direct line between demographic change and the state of the environment. The article then discusses, based on a heuristic model, possible impacts of demographic change on rural landscapes, which could be directly physical or conveyed by societal and political impacts. Because demographic change is only one factor leading to landscape transformation, another key factor—agricultural policy—is investigated in greater depth.

## Demographic Change in Europe

In this article demographic change is understood as being a phenomenon driven by life expectancy, birth rate, and migration. The combination of these drivers and their variable characteristics leads to changes of the population in size, age, and cultural and ethnic diversity (see figure 1). Not included in this model, but playing an important role especially for birth rates and migration, are societal factors such as the variety of individual lifestyles or economic-based transformations—what Müller et al. (2007) dubbed “socio-demographic change.”

Contrary to the global demographic development, characterized by a massive increase of population, demographic change in Europe is, very roughly speaking, denoted by a generally decreasing and an aging population, as well as by the increase of ethnic and cultural diversity. A median variant of a scenario for Europe published by the United Nations predicts a decrease from 728 million inhabitants in 2005 to 653 million in 2050. Referring solely to the area of the EU-



**Figure 1** ■ Characteristics of demographic change and its causative factors

Source: Heiland et al. 2004.

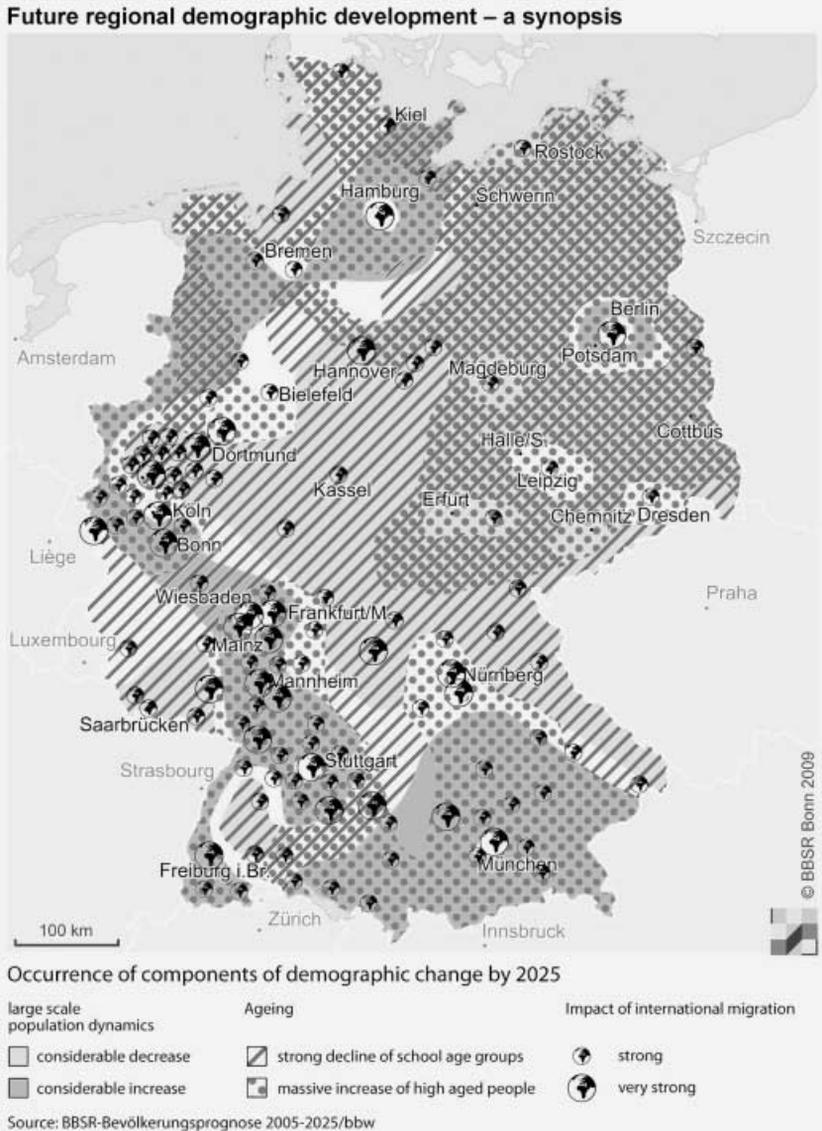
25, population will slightly diminish from 457 million in 2004 to 450 million in 2050 (European Union 2007). The number of children per woman is predicted to rise from 1.5 in 2005 to 1.6 in 2050, while the necessary rate for a replacement of generations is said to be 2.1. Subsequently, population should decrease, but in the coming decades, immigration and rising life expectancy are likely to compensate for this trend. Between 2004 and 2050 life expectancy is assumed to rise from eighty to eighty-six for women and from seventy-four to eighty-one for men, leading to a significant increase of the population share of older people. Consequently, the median age in the EU is going to jump from thirty-nine to forty-nine. Migration has already become a major determinant of demographic change in the EU and will continue to be in the future. Net migration peaked in 2004 with 1.5 million people coming to the European Union, with another 822,000 expected to migrate by 2050. These numbers do not take into account that migration or migratory pressures may rise within the next decades because of the impacts of climate change, such as drought, sinking water supplies, bad harvests, and famine. This might affect not just migratory movements to the EU from outside, but also from within. Even if the combination of trends will presumably lead to only a small change of the total population size, it will transform Europe's population structure.

The projected figures must not be regarded as definitive because every prognosis or projection is based on assumptions, which can prove inappropriate or wrong. Likewise, figures differ from projection to projection (for example, compare the figures given by Gans and Schmitz-Veltin 2008 to those by the EU 2007). Nevertheless, all of

them show the same general trend: The EU society will be aging and become more ethnically diverse—with regionally significant differences. Strong disparities at a regional level are a characterizing feature of the population size. While the EU (2007: 51) expects growth due to natural change by 2030 solely in France, southern Ireland and northern Scandinavia, population growth driven by migration will still cover large areas such as the UK, parts of Scandinavia, and of western, central, and southern Europe. Opposite developments of a shrinking population, mostly driven by emigration, but to some extent also by natural change, are to be found especially in eastern Europe and in many regions of Germany, Spain, Italy, Greece, and Sweden. But it is important to be aware of the patchwork of regions with different and even contradictory demographic trends that can be observed in Europe. This observation applies to Germany as well. The overall situation in Germany is characterized by a population decreasing from 82 million in 2005 to 77 million in 2030, a sinking birth rate, a rising life expectancy and therefore an aging society, a negative natural change and a positive migration balance of about 100,000 people per year. However, regional differences are significant: though most federal states will lose population, it will grow in Bavaria, Baden-Württemberg, and Hamburg. International migration will almost solely affect the western part of Germany. National migration from east to west will continue but diminish (Statistische Ämter des Bundes und der Länder 2007). Figure 2 shows spatial differences of demographic change until 2025.

## **Demographic Change and the Environment: A General Perspective**

The difficulty in estimating the impact of demographic change on the natural environment is not solely due to a lack of research, but also to the variety and complexity of many different factors, which influence the environment. Thus, it is presumably impossible to isolate demographic change as one single factor and to attribute specific environmental changes to it. Mostly, there is no direct connection at all; other determining factors could intensify, neutralize, or even contradict the effects of demographic change (Heiland et al. 2004). Therefore, a decreasing population does not, as often assumed, necessarily lead to a decrease of environmental burden—at least not in an immediate and direct way.

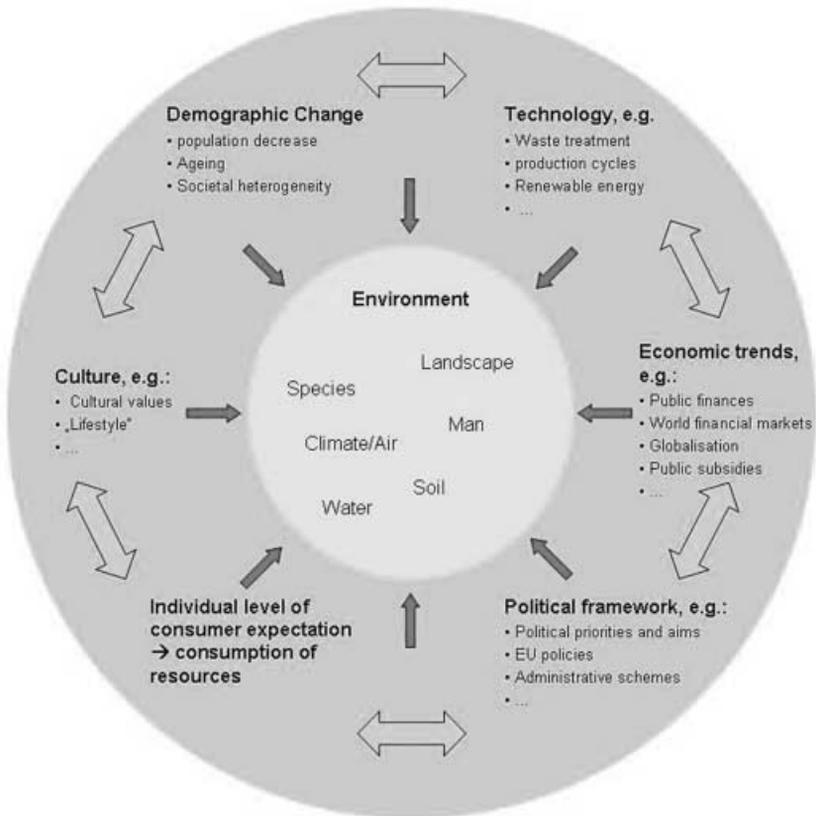


**Figure 2 ■** Regional characteristics of demographic change in Germany  
 Source: BBSR 2009; used with permission.

*Notes:* Light gray areas—significant decrease of population; dark gray areas—significant increase of population; stripes—significant decrease of school-age children; dots—significant increase of people over seventy-five; small globe—strong internationalization; big globe—very strong internationalization.

Figure 3 shows crucial impact factors on the environment, which could influence the societal importance of environmental concerns: population, per capita consumption of natural resources, technological capability of minimizing emissions and demand for resources, economic development, the political framework, and cultural and social aspects. Ecological interdependences between climate, air, water, soil, and species also have to be considered. Land use changes and climate change will probably have a stronger influence on the environment and landscapes than demographic change.

Further, it has to be considered that demographic change has many different faces that differ from country to country, from region to region, and even between different quarters of a city. There are shrinking cities in growing regions, as well as growing cities in shrinking regions; fast growing regions with high cultural heterogeneity can be



**Figure 3** ■ Determining factors of the state of environment

Source: Heiland et al. 2004.



found adjacent to shrinking regions with almost no foreign inhabitants at all. Therefore, Europe is a patchwork of areas or regions with different demographic characteristics, including different overlaps of aging, population development, and cultural diversity (Gans and Schmitz-Veltin 2008; for Germany see Siedentop and Kausch 2004). Similarly, the environment cannot be seen as a homogenous entity. In fact, impacts of demographic change and other human-related activities and development can differ with various elements of the environment, like water, soil, air, species richness or, referring to landscape, with scenery.

Hence, when studying demographic change and its environmental effects, we have to consider that there are differences among 1) the components of demographic change (aging, decreasing population, and cultural diversity), 2) different regions, and 3) the elements of the environment and the various areas of environmental policy. Also, demographic change could affect the environment either directly or indirectly. A direct impact for example would be a lower amount of sewage due to a decreasing population, while an example of an indirect impact would be less funding for nature conservation measures (or road construction) because of a lower tax revenue.

This complexity can be illustrated by the examples of traffic, energy supply, and water supply. It might seem obvious that a shrinking population would also lead to a decrease of traffic, but the contrary could also happen because public services—such as kindergartens, schools, libraries, post offices, supermarkets and parts of public transport—are often taken out of service as a result of population loss. Consequently, the remaining inhabitants might have longer journeys and might be more dependent on individual transport than before, leading to car traffic increase (Heiland et al. 2004; SLS 2003). With regard to energy consumption, the number of people is not the only factor either; although in a long-term decreasing energy consumption is to be expected—as long as other factors do not change (for example, individual life style schemes; Effenberger et al. 2003; Gruhler 2004). However, during a transition period, energy efficiency might decrease. If we consider housing, abandoned apartments in large housing units lead to a higher demand for heating in those apartments that are still in use. Impacts of demographic change on water are discussed only with regard to the infrastructure of supply and waste water disposal, whereas no research has been undertaken on how it affects the protection and enhancement of groundwater and surface water. At first glance, here too a decrease of water supply seems to be the logical

consequence of a shrinking population. But again, this underestimates the complexity of the topic because the population size is only one, though unquestionably important, factor that influences water consumption. Another factor is that the technical infrastructure cannot easily and immediately be adapted to a lower population, so there is a need of extra purging of the water pipes to avoid sanitary problems. Individual water-related behavior and consumption patterns also play a role (SLS 2003). In the long run, demographic change might have positive impacts on the water balance in certain regions, if a local decrease of land consumption and soil sealing occurs and less water demand accompanies the adaption of infrastructure.

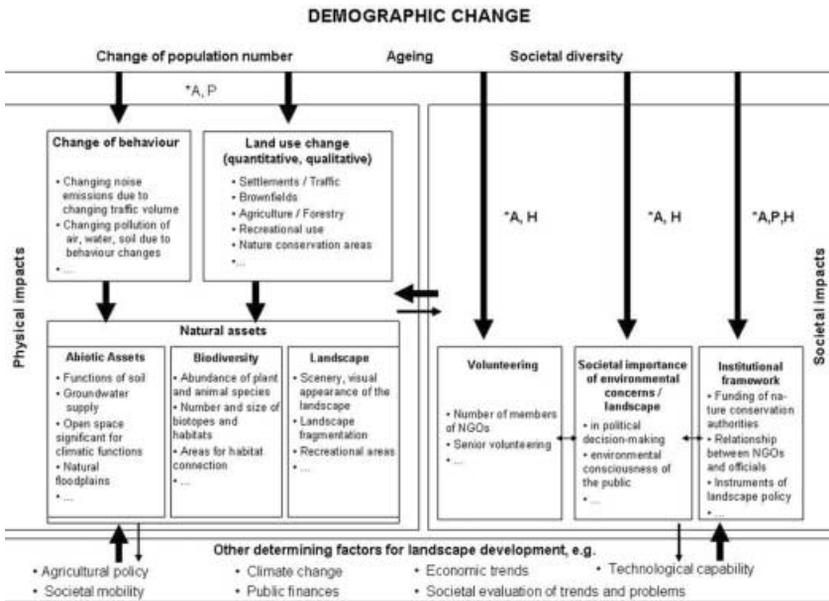
## **Impacts of Demographic Change on Landscapes in Rural Areas**

Due to the highly complex interaction among many different factors influencing the environment, the possible effects of demographic change on rural landscapes have to be discussed in a broad context. For this purpose, we introduce a heuristic model on the impacts of demographic change on natural goods and landscapes, discuss direct and indirect effects, and put an extra focus on agricultural policy because of its importance for rural areas.

### ***Demographic Change and Landscapes: A Heuristic Model***

To define the effects of demographic change on the environment in general, and on landscapes in particular, it is necessary to identify the different functional chains between the two and to consider other factors to be able to evaluate the importance of demographic change as a driver of environmental and landscape change.

A distinction needs to be made between physical effects of demographic change with a (more or less direct) impact on natural goods and landscape (fig. 4, left column) and societal and political consequences that could lead to physical effects in an indirect way (fig. 4, right column). The physical impacts of demographic change on landscape and other natural assets (e.g., soil, water, and vegetation) are results of quantitative or qualitative changes of behavior (e.g., change of traffic volume due to population loss or new requirements on open space quality due to an aging society) and of changes of land use (e.g., emergence of brownfield areas) (fig. 4, left column). The different com-



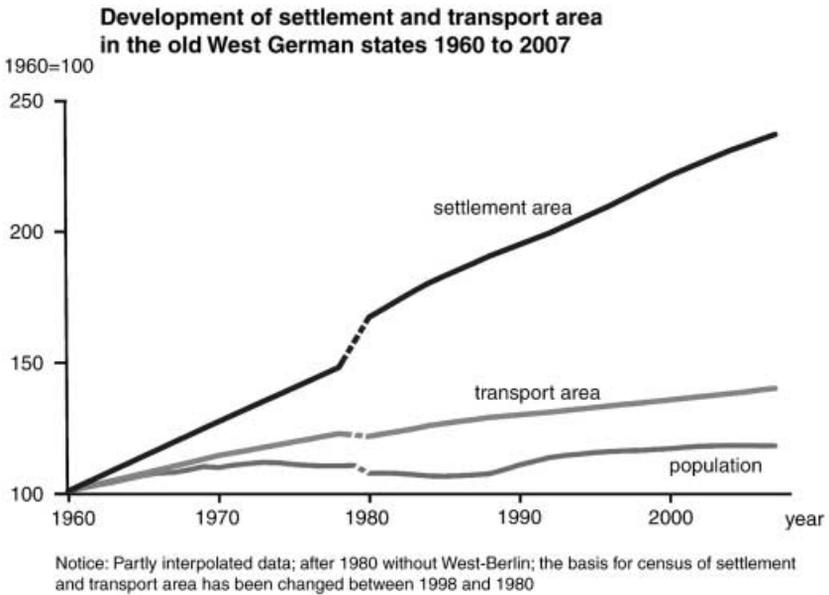
**Figure 4** ■ Model of potential impacts of demographic change on nature conservation and landscape development

\* Impacts caused mainly by A—aging, D—societal diversification, P—change in of population number

ponents of demographic change are likely to have different impacts. Therefore, they have to be looked at separately. To be able to assess the importance of demographic change for environmental and landscape development, the background of further impact factors needs to be taken into consideration (fig. 4, lower bar).

### ***Physical Impacts: Land Consumption and Landscape Fragmentation***

Fewer people means less environmental burden. This assumption can especially be found in the context of land consumption for housing, industry, and traffic. A decreasing population would lead to a reduction in land consumption. With regard to the western part of Germany, figures tell a different story: the population grew by about 20 percent between 1960 and 2000, while the increase of settlement and traffic areas added up to almost 180 percent (BBR 2005; BBSR 2009; see also fig. 5). With minor exceptions, even in the eastern part of the



Sources: Federal Statistical Office and Statistical Offices of the Laender in Germany, © BBSR Bonn 2009 Federal Institute for Research on Building, Urban Affairs and Spatial Development

**Figure 5 ■** Increase of settlement and traffic areas compared to population growth between 1960 and 2003 (without former German Democratic Republic)

Source: BBSR 2009; used with permission.

country, which is mostly affected by a shrinking population, settlement and traffic areas increased considerably between 1992 and 2004 (Siedentop and Kausch 2004). Considering that this has also been driven by the specific situation of eastern Germany after the German reunification—that is by the so-called catch-up-development or by the political priority given to these regions—this gives even more evidence to the hypothesis that demographic change is a minor driving factor of landscape change.

Certainly, there is a slowdown of land consumption or at least of new land consumption at a local or regional level in some areas. There might even be no necessity for new housing areas when people have migrated. But that does not apply in all cases; even in shrinking regions new housing areas were built because the people who stayed tried to realize the dream of living in the green areas around the cities. Thus, the overall tendency is unchanged: demographic change and land consumption are mainly disconnected.



One major environmental problem resulting from land consumption is landscape fragmentation by settlements and traffic routes, which both leads to a loss of extensive and quiet recreational areas and diminishes wildlife habitats. An often-used indicator for landscape fragmentation are the so-called large un-dissected low-traffic areas (UZR), areas that are not dissected by bigger settlements and traffic routes. In Germany, the number of UZR larger than 100 square kilometers decreased from 480 in 1998 to 422 in 2003, as did their quota of the total area of the country—from 22.42 percent to 20.61 percent (BfN 2004: 67 ff.). No direct connection to population development was observed. For example, in the federal state of Saxony, the population decreased about 350,000 inhabitants to 4.3 million between 1992 and 2004. During the same period the length of motorways increased from 12.6 km to 13.8 km; not taking into account local streets (personal communication with Ulrich Walz, 2005).

What are the reasons for this disconnection? Most important, until now the loss of people in shrinking regions has been mainly caused by migration within Germany. That has led to a shrinking population in some regions, but to an increasing population in others, and consequently to an ongoing land consumption at a national level. Evolving requirements on housing, increase of single households, a higher living space per capita, supply of building areas by local authorities, and the tax system, or state-funded subsidies, have to be considered as well (Heiland et al. 2004). As to landscape fragmentation, two supplementary factors might play a role. First, presumably there is a “temporal persistence of planning.” This means plans for traffic routes based on prognoses that have been made long before the roads were built. Even if, in the meantime, the demand for roads should have changed due to a smaller population, traffic planning might not automatically react to that.

With regard to rural areas, there might not be a significant demand for new housing in shrinking regions. Unfortunately, to our knowledge, there has been no research on the question of whether municipalities have altered their land use plans and reduced the amount of new building areas as a reaction to the loss of inhabitants. Accordingly, it also would be important to ascertain if road authorities have done likewise and adjusted their plans to a possibly sinking demand for new roads. If this were the case, there would be evidence for an environmentally positive link between demographic change and land consumption in the sense that fewer people cause less land consumption. Conversely, such a link certainly does exist. For example, there

are rural areas in Germany where population growth is still expected, such as the surrounding area of Berlin, a belt from Kiel to Hamburg and Bremen and most parts of southern Bavaria (BBR 2006). Consequently, these regions will have to face continuing land consumption.

Therefore, concerning land consumption, demographic change can have different, even contradictory impacts on rural landscapes. Hence, the reduction of land consumption will be an important remaining goal to be pursued actively. Demographic change is not the solution to this problem.

### ***Nature Conservation Areas, Wilderness, and Maintenance of Cultural Landscapes***

Often nature conservationists link demographic change to the opportunity to gain more area for nature conservation purposes—for example, for new protected areas, for habitat networks or for wilderness. But no evidence is given that this is going to happen because the decrease of inhabitants in many regions does not lead to less agricultural and forestial use. Neither depends on the number of people living in a region, but strongly depends on political decisions and on subsidies. During the last decade, the promotion of renewable energies, especially biomass, has led to a significant rivalry between different land uses and to an extension of agricultural used land. Even in areas designed for the *Habitats Directive*,<sup>1</sup> a loss of grassland for the benefit of arable land was evident (Lind et al. 2008). Thus, the importance and dominance of biomass cultivation to mitigate climate change will lead to a lower availability of areas for landscape and nature conservation. Even if this trend should change, it remains unclear whether the remaining population would accept nature conservation concepts like “wilderness,” as those concepts may often contradict traditional ideas and values about what a landscape should look like (Heiland 1999: 105 ff.).

Moreover, it has to be recognized that a retreat of agricultural use would not in any case lead to an enhancement of environment and landscape from a nature conservationist’s point of view. This applies especially to all semi-natural biotopes created by agricultural land use, such as hedgerows, extensively used dry or wet grassland and heathers. If agriculture draws back from an area, those biotopes—which are of high significance for the scenery—will also vanish. But whether these biotopes can be maintained in the future also depends on economic conditions. The most crucial question in this regard is whether



or not it is financially attractive for farmers to cultivate these biotopes in the traditional manner. Because of rising world market prices for corn and of biomass promotion, it might not be attractive for farmers unless substantial subsidy is given for the maintenance of such biotopes. Afforestation or outdoor photovoltaic plants are other options farmers have. Therefore, demographic change will not crucially affect rural landscapes, at least not directly.

### ***Societal and Political Impacts of Demographic Change with Importance for Landscape Development***

If demographic change is solely a minor direct driving force of landscape development, the question arises: could there be any significant indirect impacts? This leads us to the societal and political impacts of demographic change, which might obtain importance as they contribute to changes of preconditions of environmental and landscape-related politics. Three, closely interlinked, main impacts have to be surveyed in this context. Impacts on the societal significance of landscape-related issues (e.g., by change of the environmental consciousness of the overall population), impacts on public authorities responsible for landscape and nature conservation issues (e.g., by the alteration of the financial and personal settings); and impacts on non-governmental organizations (e.g., due to changing member schemes or target groups).

Migration, and the following cultural diversification of the society, could lead to a changing level of importance of environmental and landscape issues because of different perspectives on environmental problems, of different perceptions of landscape and of different levels of environmental consciousness in different cultures. This might affect landscape-related individual attitudes and behavior, according to the political influence of people with a migratory background. However, in the German context, little is known about landscape perceptions, landscape values, or environmental consciousness of people with different cultural backgrounds. This lack of knowledge will lead to nature conservation organizations and authorities not to be able to address those people effectively and appropriately.

For public authorities, the main problem seems to result from decreasing tax revenues, a problem that could be aggravated by demographic change in regions with an aging as well as a decreasing population. In recent years, nature conservation authorities have suffered from a lack and an above-average reduction in personnel (SRU

2007). It is feared this trend will continue owing to public finance problems and political targets such as “achieving a slender administration,” “minimizing bureaucracy,” or “promoting economic development” (Ebinger 2008). But how are nature conservation authorities to fulfill legal requirements without the necessary means? Likewise, demographic change might affect the quality of environmental assessment and planning instruments, such as Environmental Impact Assessment, Strategic Environmental Assessment, or Landscape Planning. All these instruments have to address landscape issues and to ensure a high quality of landscape and its elements. If they cannot be accomplished thoroughly and effectively, landscape concerns could be taken less seriously by land users, leading to further negative impacts on landscapes.

Another effect of public finance, possibly aggravated by demographic change, is the abandonment of semi-natural biotopes, which can only be maintained by agricultural use. The protection of these biotopes is promoted by the EU’s agri-environmental programs, but the national states—and the federal states in Germany—have to contribute a certain percentage of the amount. If, as is to be expected, public subsidies will fall, this could lead to further alterations of rural landscapes owing to the decrease of measures to maintain secondary biotopes. This could be worsened by the loss of volunteering members of nature conservation organizations who have in recent years been engaged in care of the countryside. One possible reaction to that could be the definition of regions with special responsibilities for defined biotopes, on which the remaining subsidies could be concentrated. At this point, climate change, as a major impact factor on biotopes and landscapes, must be taken into consideration. Subsidies for the maintenance of biotopes are only reasonable as long as they remain under different climatic conditions.

Although the future of traditional biotopes in cultural landscapes has to be regarded skeptically, there might still be some advantages for landscape development from demographic change because decreasing tax revenues could lead to less land consumption by housing, industry, and traffic. Whether this hypothesis proves to be right has not yet been researched. Certainly, it is an optimistic scenario. But these considerations provides even more evidence that demographic change is not the only and in most cases not even a crucial factor for landscape development. The reason is that when tax revenues decrease, political priorities and decision making become the most significant factors (Ebinger 2008).



### ***The Importance of Other Determining Factors on Landscapes: The Example of Agricultural Policy***

About 47 percent of the total area of Germany is agricultural land (BMELV 2008), as is 43 percent of the EU (Eurostat 2008). Consequently, agricultural land use practices considerably influence the ecological functions of landscapes as well as the scenery. These practices strongly depend on the agricultural policy of the EU and its member states, along with technological and global macroeconomic trends. A detailed discussion of these issues is outside of the scope of this article.<sup>2</sup> However, it is important to be aware of them in order to understand the minor impact of demographic change on landscapes. In short, agriculture has both negative and positive impacts on natural goods and landscape. Negative impacts are, for example, habitat destruction, habitat fragmentation, soil erosion, or groundwater pollution, while a positive impact could be the maintenance of secondary biotopes. In most European countries, natural and semi-natural habitats are rare and even in nature protection areas agriculture and forestry often dominate land use. According to Raths et al. (2006), the main land use types (according to CORINE Land Cover data) within terrestrial Natura 2000 sites in Germany are forestry (51%) and agricultural land use (21.4% cropland, 17.8% grassland), while natural and semi-natural habitats like lakes, bogs, and heaths cover less than 10 percent. Many habitat types protected by the Habitats Directive, such as heaths or mesophile grasslands, are secondary habitats that require traditional land use practices for maintenance and are therefore endangered by intensification as well as by the abandonment of land use.

Accordingly, the diversity of agricultural land use practices is a precondition for maintaining the diversity of landscapes. Yet, many of these practices are not competitive under market conditions. Therefore, the EU provides for payment schemes for agricultural environment measures (AEM), for less favored areas, or for the conservation of natural heritage within the second pillar of the Common Agricultural Policy (CAP). These programs play a crucial role in the protection of habitats and landscapes. But instead of substantially strengthening rural development policy, the European Council in 2005 restricted the financial support for the second pillar. In many EU countries this has led to a reduction in EU funding for rural development measures, in Germany by 23 percent (SRU 2008). Although decisions under the framework of the so-called Health Check have been taken to increase

“modulation”—which means transfer from the first to the second pillar—this does not fully compensate for the reduction.

Global macroeconomic developments, especially rising food demand caused by population growth and changing consumption patterns, have sent strong signals for a further global intensification of land use practices in recent years. This is aggravated by a rising demand for non-food and non-feed crops for energy use. As it is a declared objective of the EU to enhance the competitiveness of community agriculture and to promote market-oriented agriculture (European Council 2003), corresponding future alterations within the first pillar of the CAP might be accompanied by both synergies and trade-offs for the environment and rural landscapes. As Ganzert et al. (2008) describe, in Germany, decoupling of payments for beef production has led to less intensive livestock farming in high-productivity areas, but decoupling of suckler cow payments made extensive livestock farming practices less competitive, which has had negative impacts on low productivity grassland regions.

Although decoupling of cropland payments should have made maize cultivation in original grassland areas less competitive, this was overcompensated by the promotion of biogas production in the framework of the Erneuerbare Energien Gesetz (renewable energy act). The area for maize cultivation for use in biogas plants in Germany increased more than tenfold between 2004 and 2007 (Lind et al. 2008). Although legislation to protect permanent grassland is part of the “cross compliance” regulations (Art. 5 EC-Directive 1782/2003), further losses of permanent grassland could not be halted. The area of permanent grassland in Germany declined by 3.4 percent (share of permanent grassland in total agricultural area in 2008 as compared to 2003); in some regions the loss exceeded 5 percent (Behm 2008).

The CAP also supports rural development policies, which try to mitigate population loss in disadvantaged rural areas and to maintain vibrant rural communities, especially by means of the third and the fourth axis of the second pillar of the CAP. This is also relevant for further landscape development, as rural development initiatives often focus on cultural and natural heritage and on the value of landscape. Experience with rural development in Europe shows that there are many potential synergies between socio-economic development, nature conservation, and landscape development in regions with a low population density and decreasing population trends. For example, in German Biosphere Reserves, regional marketing, environmentally friendly agriculture, and sustainable tourism are regarded as impor-



tant drivers for both the mitigation of demographic trends and for nature and landscape conservation. Therefore, integrated rural development is part of the national strategy for biodiversity of the German government (BMU 2007; Jessel 2009). Whether, and to what extent, these efforts and programs will be able to mitigate migration and to enhance landscape qualities in the long run is still unknown.

## Summary

The article comes to five main conclusions.

1. Demographic change cannot be considered as a homogenous phenomenon characterized by identical features in every region. In fact, it varies in population size changes, aging and cultural diversification from region to region and within regions or even within single cities.
2. According to current knowledge/research, demographic change characterized by a loss of population does not appear to be the most significant driver of landscape changes in rural areas compared to other factors such as agricultural policy, climate change, or the promotion of renewable energies. Nonetheless, it may relieve some pressure from the environment in some areas, but only under distinct circumstances.
3. On the contrary, demographic change characterized by population growth significantly affects landscapes as it leads to further land consumption for settlement and traffic.
4. Even if physical impacts of demographic change in shrinking rural areas seem to be the exception, there might be some indirect effects caused by structural and institutional changes of nature conservation administrations, which could lead to a lower level of importance of landscape-related concerns. Also, changes of environmental consciousness due to cultural diversity could lead to a different societal attitude toward landscapes and their values.
5. Finally, demographic change should not be the major point on which nature conservation and the corresponding research concentrate; however, but it should not be completely neglected.



---

Stefan Heiland, PhD, is professor at the Department of Landscape Planning and Development at the Berlin Technical University. His fields of teaching and research include landscape planning and development, participation

processes, biodiversity, demographic and climate change, and their relevance for nature conservation and landscape development.

Silke Spielmans is at the Department of Landscape Architecture and Environmental Planning at the Berlin Technical University, where she is working on a research project on valuing ecosystem services. Her research interests include soil science and environmental impacts of land use.

Bernd Demuth is a scientific staff member at the Department of Landscape Planning and Development at the Berlin Technical University. His most recent research projects are “Young Cities—New Towns in Iran” and “Demographic Change and Nature Protection.”

## Notes

1. The Habitats Directive is a European Union directive adopted in 1992. It is one of the EU’s two directives in relation to wildlife and nature conservation, the other being the Birds Directive. The Habitats Directive aims to protect over 200 habitat types (e.g. special types of forests), and approximately 1.000 species listed in the directive’s Annexes.

2. For more details, with focus on Germany, see Ganzert et al. 2008 concerning the first pillar of the CAP; for the second pillar see Güthler and Oppermann 2005; Hartmann, Schekahn et al. 2006; Hartmann, Thomas, and Luick 2006; and Ruschowski and von Haaren 2008.

## References

- BBR (Bundesamt für Bauwesen und Raumordnung). 2005. *Raumordnungsbericht 2005*. Vol. 21. Bonn: BBR Berichte.
- BSR (Bundesinstitut für Bau-, Stadt- und Raumforschung). 2009. Future Regional Demographic Development: A Synopsis; Development of Settlement and Transport Area in the Old West German States, 1960 to 2007. Internal Report made available to the authors, August 2009.
- . 2006. *Raumordnungsprognose 2020/2050*. Vol. 23. Bonn: BBR Berichte.
- Behm, Cornelia. 2008. “Grünlandverluste schreiten beschleunigt voran. Schleswig-Holstein, Mecklenburg-Vorpommern und Rheinland-Pfalz haben 5%—Grenze bereits überschritten.” Press release. November 13. [http://www.cornelia-behm.de/cms/archiv/dok/257/257600.gruenlandverluste\\_schreiten\\_beschleunigt.pdf](http://www.cornelia-behm.de/cms/archiv/dok/257/257600.gruenlandverluste_schreiten_beschleunigt.pdf) (accessed 15 July 2009).
- BfN (Bundesamtes für Naturschutz). 2004. *Daten zur Natur 2004*. Münster: BfN Berichte.
- BMELV (Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz). 2008. *Statistisches Jahrbuch über Landwirtschaft und Ernährung 2008*. Bremerhaven, Germany: NW-Verlag.
- BMU (Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit). 2007. *Nationale Strategie zur biologischen Vielfalt*. Bonn: BMU Publication.



- Ebinger, Falk. 2008. "Thesen zur Auswirkung des demographischen, gesellschaftlichen und institutionellen Wandels auf den Umwelt- und insbesondere Naturschutz." Paper presented at the workshop Naturschutzpolitische Folgewirkungen des demografischen Wandels, Vilm, Germany, November 23–25.
- Effenberger, Karl-Heinz, Karin Gruhler, and Norbert Gassel. 2003. *Wärmedienstleistung im Wohngebüdesektor für das Energieprogramm Sachsen*. IÖR-Expertise in Zusammenarbeit mit invencon Innovative Energieconsulting GmbH Dresden. Stuttgart: IER.
- European Council. 2003. "Establishing Common Rules for Direct Support Schemes under the Common Agricultural Policy and Establishing Certain Support Schemes for Farmers and Amending Regulations (EEC) No 2019/93, (EC) No 1452/2001, (EC) No 1453/2001, (EC) No 1454/2001, (EC) 1868/94, (EC) No 1251/1999, (EC) No 1254/1999, (EC) No 1673/2000, (EEC) No 2358/71 and (EC) No 2529/2001." Council Regulation (EC) No 1782/2003, September 29.
- European Union. 2007. "Europe's Demographic Future: Facts and Figures on Challenges and Opportunities." <http://ec.europa.eu/social/main.jsp?catId=370andlangId=lvandfeaturesId=33andfurtherFeatures=yes> (accessed 4 March 2009).
- Eurostat. 2008. *Agricultural Statistics. Main Results 2006–2007*. Luxembourg: European Communities.
- Gans, Paul, and Ansgar Schmitz-Veltin. 2008. "Demografischer Wandel auf europäischer Ebene." Pp. 14–25 in *Demographie und Kulturlandschaft. Tagungsdokumentation der 18. Fachtagung des LVR-Fachbereichs Umwelt*. Köln: Landschaftsverband Rheinland.
- Ganzert, Christian, Christine Krämer, Jochen Kantelhardt, Peter H. Feindt, Johannes Schuler, Sabine Weiland, and Alois Heißenhuber. 2008. "Integration von Naturschutz in die Reformen der EU-Agrarmarkordnungen." BfN-Skripten no. 198, Bonn, Germany.
- Gruhler, Karin. 2004. "Ermittlung von Raumwärmebedarf." *BundesBauBlatt* 7/8: 46–49.
- Güthler, Wolfram, and Reiner Oppermann. 2005. *Agrarumweltprogramme und Vertragsnaturschutz weiter entwickeln. Mit der Landwirtschaft zu mehr Natur*. Münster-Hiltrup, Germany: Landwirtschaftsverlag.
- Hartmann, Elisabeth, Anke Schekahn, Rainer Luick, and Frieder Thomas. 2006. "Kurzfassungen der Agrarumwelt- und Naturschutzprogramme, Darstellung und Analyse von Maßnahmen der Agrarumwelt- und Naturschutzprogramme in der Bundesrepublik Deutschland." Bundesamtes für Naturschutz Skript no. 161, Bonn, Germany.
- Hartmann, Elisabeth, Frieder Thomas, and Rainer Luick. 2006. "Agrarumweltprogramme in Deutschland: Anreiz für umweltfreundliches Wirtschaften in der Landwirtschaft und Kooperationen mit dem Naturschutz." *Naturschutz und Landschaftsplanung* 38 (7): 205–13.
- Heiland, Stefan. 1999. *Voraussetzungen erfolgreichen Naturschutzes – Individuelle und gesellschaftliche Bedingungen umweltgerechten Verhaltens, ihre Bedeutung für den Naturschutz und die Durchsetzbarkeit seiner Ziele*. Landsberg, Germany Ecomed-Verlag.
- Heiland, Stefan, and Moorfeld, Maria. 2008. Demografischer Wandel und Kulturlandschaft – Beziehungen, Wirkungen, Perspektiven. Pp. 80–91 in *Beiträge zur Landschaftsentwicklung*, ed. Landschaftsverband Rheinland. Köln: Landschaftsverband Rheinland.

- Heiland, Stefan, Maren Regener, and Sylke Stutzriemer. 2004. "Folgewirkungen der demografischen Entwicklung in Sachsen im Geschäftsbereich des Sächsischen Staatsministeriums für Umwelt und Landwirtschaft." [http://www.landschaft.tu-berlin.de/fileadmin/FG/Lapla/Forschung/Heiland\\_etal\\_2004\\_DemogrWandel\\_Umwelt\\_Sachsen\\_EB.pdf](http://www.landschaft.tu-berlin.de/fileadmin/FG/Lapla/Forschung/Heiland_etal_2004_DemogrWandel_Umwelt_Sachsen_EB.pdf) (accessed 4 February 2009).
- Jessel, Beate. 2009. "Herausforderungen an den ländlichen Raum—Chancen für die Biodiversität und die ländliche Entwicklung." [http://www.bfn.de/0504\\_vortraege.html](http://www.bfn.de/0504_vortraege.html) (accessed 4 February 2009).
- Lind, Birgit, Sabine Stein, Andreas Kärcher, and Manfred Klein. 2008. "Where have all the flowers gone?" *Grünland im Umbruch*. Bad Godesberg, Germany: Bundesamt für Naturschutz.
- Müller, Klaus, Astrid Artner, and Andrea Knierim. 2008. "Demographic Changes and the Demands on Agricultural Landscapes: Reflections on a New Research Topic." *Landscape Online* 9: 1–16.
- Müller, Bernhard, Monika Meyer-Künzel, Ansgar Rudolph, and Maren Regener. 2007. "Soziodemographischer Wandel in Städten und Regionen. Entwicklungsstrategien aus Umweltsicht." UBA-Texte 18/07. <http://www.umweltdaten.de/publikationen/fpdf-l/3201.pdf> (accessed 4 February 2009).
- Raths, Ulrike, Sandra Balzer, Marion Ersfeld, and Uschi Euler. 2006. "German Natura 2000 sites in numbers." *Natur und Landschaft* 81 (2): 68–80.
- Ruschkowski, Eick von, and Christina von Haaren. 2008. "Agrarumweltmaßnahmen in Deutschland im europäischen Vergleich. Eine Bewertung und Optimierungssansätze für den Natur- und Klimaschutz." *Naturschutz und Landschaftsplanung* 40 (10): 329–35.
- Siedentop, Stefan, and Steffen Kausch. 2004. "Die räumliche Struktur des Flächenverbrauchs in Deutschland." *Raumforschung und Raumordnung* 1: 36–49.
- SLS (Sächsische Landsiedlung GmbH) in Kooperation mit Regionomica und Korff Agentur für Regionalentwicklung. 2003. "Studie zur künftigen Ausgestaltung der Strukturpolitik im ländlichen Raum im Freistaat Sachsen für den Zeitraum 2007 bis 2013. Endbericht." [http://www.smul.sachsen.de/de/wu/landwirtschaft/laendliche\\_neuordnung/downloads/ThierbachStudie.PDF](http://www.smul.sachsen.de/de/wu/landwirtschaft/laendliche_neuordnung/downloads/ThierbachStudie.PDF) (accessed 15 October 2004).
- SRU (Rat von Sachverständigen für Umweltfragen). 2007. *Umweltverwaltungen unter Reformdruck: Herausforderungen, Strategien, Perspektiven. Sondergutachten*. Berlin: SRU Publication.
- . 2008. *Umweltgutachten. 2008. Umweltschutz im Zeichen des Klimawandels*. Bonn: SRU Publication.
- Statistische Ämter des Bundes und der Länder. 2007. "Demografischer Wandel in Deutschland. Heft 1. Bevölkerungs- und Haushaltsentwicklung im Bund und in den Ländern. Wiesbaden." <http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/DE/Navigation/Statistiken/Bevoelkerung/Bevoelkerung.psm1> (accessed 11 March 2009).
- Wolf, Angelika, and Elisabeth Appel-Kummer. 2005. *Demografische Entwicklung und Naturschutz. Perspektiven bis 2015*. Duisburg, Germany: Bundesamt für Naturschutz.