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Demographic changes and the demands on agricultural landscapes: Reflections on a new research topic

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Abstract

Demographic change suggests substantial effects on future societal demands on agricultural landscape use and thus on rural areas. Demographic change is thereby defined as both the decrease of the population and the shift in the age distribution („aging“) and in the spatial distribution („rural flight“ particularly of young people). The exploration of the research object is based on the starting hypothesis that the demands and preferences of an aging and urbanizing population are changing and have effects on the controlling state interventions, which are also reflected in the agricultural use of landscapes. After a short description of demographic change, a conceptual politico-economic model, which describes the transmission of demographic change on land use, through the analysis of group (age groups, groups of residences) demands on agrarian landscape use is presented. The focus is on the demand for land use related non-commodity outputs (NCO). The starting hypothesis is then examined using selected studies. The literature suggests that urban-rural dichotomy is likely to be greatly diminished. In addition, the urbanization of preferences is expected while preferences differentiated against heterogeneous cultural lifestyles seem to become even more important. However, without further research on the related topics, the basic issues cannot be clearly dealt with. Assumptions are finally made regarding changing societal demands for agrarian landscapes due to demographic change. The limitations of the selected approach and the identification of further research needs will be discussed in closing.

Keywords:

politico-economic model, literature review, agrarian landscapes, preferences, aging-effects, lifestyles, non-commodity outputs

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1 Introduction

While the impact on the social security systems and related issues are central in the research interests of demographic change, only few scientists have actually looked at its consequences on the demands on agricultural landscape use (Kujath & Schmidt 2007). The fulfilment of the diverse demands towards the use of (multifunctional) agricultural landscapes is at the centre, posing the question of how the changing provision of non-commodity outputs (NCO)[1] of agriculture and forestry is a result of demographic change (OECD 2001). Demographic change will be seen as both the absolute decline in the population as well as shifts in the age structure („aging") and the spatial distribution structure (continuous migration of young people from outlying rural areas) of the population. This article examines the cause-effect relationship between demographic change and societal demand for NCO, and the resulting effects on the provision of NCO through agriculture and forestry.

After a brief description of the main demographic trends in Germany, the main hypothesis is formulated. Following that, a conceptual politico-economic model[2] is introduced showing the cause-effect relationship between demographic change and societal demand for NCO. In the second part of the research, theoretical a priori considerations regarding group specific claims, in terms of age and place of residence groups, on agricultural landscape NCO use are employed based on the analysis of selected studies in the existing literature. Because studies that refer directly to our starting hypothesis could not be found, the search was reverted to literature on related issues in order to gain first indications of its empirical evidence. Lifestyle research in particular, which is well represented in the German literature, allows for the distinction of residence and age. Even though rural-urban differences in the demand for NCO could not be found, studies show that age does indeed influence it, which raised the question of the relevance and share of life-cycle theory and generation theory. Hypotheses regarding changes in societal demands on agricultural landscapes resulting from demographic changes were formulated based on these findings. Finally, limitations of the selected investigative approaches, open scientific questions and initial considerations of the consequences on governmental steering interventions with regards to agricultural landscape use under the conditions of demographic change will be discussed.

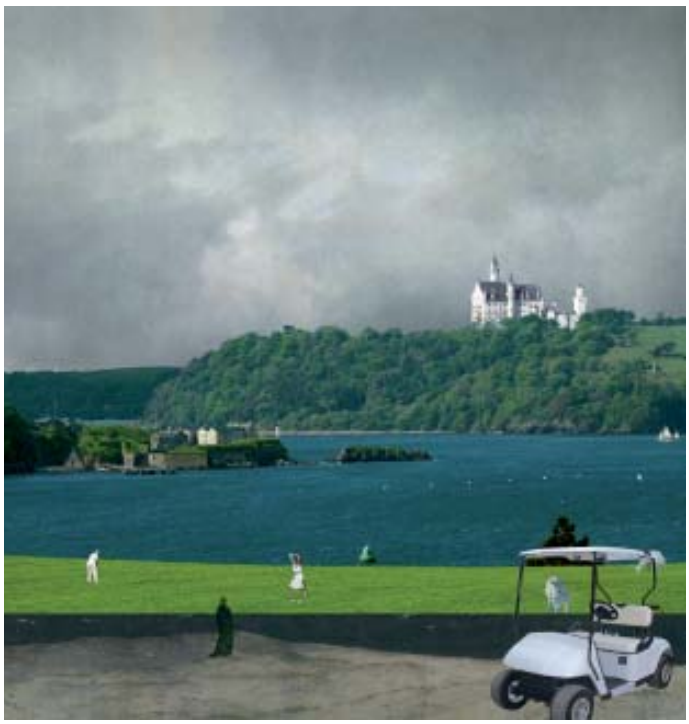

Figure 1. Future Landscapes: Collage "Historical Landscape" (Artner et al. 2005).

[1] The term commodity outputs (CO) comprises the classical agricultural products, while non-commodity outputs (NCO) are coupled products of agricultural production of food and raw materials (resources), which satisfy the economic, ecological and social needs of the society.

[2] For information on the construction, the possibilities and limits of conceptual models see Heemskerk et al. (2003).

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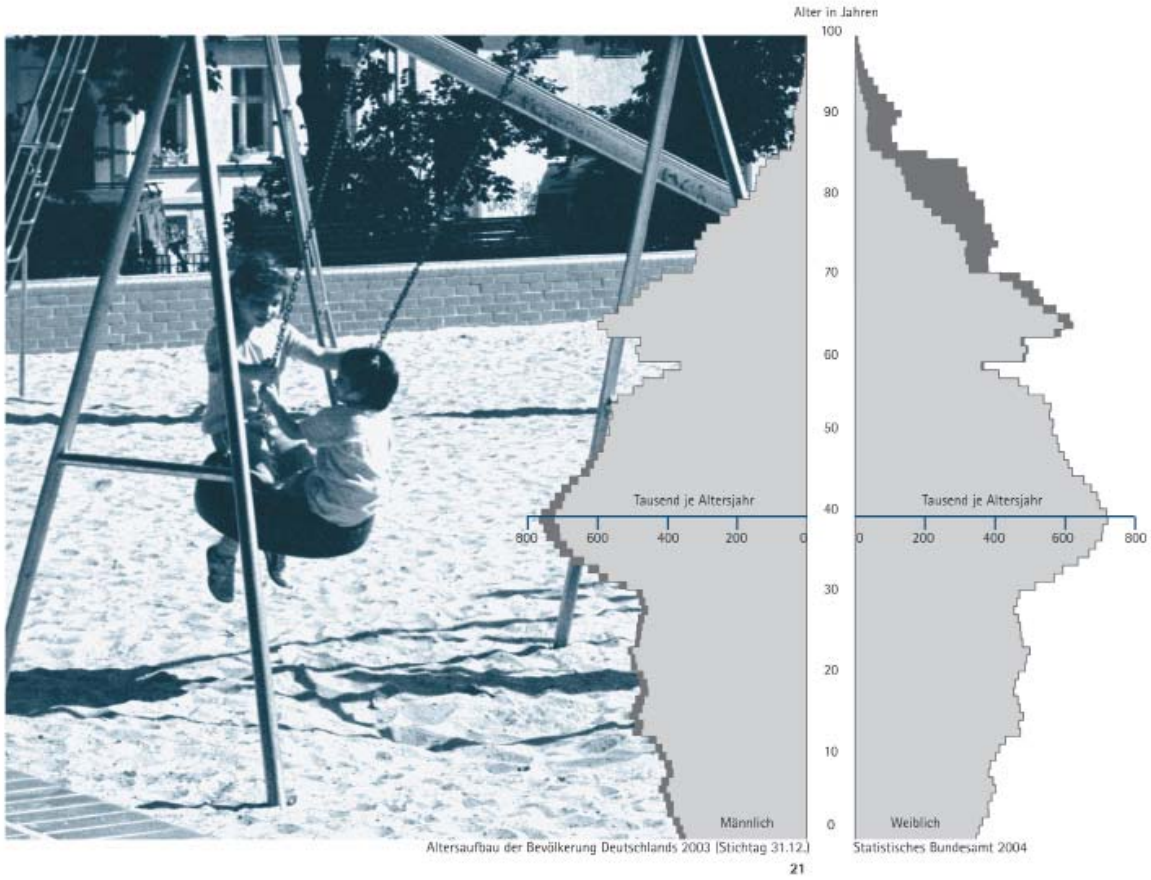

Figure 2. Collage "Demographic change" (Artner et al. 2005).

2 Starting point and hypothesis

There are three dimensions to demographic change in relation to the demand for NCO (and CO) of agricultural land use:

- Population decline: by 2050, a population decline from 82.5 million to between 68.7 and 79.4 million (3.8 % to 16.7 %) residents with strong regional variations is predicted in Germany (Statistisches Bundesamt 2006, 2007).
- Migration: The population currently moves from the peripheral rural areas into the urban and suburban areas (cities and economically prosperous surrounding areas). Significant migration losses are reported particularly in the already sparsely populated rural districts of East Germany (Kröhnert et al. 2004).
- Aging population: the proportion of the employable age group (20-65) is expected to decline from 62 % in 2001 to 60.4 % in 2020 and to about 54 % in 2050 (Statistisches Bundesamt 2007).

The initial hypothesis assumes in the light of the latter two demographic trends that the aggregated individual demands of the population towards the provision of NCO from agricultural landscapes, distinguish the different age groups as well as the urban from the rural population (in its mean value). The shift in the aggregate individual demands[3] on agricultural landscapes can be derived from the consequences of usage change due to regulating interventions and thus changes in the entire cultural landscape, which is all mediated through political-economic processes.

[3] The use of the terms 'aggregate individual demands for NCO' and 'social demands on agricultural landscape use' is synonymous.

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Table 1. Selection of agricultural non-commodity outputs (Source: OECD 2001; Vatn 2001).

Socioeconomic NCO	Biophysical NCO
recreation	protection against natural hazards
aesthetic heritage	groundwater protection
economic viability of rural areas	promotion of biodiversity
food security	erosion protection
animal welfare	climate protection

„Aging" and „migration into cities" will thus lead to changes in the agricultural landscape design. Modern political economy has shown that the changing demands of the electorate are reflected in the changing public programs (abolition, introduction, modification), which result from political party actions that are oriented on maximizing votes or securing re-election. These programs implicate agricultural land use and thus the provision of NCO. NCO are defined by the OECD (2001a, b) as functions provided through agriculture that are not marketable (so-called public goods). They are closely linked to the concept of multifunctionality in agriculture: *‚Multifunctionality' refers to the fact that an economic activity may have multiple outputs and, by virtue of this, may contribute to several societal objectives at once. Multifunctionality is thus an activity-oriented concept that refers to specific properties of the production process and its multiple outputs'* (OECD 2001). NCO are either provided as intended products or as by-products of agricultural production. They can generally be grouped as socio-economic and biophysical NCO (Tab. 1).

3 A conceptual politico-economic model

In the following, a simple conceptual politico-economic model is presented, which describes in a two-stage process, the impact of societal demand on NCO from agricultural landscape use (see Fig. 3). In the initial situation, the state demands certain NCO (e.g. through government programs or regulatory assignment of property rights) from farmers and foresters (Level 2). The farmers produce in the light of this framework conditions and this incentive system a certain amount and structure of NCO, which are then provided by the state to the citizens to satisfy their demands (Level 1). In response to e.g. "shift in demand induced by demographic change", the state adjusts the frame conditions to the new societal demand, i.e. it varies the incentives for NCO-production (government programs, regulatory law) (Level 2). The result is an indirect relationship (shown with a dashed line) between consumers (voters) and producers (farmers and foresters).

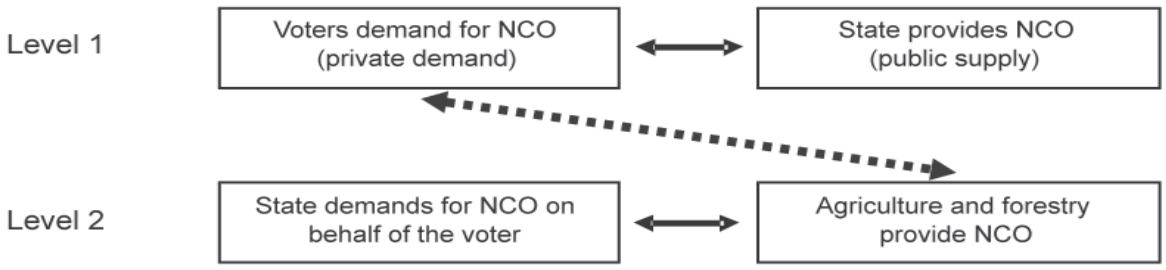

Figure 3. The two-stage process of public provision of NCO from agriculture and forestry, with public goods characteristics.

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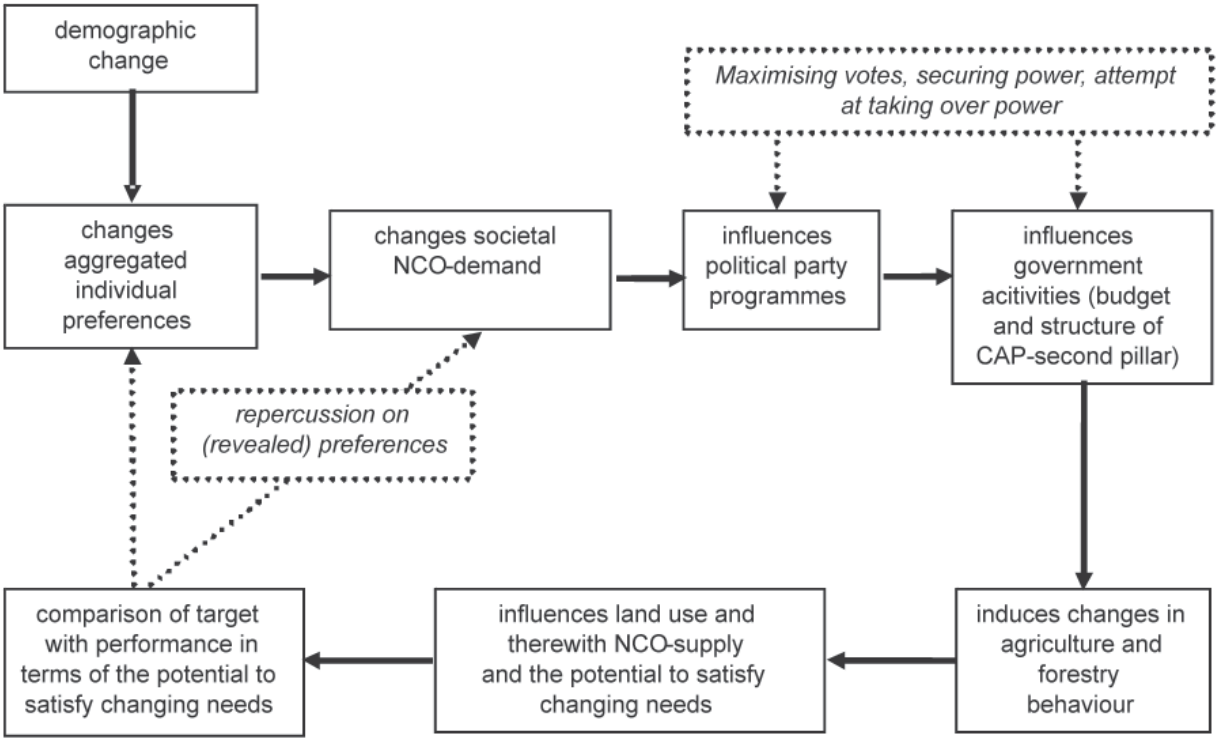

Figure 4. Politico-economic cause-effect relationships (Source: own presentation).

The state acts both as a provider of NCO (towards the public) and as a buyer of NCO (towards the producers of the NCO). State intervention is justified by the fact that the requested NCO usually have the properties of public goods, so that private markets would not develop or would fail if they did develop. This behaviour of the state under democratic systems can be explained by the re-election aspirations of the ruling party(s) and the vote maximizing behaviour of the opposition party(s).

The political-economic cause-effect relationship is demonstrated in Fig. 4 as follows: Demographic change alters the demand for NCO and therefore the demands on agricultural landscape design and use. This is true provided if the initial hypothesis that the demands of the urban and rural population as well as the young and old are different is correct. In following the approach of modern political economy, political parties in a representative democratic system based on the decision sovereignty of the individual will adjust their programs to changing social preferences, if they are interested in re-election or in the case of the opposition party, in taking over the political power[4].

For the above mentioned reasons the adjusted programmes of the political parties will be reflected in the new government activities, as in the design of the agricultural development programmes or NCO-relevant regulatory regimes. This in turn will give farmers and foresters incentives to change land use in the desired ways and thus to alter the production of the requested NCO. This is ultimately reflected in land use changes and its potential to satisfy the aggregated individual preferences. This simple politico-economic model however neglects both strategic behaviour in the expression of preferences for NCO (with the na-

[4] The vote maximisation model was developed by A. Downs (cf. Downs 1968). Downs's democratic theory (later called Public Choice Theory) was based on the assumptions made by rational and well-informed individuals who elected parties that met their preferences best. Political parties were also seen as operating rationally where their interest for re-election or the taking over of power was concerned. Policies are therefore made through democratic elections and reflect the preferences of society.

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ture of public goods) as well as the influence of interest groups and other stakeholders, and the importance of incomplete and asymmetric information. The consideration of these aspects of the framework would mean going beyond the scope of this study without producing any changes in the core statements[5].

4 State of knowledge: NCO-demand and agricultural landscape use in demographic change

Based on the assumption that the initial hypothesis is valid, only the theoretical cause-effect relationship between demographic change and the provision of NCO for agricultural landscape could be shown. In the following section the expected concrete effects on NCO-demands due to demographic change are identified, i.e. the validity of the initial hypothesis is reviewed. In doing so, the NCO-demands are then interpreted as a subset of the demands on agricultural land use.

Starting hypothesis: The population's aggregated individual claims on the provision of NCO from agricultural landscapes vary between different age groups as well as between the urban and rural population (in its mean value).

Based on empirical findings, some initial statements can possibly be made regarding the expected changes in the demands on NCO that are induced by demographic changes. Also, as a result of the above-mentioned politico-economic processes the expected changes in the framework conditions of agricultural land use could also then be outlined. As expected, no studies could be found in the literature that analyse the existence of differences with regard to the desired NCO provision between urban and rural population and between different age groups. Therefore, the above assumption cannot be directly empirically verified. This information, however, is of essential importance as input information for the above-presented political economic model. Because a series of related studies was available in the literature, the attempt is made in the following to gain first indications or empirical evidence of this hypothesis using a literature analysis of the available studies. It is possible then to approach the chosen theme in an exploratory manner on the one hand and discover the gaps in research that impede or prevent the review of the hypothesis on the other hand. Based on these results and the empirical and theoretical considerations, attempts are made to formulate theories concerning the change in social demands on agricultural landscapes as a result of demographic change, with which the research subject should systematically be comprised. In the following, (1) the considered literature is methodologically classified, (2) the empirical results comparatively analysed, and (3) conclusions are drawn with regard to the chosen approach.

4.1. Presentation of selected literature

The general criterion for the selection of literature was the consideration of socio-demographic and socio-economic factors influencing the claims or the demand for NCO from agricultural landscape in the broadest sense. Another criterion was to use empirical studies from Germany, for in this case a single politico-economic causal system could be assumed. Due to the low number of German studies that can provide conclusions for individual or social aggregated preferences, internationally published studies had to be used for topics that could not be covered by German studies.

The argumentation on the demand, needs and preferences with regard to the agrarian landscape use in Germany in the social sciences has been surprisingly one-sided with a primary economic approach. Sociologically and psychologically founded works are generally wider set in the perceptions, attitudes, values and behaviour with regard to landscape, nature or environment in general, while studies dealing explicitly with agricultural landscapes are in contrast rare (Philipp 2005, for Switzerland Hunziker & Buchecker 1999, Hunziker 2000, van den Berg, 1999).

[5] An overview of the relevance of the interest groups is found in Olson (1965). Elschen (1991) provides information about the consequences of incomplete and asymmetrical information. Simple politico-economic models are found in Frey (1981) or Petersen & Müller (1999).

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The term „preferences" from the above-mentioned socio-psychological and sociological studies is used synonymously with demands (Vogel 1999) while values and attitudes are defined as the determining variables of preferences. In order to identify the preferences and demands of consumers towards the protection and use of public goods (such as landscape) from an economic perspective, quantitative evaluation approaches in particular were applied to the existing studies, so that decision-making behaviour, benefit increase and consumer's willingness to pay may be described (for an overview of the contingent valuation see Hampicke 2003 and for benefit transfer see Wilson & Hoehn 2006).

A literature review on the valuation methods for NCO of the multi-functional land use shows for the countries France, Germany and Portugal, a clear focus on contingent valuation and choice experiment approaches (Zander et al. 2008). The results i.e. assessments of the NCO, which are common to all investigations are not differentiated by socio-demographic characteristics. In the sociological and environmental-psychological fields, attitudes towards nature and preferences in land use had been investigated by mainly quantitative and mostly representative surveys (Brämer 2003, Kuckartz 2002, 2004, NFO System Three 2003, Philipp 2005, Hunziker & Buchecker 1999). Some qualitative studies on the perception of and attitudes towards nature and landscape did also investigate socio-demographic data (Braun 2000, Ipsen et al. 2003, Hunziker & Buchecker 1999, Hofinger 2001, Lee 2001). There were additionally studies that investigated preferences regarding environmental protection and nature development from a lifestyle approach (Lantermann et al. 2003, Preisendörfer 1999, Sinus Sociovision 2008, Kleinhückelkotten & Wippermann 2007). This research approach seems to be appropriate for our purposes, since here the distinction can be made according to geographic origin and age. The lifestyle research assumes that the development of preferences cannot be adequately explained by socio-demographic characteristics alone. Rather, it is necessary to consider the basic value orientations as well as everyday attitudes towards work, family, leisure, money and consumption as further determinants[6].

[6] Depending on the author, the identified groups were defined as lifestyle types, value types or milieus types.

Due to the lack of socio-demographic studies with an explicit focus on the agricultural landscape and the contrasting great variety of available studies on the related issues, a selection of the literature was made with the aim of the widest possible reception of the research object. For a more comprehensive analysis of the empirical literature on the general landscape related preference analysis and the theoretical approaches behind it, refer to Hunziker (2000) and van den Berg (1999).

4.2 Empirical findings of age and residence dependent preference differences

Before the results of the selected studies are examined, the selection of agricultural NCO shown in Tab. 1 (see Chapter 2) will first be grouped in accordance with the terminology of the non-economic literature. Thus expectations towards the rural cultural landscapes can be distinguished in their **ideal** and **factual** and resulting political approach to agricultural landscape (see Tab. 2). While the ideal claim per se does not change the agricultural landscape, there are forms of factual approach that have a concrete changing effect on space. In this context, the distinction between the individual and societal approach to cultural landscapes must first be made: individual approaches are specific uses and the thereof derived factual claims as well as dealistic associations can be created (Ipsen et al. 2003). The social approach to landscape is dependent on how the rights for resource use, or its individual elements and the incentive structures are negotiated, defined and implemented (Rodewald et al. 2003). The social approach of the above-introduced politico-economic model is derived from the aggregation of the individual ideal and factual claims towards the landscape.

First, the statements identified in the literature towards the demands on the agricultural landscape are presented in dependence on the variable 'age'. In looking at studies that made statements on the influence of the variable 'age' on landscape preferences, two theories could be distinguished: The generational theory assumes that the values of a generation remain constant during their entire lifetime while the life-cycle theory argues that

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the values change within a lifetime. Several studies did come to the conclusion that the variable 'age' has indeed an impact on the landscape preferences. Older people represent traditional values and hence have differing preferences regarding landscape image and landscape use as compared to other age groups (see Kuckartz 2002, 2004, Braun 2000, Lantermann et al. 2003, Preisendörfer 1999, Kleinhückelkotten & Wippermann 2007, Reusswig 2002). Older people show a strong preference for managed landscapes, while younger adults show comparatively stronger preferences for non-cultivated, natural landscapes (see Lantermann et al. 2003, van den Berg 1999, Hunziker & Buchecker 1999, Tarrant et al. 2002). The lifestyle research, which considers values and attitudes as essential determinants of preferences that therefore enable a finer distinction between types of lifestyle or milieus, also confirmed these results. The lifestyle types dominated by younger age groups have a higher preference for wilderness or natural landscapes (Lantermann et al. 2003). An example is Kleinhückelkotten & Wippermann's (2007) lifestyle study, which showed that more recent modern milieus, whose values are characterized by individualization and self-realization, see forests as fragile and endangered ecosystems, while the so-called (also younger) reorientation milieu, whose values are marked by multi-optionality and life in paradoxes, sees the forest as one of many employable options (e.g. for recreational use). Despite the differences in the land use preferences, the demand for NCO is still in the foreground.

In addition to the change in preferences, it is evident that younger people under 30 years old have a significantly more diverse imagination of landscape use than people above the age of 60 (Kuehne 2006). This can be seen as an indication for the demand shift in the desired NCO-provision that results from the aging process of a society, if the younger generation still keeps the same preferences as they get older. Also a number of studies on societal values and preferences regarding forests in the United States showed a fundamental shift from commodity-oriented, anthropocentric attitudes towards a more inclusive and diverse (NCO and CO) bio-centric approach (Tarrant et al. 2002, see Fig. 5). This shift seems to occur along with a certain amount of exaltation and „idealisation" (see Brämer 2003 and Kleinhückelkotten 2006 for youths, Hofinger 2001 and Brand et al. 2003 for adults). The ever-increasing alienation from nature in which the difference between urban and rural residents can no longer be detected (Brämer 2003) will in the future be reflected in society's relationship with nature and their landscape (use) preferences.

Although traditional milieus still currently exist, their numbers will continue to decline over the next decades. Regardless of age structure, change in values occurs at

Table 2. Assignment of agricultural NCO to approach to agricultural landscape (Source: own presentation).

Approach to agricultural landscape	Examples of NCO
Ideal	Aesthetics
aesthetic-visual	Landscape image
symbolic-emotional	Home
historical-cultural	Cultural heritage
	Regional identity
Factual	Recreation
producing	Food security
resource friendly – reproducing	Animal welfare
recreation – consuming	Protection against natural hazards
	Protection of groundwater
	Promotion of biodiversity
	Erosion protection
	Climate
	Sustainability of agrarian influenced areas

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Figure 5. Future Landscapes: "Natura 2030 landscape" (Artner et al. 2005).

all times. „While the proportion of traditional milieus in our society continually shrinks (from 47 % in 1982 to 24 % in 2007), we are witnessing a continuous growth in the modern segment" (Sinus Sociovision2008, Klages 2001[7]). It can also be assumed that the older generation of the future will belong to the modernization segment (from Sinus Sociovision, date not available).

Besides claims differences that may be based on generational phenomena, some preferences do also change during a lifetime (life-cycle theory). Unlike in the previously presented studies, whose subjects were mostly ideal symbolic (general aesthetic, psychological, historical-cultural) approaches to landscapes, the following studies address their physical uses. NFO System Three (2003) and Lee (2001) showed different preferences for landscapes: Young people have more emotive reasons, 30-40 year olds have family related motives and elderly people prefer to use the countryside as a nature experience. With a growing elderly population stratum, landscape design can be guided through their needs and created by physical use (e.g. age infrastructure).

[7] Klages´ approach (Klages 2001) of value synthesis stated a general mega trend, which leads away from duty and acceptance values towards self-development values. He included combinations of complex values in the form of concrete value type and distinguished order-liking conventionalists, the resigned that are without perspectives, non-conforming idealists, hedonistic materialists and active realists from each other.

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Socio-economic prosperity will also be another important determinant for the expression of societal landscape preferences in the future (net annual effects). Positive environmental attitudes (Tarrant et al. 2002), more diverse ideas for the use of landscape (Kuehne 2006), the desire to be closer to nature (van den Berg, 1999) and the frequency of visits to natural landscapes (NFO System Three 2003, Brown 2000) all correlated positively with education and income, and in part with gender.

Although smaller in number, several studies also differentiated the statements from city and country dwellers. Regardless of age, many authors stated an increase in urbanization, but above all, they stated the adjustment of rural lifestyles to urban patterns, which as discussed before goes hand in hand with a growing alienation from nature (eg, Brown 2000, Tarrant et al. 2002). Only Kuehne (2006) with regards to the diversity of landscape ideas and Philipp (2005) regarding society's willingness to donate for landscape protection found significant urban-rural differences. Publications from other European countries also support the assumption that landscape use for the production of commodity outputs (CO) alone justifies the distinction between the preferences of townspeople and country dwellers (van den Berg 1999, Hunziker & Buchecker 1999, O´Neill & Walsh 2000). Van den Berg (1999) stated the strong preference by farmers for cultivated landscapes. Ipsen et al. (2003) reported of the same preference by the population in the rural dominated region Uckermark, which uses the landscape in a variety of ways for self-sufficiency, labour and employment.

4.3 First conclusions, open questions and limitations of the chosen research approach

The considered literature enabled the drawing of some early conclusions on the development of future research hypotheses: First it appears that the urban-rural dichotomy will likely to be greatly diminished. The lifestyles of urban and rural population groups will become more alike, and the urbanization of preferences is expected[8] . The differentiation of heterogeneous cultural lifestyles (Klages 2001) and their group specific preferences seem to be even more important. Against this backdrop, the methodical young lifestyle research can be seen as an asset for the question considered here. The increasing distancing to nature and landscape and a growing preference shift towards a higher and more diverse NCO provision among younger social groups both in urban and rural areas make it ambivalent for assessment and thus create the cause for further research needs.

Although lifestyle offers promising approaches for the preference formation of landscape design, the aging process remains relevant to the pursuit of social goals. The question remains, to what effect life cycles (life-cycle theory = value changes during a life time), cohort effects (generation theory = the values of a generation remain constant) and net annual effects (impact of changing economic and political situations) have and what relative proportion they take.

Based on the review of existing literature sources on perception, attitudes and preferences of land use and the focus of this article on agricultural landscapes, the first hints regarding the potential relevance of the impact of demographic changes on societal demands on agricultural land use arise. However, the following basic issues cannot be clearly answered without the implementation of other related investigations: Are there age related differences in the preferences of the median voter on agricultural land use (ageing-effects)?

- Does each individual take its once trained preferences through its entire life (are preferences constant)?
- Or do preferences change within a lifetime?

Are there differences between the ideas of urban and rural residents regarding agricultural land use (rural exodus-effects) and do the preferences of the urban and rural communities (where there are differences) get more similar over time?

[8] Statement holds true, provided that a growing distancing and alienation towards nature and landscape is understood as an urban specification.

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Are there other influences on the group specific preferences for agricultural land use, and if so:

- Can lifestyle give more accurate statements regarding attitudes and preferences for agricultural landscape design and can future demands on agricultural land use be better estimated?
- What influence do socio-economic factors have on the individual preference system (net annual effects)?

Does the absolute population decline with its impact on land use and area claims also have an impact on the preferences for agricultural land use?

Overall, it can be seen, based on currently available information that demographic change influences the demands on agricultural land use. However, no clear statements regarding how the effects behave relative to one another and how this will affect the preferences of the people in terms of agricultural landscape design can be made. The general rule is that the preferences of the decisive median voter in politico-economic models are becoming "more urban" and „older". Also individual income and social economic prosperity can be crucial for the voting behaviour. The analysed studies suggested that the group specific demands of the population in the provision of agricultural landscape NCO differed among different age groups, while the preferences of urban and rural dwellers tended to merge through the effect of the „urbanization" of the lifestyles. In addition, the higher percentage of urban population due to rural exodus implies stronger enforcement of the preferences of townspeople in the political decision-making process.

It should, however, be pointed out that „secondary use" of the studies used for verifying the initial hypothesis should be done with caution. The interpretation of these studies with regard to the question of whether the preferences of different age groups and the urban and rural populations differ certainly cannot be clearly answered given its empirical basis. However, there are suitable hints on how the hypotheses to be tested can be further clarified and how specific surveys to clarify these issues should be elaborated.

5 Expected usage change and effects on the development of agricultural land use conditions

The following comments deal with the question of how a government that is interested in its re-election will change the frame conditions of the agricultural landscape use, (i.e. the incentive systems of the farmers) to meet preference changes of median voters that are induced by demographic processes with regard to NCO originating from agricultural landscape use. With this, the systematic reflections on the research subject should be concluded with the discussion of approaches for controlling interventions.

While the absolute decline in the population will affect both the CO and the NCO-production, the urbanization of lifestyles as well as an increasing proportion of older people in the total population will primarily impinge on the NCO-demand. The social demand for NCO from agricultural landscape use will also tend to be shaped more by the „urban" demands on agricultural landscapes.

Thesis 1: The aggregated (social) preferences of the population (or the median voter) are becoming more „urban" with regard to agricultural land use and the provision of NCO.

At the same time, median voters are also becoming older due to the "aging-process" of society. How the demands actually change will depend mostly on how the demands differ between the older and younger voter groups. Overall, it can be stated that the demands of older people will gain more importance.

Thesis 2: The aggregated (social) preferences of the population (or median voter) with regards to agricultural land use and the provision of NCO will in the future be oriented more than ever on the preferences of the older age group.

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Since CO-demand falls simultaneously as a result of population decline under the assumption of constant import and export volumes (assuming constant export and import), the potential to satisfy the NCO-demand would increase. The compensation for the decline in the demand for CO in the form of population income increase seems unlikely due to the small or even negative income elasticity[9]. The development of the demand for NCO is undetermined, since it presumably would decrease due to the decline in the population (area competition is reduced, problem pressure declines in the area of abiotic resource protection) while a demand increase can be expected due to the high positive income elasticity of demand for NCO (see Maslow's hierarchy of needs) in the case of an increase in income. This offers more scope for an even stronger orientation of agricultural landscape use in the multifunctionality concept[10]. The use of agricultural land for leisure and recreation purposes, the provision of „environmental benefits" (biodiversity, species protection, groundwater recharge, compensatory space etc.), the security of energy supply (wind energy, biogas, biomass for combustion purposes) and the provision of NCO for the maintenance and sustainable development of cultural landscape types are likely to grow in importance[11]. This has implications for the future design of the framework of agricultural landscape use. The question here is what landscape relevant instruments exist and whether they are capable of fulfilling the changing demands for CO and NCO in the wake of demographic change?

Value shifts are reflected in the EU Environment and Nature Protection legislation (but probably of a more general nature than caused by demographic effects), which is the legal framework for the protection of species and habitats and has a wide impact on agricultural landscape. The Habitats Directive (92/43/EWG) and the Birds Directive in particular (79/409/EWG) aim at providing environmental NCO through the design of agricultural landscape. The nature conservation law primarily serves the more urban-oriented population, which has more diverse bio-centric attitudes towards landscapes.

Regional planning, as a major player in regional development, also intervenes and coordinates the integration of the claims towards the total area of the federal republic. Rural areas are explicitly referred to as living space and economic areas, places of rural development as well as places of environmental function safeguarding. In following the guiding principles of sustainable development, this offers potentials for the provision of ecological, socio-cultural and aesthetic NCO.

The demographic changes could also be reflected in the design of the Common Agricultural Policy of the European Community, enforcing the trend of the budget shift from the first to the second pillar of agricultural support, which had already been triggered by other factors (WTO negotiations, EU Enlargement, EU-financial problems etc.), and thus enforcing a greater focus on the provision of NCO from agricultural landscape (use) (see Hofreither et al 2002). The supporting instruments of the second pillar (e.g. agri-environmental schemes) allow for a regionally oriented bottom up-approach, which is oriented flexibly on the preferences of the people and their achievement, both in the spatial and in the content design of the programs. These instruments can respond flexibly towards demand changes caused by demographic change.

[9] The income elasticity of the demand indicates to which extent the demand for a good relatively changes if the income of a household changes relatively. For goods of vital importance the income elasticity is smaller than 1 (negative) and for luxury goods it is greater than 1 (positive).

[10] For more information on the multifunctionality concept cf. Mander et al. (2007), Wiggering et al. (2006), Helming & Wiggering (2003) and Wüstemann et al. (2008).

[11] Scenarios of future landscape development as a base for the preference formation are described in Artner et al. (2005).

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6 Conclusions

In this article, the potential impact of demographic change on the demands on the conditions of agricultural land use was derived based on existing studies on age and residence specific preferences and a simple politico-economic model. The literature analysis was used to validate the hypothesis that demographic change affects the preferences of the median voter with respect to the provision of agricultural landscape use dependent NCO because differences in demand can be expected among different age groups as well as among the urban and rural populations. While age group specific differences could be identified, the latter showed that the preferences of city and country dwellers tended to merge because of the „urbanization" of the lifestyles.

Based on the presented politico-economic model, possible adjustment reactions from the state towards the shifting preferences of the median voter were derived in terms of control (of the framework conditions) over agricultural land use, with the assumption that re-election or opposition's gain in power in a democratic system is desirable. Based on that, policy programs were analysed for their potential to provide future requested NCO among other things as a result of demographic change. However, the underlying assumptions of the analysis require further reviewing.

The aspects discussed above led to the identification of the following research needs:

- Identification and operationalization of all current demands towards agricultural landscapes (population's preferences regarding land use dependent NCO- and CO-supply);
- Empirical analysis of the impact of demographic change on the demands on agricultural landscape use (identification of future NCO-demand);
- Review of existing NCO in terms of their potential to satisfy current demands;
- Review and expansion of politico-economic models; analysis of institutional circumstances and control options for NCO-supply.

In summary, it can be said that the points raised in this article are aimed more at raising awareness on the importance of this issue for future policy making and starting scientific and political debates than providing clear answers for the question of demographic change impact on the demands on agricultural land use.

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