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# The Demogeographic Crisis in Racha, Georgia: Depopulation in the Central Caucasus Mountains

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*Many rural mountain areas across the world are facing depopulation due to outmigration and negative natural population growth. This study examines depopulation in the mountains of Georgia based on the example of Oni municipality in the Racha region on the southern slopes of the Central (Greater) Caucasus. Depopulation in Oni, as in other Georgian mountain areas, has been driven by the socioeconomic and political disruption associated with the ongoing transition from a planned to a market economy after the demise of the Soviet Union. Based on official Georgian statistics for the period from 1989 to 2014/2016, the study documents a 50% loss of population over this period. While data on migration are lacking, the natural growth rate dropped from about −5‰ to −14‰, due to a combined decrease in the number of women of childbearing age (20–49 years of age) and in the number of births by women in this age group. Aging is reaching drastic levels, especially in rural communities, with 37% of the population in 2015 aged 65 and older. Settlements at higher altitudes are increasingly deserted. Investment in recreational economies based on local potentials such as hot springs, mountain tourism, and local (labeled) products, coupled with the establishment of protected areas as "working landscapes," could help create local employment and reverse current negative population dynamics.*

***Keywords:*** *Migration; population loss; demographic dynamics; Caucasus; Georgia.*

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## Introduction

Many rural mountain areas across the world are facing an increasing demographic challenge due to outmigration, low fertility rates, aging, and, ultimately, depopulation. These processes are driven by the effects of globalization, industrialization, urbanization, and changing lifestyles, sometimes combined with political marginalization and violent conflicts (Wymann von Dach et al 2007). However, the scope of these processes differs widely between and within mountain regions due to the site-specific development contexts created by economic, sociopolitical, and environmental circumstances. Time is another differentiating factor. In Europe, for example, outmigration and depopulation have affected many rural mountain areas since the 19th century, but an overview analysis of population changes in European mountain areas between 1991 and 2001 found a positive or stable trend for this period in northern and central Europe. No clear pattern emerged in the Mediterranean region, while in Eastern Europe, depopulation dominated due to outmigration, negative natural population growth, or both (EU 2004).

While population loss is a general trend in many rural regions of Eastern Europe, case studies suggest that rural mountain areas are particularly hard hit by this loss. In southeastern Europe, for example, Macedonia's mountain population has declined by 50% since the 1950s, reducing the size of villages and ultimately the ability of self-governance (Madzevic and Toshevska 2016). For Bulgaria, high depopulation rates in border and mountains regions have been reported for the period since the end of World War II and especially since 1985 (Mladenov and Ilieva 2012). A similar picture appears in Romania, judging from the situation in the mountains of Apuseni, where population peaked in 1941 but has declined ever since, with depopulation rates accelerating after the change of the political regime in 1990. This decline was accompanied by a downward movement of population from higher to lower altitudes and by increasing outmigration (Plaias et al 2016; Telbisz et al 2016). Similar dynamics exist in the Carpathian Mountains of Ukraine, Slovakia, and Poland. In the Ukrainian Carpathians, depopulation became dominant after the demise of the Soviet Union and with the ensuing transition process (Kuemmerle et al 2008;

Angelstam et al 2013; Warchalska-Troll and Troll 2014). Depopulation coupled with land abandonment and forest encroachment is also documented for Slovakia's central and eastern mountains, Poľana and Bukovské Vrchy (Chovankova and Mladek 2002; Meessen et al 2015; Solar et al 2016), as well as for parts of the Polish side of the Carpathians (Kozak et al 2007). Farther to the east, evidence of depopulation has been provided for the Caucasus, including detailed demographic analyses comparing mountains and lowlands in North Ossetia-Alania (Gracheva et al 2012) and a general regional overview across the Caucasus (Radvanyi and Muduyew 2007).

This general overview reports particularly high population losses for the mountains of Georgia since the late 1980s, as compared to the North Caucasus, which forms part of the Russian Federation. Georgia was hit hardest among all former Soviet Republics and Eastern European countries by the demise of the Soviet Union (Salukvadze and Meladze 2014). The demise confronted the country with an abrupt rupture of close economic links with its main trading partners. This led to an almost complete breakdown of industry and large-scale agriculture, high rates of unemployment, and exorbitant inflation. The economic crisis was exacerbated by civil tensions, political unrest across the country, and open conflict with Russia over the 2 regions of Abkhazia and South Ossetia.

The present study expands evidence on depopulation and demography in the mountains of Georgia by providing detailed information about population loss over time and space. We focus on the period from 1989 to 2014/2016 and on the municipality of Oni in the Racha region on the southern slopes of the Central (Greater) Caucasus. Demographic developments in Oni municipality and the Racha region during this period are typical of the developments witnessed throughout the Central Caucasus in Georgia. Racha is divided into 2 municipalities: Ambrolauri, situated at intermediate altitudes, and Oni, which reaches up to the highest peaks of the Central Caucasus. It is bordered by Russia in the north and east and by the Tskhinvali region (South Ossetia) occupied by Russia in the southeast. Oni municipality covers an area of about 1300 $km^2$ and ranges from 600 to 4500 masl. The region is highly diverse in terms of relief, climate, soils, and vegetation. It is known for its unique mineral waters, hot springs, and health resorts and has a high potential for the development of a recreational economy, for which it once was famous. Its resources also include large coniferous forests, as well as streams and rivers for hydropower generation. In addition, new protected areas are planned across the region, and the local people pin their hopes on these for regional development (Elizbarashvili et al 2000).

## Aims and methods

This paper aims to document population dynamics, including the drastic loss of population, in the mountain areas of Georgia from just before the demise of the Soviet Union to the present (1989–2014/2016). Taking the example of Oni municipality in Racha, we illustrate these dynamics by means of a series of demographic indicators such as overall population figures, birth and death rates, age and sex structure, and related dependency ratios. We also document the resulting altitudinal trend of depopulation in the area. We define depopulation as the loss in the number of people in a defined territory and over a given period, due to the dynamics of natural population growth (or decline) and the net effect of migration (in- and outmigration).

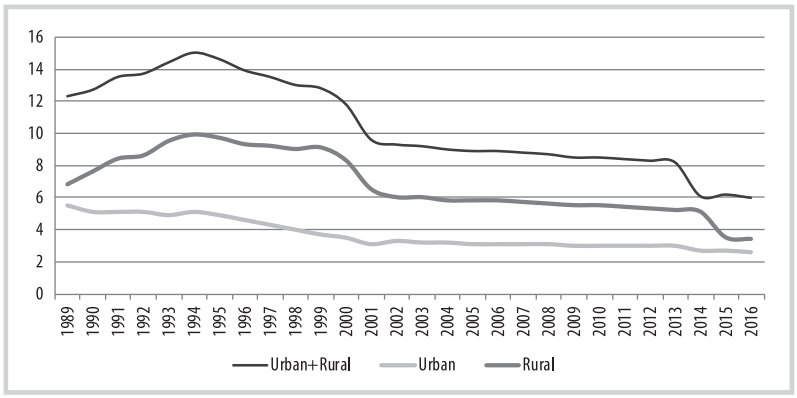
Our methods include a review of the relevant literature from Georgia and other mountain areas. The statistical material used comes from the National Statistics Office of Georgia (GEOSTAT) and includes data from 2 national censuses (1989 and 2014). For the years in between, we used current official registration data available from GEOSTAT. They are less reliable than the census data. We used a geographic information system to prepare a map of the study area showing altitudinal zones and the location of all settlements. No fieldwork was done specifically for this paper; however, the authors have been familiar with the area for many years.

## Results

### Overall population loss between 1989 and 2016

According to official data, the total number of the population of Oni municipality went through 2 distinctively different phases between 1989 and 2016. In the first phase, from 1989 to 1994, the population increased, especially in the rural areas (Figure 1), despite the negative natural growth in the same period (Table 1) and the emigration of the Jewish population since 1992. The overall increase in this phase was thus due to in-migration: because of the grave socioeconomic crisis in the first half of the 1990s, many Georgian townspeople returned to their rural homelands (Figure 2). An important reason for this move was the land reform, which granted small-scale parcels to hundreds of thousands of households (Salukvadze and Meladze 2014), providing them a basis for their livelihood. This is confirmed by the GEOSTAT data, which show a decrease of the urban and an increase of the rural population between 1989 and 1994. The resettlement of refugees during the armed conflicts in Abkhazia and South Ossetia had a minor effect, as only about 400 people were resettled to Oni municipality by 1994 (Gogelidze 2004). The major earthquake of 1991 did not cause any population decline in the region either.

**FIGURE 1** Population size of Oni municipality in 1989–2016 (in thousands).




Overall, the population of Oni municipality grew by 20% between 1989 and 1994. This corresponds to an increase of 2700 people and led to a total population of 15,000 in 1994, the maximum in our period of observation. From that year onward, which marked the beginning of the second phase, the population declined to a mere 6000 people in 2016. The very marked decrease between 2013 and 2014 is a statistical artifact. According

**FIGURE 2** View of the River Rioni, in Oni municipality, Georgia. (Photo by N. Elizbarashvili)


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**TABLE 1** Dynamics of birth, death, and natural increase rates in Oni municipality during 1989–2015.[a)]

| Years | Crude birth rate (‰) | | | Crude death rate (‰) | | | Natural increase, crude rate (‰) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Oni[b)] | Urban[c)] | Rural[d)] | Oni[b)] | Urban[c)] | Rural[d)] | Oni[b)] | Urban[c)] | Rural[d)] |
| 1989 | 11.8 | 14.7 | 9.7 | 17.3 | 10.6 | 22.2 | −5.4 | 4.1 | −12.5 |
| 1990 | 14.4 | 22.4 | 9.4 | 18.6 | 13.9 | 21.6 | −4.2 | 8.4 | −12.2 |
| 1991 | 10.1 | 15.3 | 6.9 | 21.7 | 15.9 | 25.2 | −11.6 | −0.6 | −18.2 |
| 1992 | 10.7 | 19.8 | 5.7 | 23.3 | 20.4 | 24.9 | −12.5 | −0.6 | −19.1 |
| 1994[e)] | 6.6 | 13.2 | 3.2 | 16.2 | 12.2 | 18.3 | −9.7 | 1.0 | −15.1 |
| 1995 | 8.5 | 17.5 | 4.0 | 17.5 | 15.6 | 18.4 | −9.0 | 1.9 | −14.4 |
| 1996 | 6.3 | 15.5 | 1.8 | 7.3 | 4.9 | 8.4 | −1.0 | 10.6 | −6.6 |
| 1997 | 5.4 | 12.8 | 2.1 | 8.1 | 5.1 | 9.5 | −2.6 | 7.7 | −7.4 |
| 1998 | 5.3 | 12.5 | 2.2 | 17.7 | 19.0 | 17.1 | −12.4 | −6.5 | −14.9 |
| 1999 | 4.6 | 9.7 | 2.5 | 20.4 | 32.2 | 15.3 | −15.8 | −22.5 | −12.8 |
| 2000 | 5.1 | 10.0 | 2.9 | 21.7 | 30.3 | 17.5 | −16.5 | −20.3 | −14.6 |
| 2001 | 5.5 | 9.7 | 3.4 | 23.6 | 37.2 | 16.6 | −18.1 | −27.5 | −13.3 |
| 2002 | 5.1 | 8.9 | 3.0 | 20.9 | 35.4 | 13.0 | −15.8 | −26.5 | −10.0 |
| 2003 | 4.6 | 8.1 | 2.7 | 22.5 | 44.4 | 10.7 | −17.9 | −36.3 | −8.0 |
| 2004 | 6.0 | 5.1 | 6.6 | 23.9 | 49.8 | 9.8 | −17.9 | −44.8 | −3.3 |
| 2005 | 7.4 | 10.6 | 5.7 | 13.8 | 24.2 | 8.3 | −6.4 | −13.5 | −2.6 |
| 2006 | 5.3 | 10.3 | 2.4 | 17.1 | 20.3 | 15.5 | −11.8 | −10.0 | −13.1 |
| 2007 | 6.2 | 10.6 | 3.7 | 16.8 | 19.4 | 15.4 | −10.6 | −8.8 | −11.7 |
| 2008 | 8.0 | 13.1 | 5.2 | 17.7 | 20.7 | 16.0 | −9.7 | −7.6 | −10.8 |
| 2009 | 11.3 | 18.4 | 7.4 | 21.3 | 25.2 | 19.1 | −10.0 | −6.9 | −11.7 |
| 2010 | 9.4 | 14.3 | 6.7 | 22.6 | 16.0 | 26.2 | −13.2 | −1.7 | −19.5 |
| 2011 | 8.4 | 9.3 | 7.9 | 21.4 | 17.3 | 23.7 | −13.0 | −8.0 | −15.8 |
| 2012 | 7.2 | 8.0 | 6.7 | 21.3 | 13.0 | 26.0 | −14.1 | −5.0 | −19.3 |
| 2013 | 6.3 | 9.7 | 4.8 | 18.4 | 11.3 | 22.5 | −11.9 | −1.7 | −17.7 |
| 2014 | 7.7 | 9.7 | 6.6 | 21.8 | 19.0 | 23.5 | −14.1 | −9.3 | −16.9 |
| 2015 | 8.0 | 11.2 | 5.8 | 21.7 | 20.0 | 22.8 | −13.7 | −8.8 | −17.0 |

[a)] Source: Calculated by the authors, based on GEOSTAT data.
[b)] Oni municipality.
[c)] Urban population.
[d)] Rural population.
[e)] 1993: data not available.

to GEOSTAT, the 2014 figures are more reliable. Overall, Oni has lost 60% of its population since 1994 and 50% since 1989. In the same period from 1989 to 2016, the population of the entire country decreased by 31% (GEOSTAT). The main reason for the increased downward population trend in Oni municipality as compared to the country as a whole is its peripheral location, poor general infrastructure, and weak economic diversification (Government of Georgia 2017). In addition, the summer and winter recreation economy, largely


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dependent on visitors from Russia, collapsed due to the closure of the border and the loss of the direct road link between Russia and Oni in 2005.

### Birth rates, death rates, and natural population growth between 1989 and 2015

Death rates were higher than birth rates in all years, with the exception of the urban areas in the 1990s. Overall, the balance between birth and death rates resulted in a negative natural population growth in every single year of the observation period (1989–2015) (Table 1).

The drastic decline in the number of newborns highlights the severity of the demographic situation in Oni municipality. The absolute number of newborns decreased by a factor of 2.2 between 1989 and 2005 owing to the combined effects of outmigration and a declining birth rate. The birth rate in Oni municipality (Table 1) was highest in 1990, when it stood at 14.4‰, close to the critical limit of reproduction (15‰); but then it plummeted to values between 4‰ and 6‰. It was only after 2008 that birth rates recovered, but they never reached the level of the early 1990s.

It should be noted that birth rates were always higher in the urban than in the rural areas of the municipality, with the exception of 2004. The very low rates recorded in the rural areas from 1996 to 2003 were due to the difficult socioeconomic and political situation in the region mentioned above, which affected villages more than towns, where minimal basic infrastructure and services were kept up better; moreover, village populations had a higher share of older people. After 2003, the situation improved to some extent, and rural birth rates increased from 2.7‰ in 2003 to 5.8‰ in 2015. But this is still far below the 1989 rate of 9.7 ‰ for the rural areas, and clearly below the 2015 urban rate of 11. 2‰. The decline of birth rates over the observation period was also a result of the decreasing child–woman ratio. This ratio indicates the number of children aged 0–9 in relation to the number of women aged 20–49. In 1989 it was already lower in Oni municipality than at the national level (694 as compared to 789). By 2014 the child–woman ratio in Oni municipality decreased by 23% (*Supplemental material*, Figure S1: http://dx.doi.org/10.1659/MRD-JOURNAL-D-17-00064.S1).

Death rates in Oni municipality were among the highest in Georgia. Between 1989 and 2015, the municipality's death rate rose by 25%, reaching 21.7‰ in 2015 (Table 1), whereas the national death rate in 2015 was 13.2‰. From 1990 to 1997, and again after 2010, death rates in the municipality's urban areas were lower than in the rural areas. In between, from 1998 to 2009 and especially between 1999 and 2004, we find an inverse picture, with death rates drastically higher in towns and remarkably low rates in the rural areas. However, this anomaly does not reflect demographic change but rather is due to inaccurate data. The problem lies in how deceased people were recorded: due to precarious socioeconomic conditions, especially in the rural areas, many families could not afford to pay the sum required for obtaining a death certificate from the issuing medical institution. Without such a document, the deceased were not registered and hence not included in official statistics (Tsuladze et al 2002; Meladze 2004). This may also have contributed to the sudden "loss" of population between 2013 and 2014 (Figure 1).

The deep crisis in the 1990s and around the turn of the millennium also affected the statistical offices directly (Meladze and Tsuladze 1997; Gugushvili 1998; Meladze 2004). After the 2002 census, when the general situation in the country had improved, GEOSTAT had to recalculate critical data sets, including those on the natural movement of the population (DSMEDG 2015). Still, birth rates in some of the critical years may be higher than the recalculated ones—a hypothesis that would require further investigation.

However, Georgia is not alone in facing accuracy problems in demographic data. Radvanyi and Muduyev (2007) report an abrupt surge in the mountain population of certain regions in the North Caucasus (Dagestan, Karachayevo-Cherkessia, and Kabardino-Balkaria) at the time of the 2002 census of the Russian Federation, in this case suspected to be the result of deliberate manipulations in search of increasing federal financial transfers.

### Age and sex structure and dependency ratios

Negative natural population growth has an impact on the age structure of the population. In the period between 1989 and 2014, the number of children and youth under the age of 15 decreased dramatically in both absolute and relative terms, that is, by 68.4% (Table 2). The same is true for the group aged 15–64, the working-age group, whose number declined by 55%. The group aged 65 and above declined by 30%, which is quite substantial too, but nonetheless much lower than the relative decline in the other 2 groups. This means that the relative shares of the 3 age groups in the overall population changed markedly between 1989 and 2014. The share of children and youth dropped from 17.5% to 11.5%, and that of the working-age population from 62% to 58%; whereas the share of elderly people increased from 20% to over 30% across the entire municipality, and up to as high as 37% in the rural areas. At the national level, the old age group accounted for 14% of the population in 2014; by contrast, in Europe it accounted for 17% in 2015 (UN-ECOSOC 2015; Wan He et al 2016). The higher figure in Europe is also due to higher life expectancy there. The UN 3-step population aging scale considers a nation to be demographically aged if the share of people aged 65 and older in the total population is greater than 7% (Kausler et al 2007).

**TABLE 2** Age structure of population in 1989 and 2014.[a)]

| Age group | Absolute number | | | | | | Percent | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1989 | | | 2014 | | | 1989 | | | 2014 | | |
| | Oni[b)] | Urban[c)] | Rural[d)] | Oni[b)] | Urban[c)] | Rural[d)] | Oni[b)] | Urban[c)] | Rural[d)] | Oni[b)] | Urban[c)] | Rural[d)] |
| Under 15 | 2239 | 1270 | 969 | 708 | 410 | 298 | 17.5 | 23.2 | 13.2 | 11.5 | 15.4 | 8.6 |
| 15–64 | 7943 | 3665 | 4278 | 3577 | 1696 | 1881 | 62.0 | 66.9 | 58.3 | 58.4 | 63.9 | 54.1 |
| 65+ | 2633 | 547 | 2086 | 1845 | 550 | 1295 | 20.5 | 10.0 | 28.4 | 30.1 | 20.7 | 37.3 |
| **Total** | **12,815** | **5482** | **7333** | **6130** | **2656** | **3474** | **100** | **100** | **100** | **100** | **100** | **100** |

[a)] Source: GEOSTAT.
[b)] Oni municipality.
[c)] Urban population.
[d)] Rural population.

Because of the changes in the age structure, the mean age of the population in Oni municipality rose from 43.3 years in 1989 to 49.4 years in 2014, with a lower value of 44 years in urban areas, compared to 53.6 years in rural areas. The mean value for Georgia was again much lower and stood at 38.1 years in 2014 (GEOSTAT).

The age and sex pyramids for Oni municipality resemble a classical example of a declining population. A comparison of 1989 and 2014 for the rural versus urban areas clearly shows the negative demographic changes in Oni municipality in the 25-year period between the 2 censuses (*Supplemental material*, Figure S2: http://dx.doi.org/10.1659/MRD-JOURNAL-D-17-00064.S1). What catches the eye first when examining the pyramids is the growing imbalance in the size and distribution of the male and female populations. The ratio of women to men in the groups aged 20–49 years of age is decreasing, whereas it is increasing in the older age groups. Both observations apply to the rural areas in particular. This means that younger and middle-aged women are (forced to be) more mobile than men of the same age. The same phenomenon was found in countries of Eastern Europe, for example, Serbia (Nikitovic 2010), as well as in the North Caucasus, for example, in North Ossetia, where it was explained by the role of men as caretakers of the parent generation (Gracheva et al 2012).

The changing age structure of the population is also reflected by the total dependency ratio, which relates the number of dependents (aged 0–14 plus over 65) to the population aged 15–64. According to the 2014 population census, this ratio was 714 dependents per 1000 people of working age in Oni. In Georgia the same rate was 490 (*Supplemental material*, Figure S3: http://dx.doi.org/10.1659/MRD-JOURNAL-D-17-00064.S1). The ratio was particularly high (847) in the rural areas. The effects of reduced fertility and emigration on age structure appear most drastically if one sets the 65-plus-year age group in direct relationship with the below-15-year group. This relationship can be expressed by the population aging index (old-to-young age dependency ratio) in the municipality (Figure 3). In the period between the two censuses, the aging index more than doubled and reached 261 in 2014. For the country as whole, the value is much lower. Especially drastic was the index value in the rural areas of the municipality. In 2014 it stood at 298, meaning that the rural population had 3 persons of old age for each person under the age of 15 (Figure 3). This figure is considerably higher than in other mountain areas that experience depopulation, such as in Digoria in North Ossetia (142 dependents) (Gracheva et al 2012). In the European Alps, ratios of up to 150 are found in depopulated communities in the southern Alps of France and Italy; these are rated as very high (Tappeiner et al 2008).

To sum up, in a world that is aging rapidly (UN-ECOSOC 2015), Georgia belongs to the countries featuring the second highest share of older people in global comparison (14–21%). This category comprises the European countries both east and west, plus Canada and the United States, Australia, and New Zealand. The other Caucasian countries and Russia have lower shares of old people (Wan He et al 2016).

**FIGURE 3** Aging index (old-to-young age dependency ratio) in Oni municipality and in Georgia according to the censuses for 1989 and 2014.

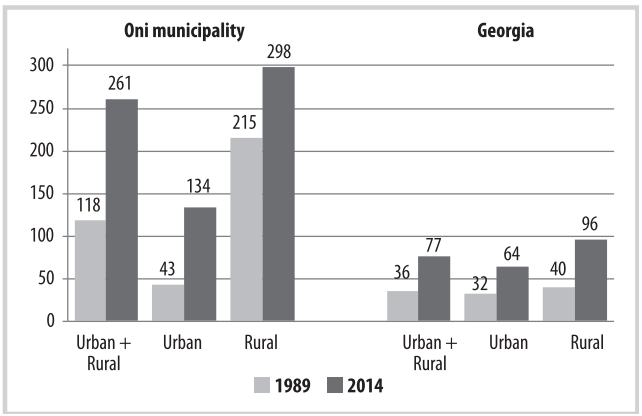



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**TABLE 3** Distribution of rural population in Oni municipality by altitudinal zones for 1989 and 2014.[a)]

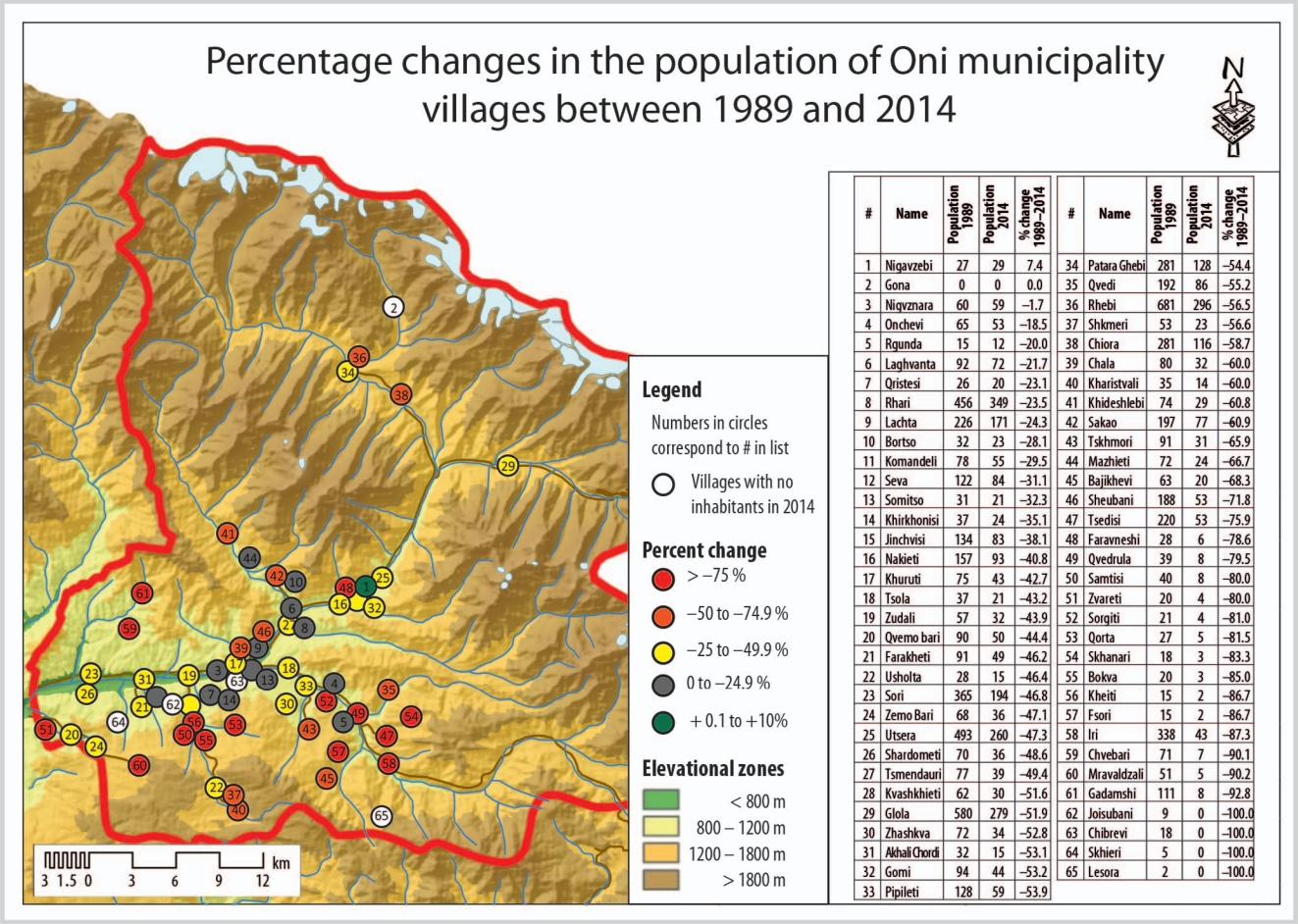
| Geographical zone | Population | | | | Population change, (±) | |
|---|---|---|---|---|---|---|
| | 1989 | | 2014 | | 1989–2014 | |
| | Absolute number | Percent | Absolute number | Percent | Absolute number | Percent |
| Plains (0–799 masl) | 454 | 6.2 | 241 | 6.9 | −213 | −46.9 |
| Low-mountains (800–1199 masl) | 4083 | 55.7 | 2080 | 59.9 | −2003 | −49.1 |
| Middle mountains (1200–1800 masl) | 2794 | 38.1 | 1153 | 33.2 | −1641 | −58.7 |
| High mountains (>1800 masl) | 2 | 0.0 | 0 | 0 | −2 | −100.0 |
| **Total** | **7333** | **100** | **3474** | **100** | **−3859** | **−52.6** |

[a)] Source: Population and Settlements of Georgia 1991; Kekelia et al 2002; calculations by the authors, based on GEOSTAT data.

### Population dynamics by altitude

The loss of population documented above has a clear geographical component, expressed by a downhill trend of the population accompanied by a move toward the central valley, the Racha Basin. Table 3 and Figure 4 show these movements very clearly, using the example of the rural settlements (villages) in the municipality. Between 1989 and 2014, the highest zone of settlement lost all its population, which was already marginal in 1989, suggesting that depopulation here might reach back into

**FIGURE 4** Map of Oni municipality with elevational zones, location of villages, and village population loss between 1989 and 2014. (Source: GEOSTAT; data prepared by Nodar Elizbarashvili and Giorgi Meladze, based on GEOSTAT; map prepared by Davit Svanadze, Tbilisi State University)




| # | Name | Population 1989 | Population 2014 | % change 1989–2014 | # | Name | Population 1989 | Population 2014 | % change 1989–2014 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Nigavzebi | 27 | 29 | 7.4 | 34 | Patara Ghebi | 281 | 128 | −54.4 |
| 2 | Gona | 0 | 0 | 0.0 | 35 | Qvedi | 192 | 86 | −55.2 |
| 3 | Niqvznara | 60 | 59 | −1.7 | 36 | Rhebi | 681 | 296 | −56.5 |
| 4 | Onchevi | 65 | 53 | −18.5 | 37 | Shkmeri | 53 | 23 | −56.6 |
| 5 | Rgunda | 15 | 12 | −20.0 | 38 | Chiora | 281 | 116 | −58.7 |
| 6 | Laghvanta | 92 | 72 | −21.7 | 39 | Chala | 80 | 32 | −60.0 |
| 7 | Qristesi | 26 | 20 | −23.1 | 40 | Kharistvali | 35 | 14 | −60.0 |
| 8 | Rhari | 456 | 349 | −23.5 | 41 | Khideshlebi | 74 | 29 | −60.8 |
| 9 | Lachta | 226 | 171 | −24.3 | 42 | Sakao | 197 | 77 | −60.9 |
| 10 | Bortso | 32 | 23 | −28.1 | 43 | Tskhmori | 91 | 31 | −65.9 |
| 11 | Komandeli | 78 | 55 | −29.5 | 44 | Mazhieti | 72 | 24 | −66.7 |
| 12 | Seva | 122 | 84 | −31.1 | 45 | Bajikhevi | 63 | 20 | −68.3 |
| 13 | Somitso | 31 | 21 | −32.3 | 46 | Sheubani | 188 | 53 | −71.8 |
| 14 | Khirkhonisi | 37 | 24 | −35.1 | 47 | Tsedisi | 220 | 53 | −75.9 |
| 15 | Jinchvisi | 134 | 83 | −38.1 | 48 | Faravneshi | 28 | 6 | −78.6 |
| 16 | Nakieti | 157 | 93 | −40.8 | 49 | Qvedrula | 39 | 8 | −79.5 |
| 17 | Khuruti | 75 | 43 | −42.7 | 50 | Samtisi | 40 | 8 | −80.0 |
| 18 | Tsola | 37 | 21 | −43.2 | 51 | Zvareti | 20 | 4 | −80.0 |
| 19 | Zudali | 57 | 32 | −43.9 | 52 | Sorqiti | 21 | 4 | −81.0 |
| 20 | Qvemo bari | 90 | 50 | −44.4 | 53 | Qorta | 27 | 5 | −81.5 |
| 21 | Farakheti | 91 | 49 | −46.2 | 54 | Skhanari | 18 | 3 | −83.3 |
| 22 | Usholta | 28 | 15 | −46.4 | 55 | Bokva | 20 | 3 | −85.0 |
| 23 | Sori | 365 | 194 | −46.8 | 56 | Kheiti | 15 | 2 | −86.7 |
| 24 | Zemo Bari | 68 | 36 | −47.1 | 57 | Fsori | 15 | 2 | −86.7 |
| 25 | Utsera | 493 | 260 | −47.3 | 58 | Iri | 338 | 43 | −87.3 |
| 26 | Shardometi | 70 | 36 | −48.6 | 59 | Chvebari | 71 | 7 | −90.1 |
| 27 | Tsmendauri | 77 | 39 | −49.4 | 60 | Mravaldzali | 51 | 5 | −90.2 |
| 28 | Kvashkhieti | 62 | 30 | −51.6 | 61 | Gadamshi | 111 | 8 | −92.8 |
| 29 | Glola | 580 | 279 | −51.9 | 62 | Joisubani | 9 | 0 | −100.0 |
| 30 | Zhashkva | 72 | 34 | −52.8 | 63 | Chibrevi | 18 | 0 | −100.0 |
| 31 | Akhali Chordi | 32 | 15 | −53.1 | 64 | Skhieri | 5 | 0 | −100.0 |
| 32 | Gomi | 94 | 44 | −53.2 | 65 | Lesora | 2 | 0 | −100.0 |
| 33 | Pipileti | 128 | 59 | −53.9 | | | | | |


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**FIGURE 5** Abandoned house in the village of Gona in the high-elevation mountainous zone. This remote village was completely abandoned already in 1989; see Figure 4 for its location. (Photo by G. Dvalashvili)

Soviet (or even earlier) times. The middle mountain zone lost a larger share of its population (58.7%) than the low mountain zone (49.1%); however, absolute losses were higher in the low zone, which continued to hold the largest population of the municipality, close to 60%. This is 4% more by comparison with 1989, which illustrates the downward movement. The lowest (plain) zone, the Racha Basin, lost 46.9% of its population.

Population loss is also visible in the size of the villages. While the total number of villages remained practically constant over our observation period (only 5 out of 65 villages disappeared; see Figure 5), there was a significant shift in village categories as defined by their population size (*Supplemental material,* Table S1: http://dx.doi.org/10.1659/MRD-JOURNAL-D-17-00064.S1). Today there are no large villages anymore; the 2 villages found in this category in 1989 now belong to the middle-sized villages. In addition, the other village size categories occur less often and have lost about half of the population per category. The exception is the category of the smallest villages, which have almost doubled in number and overall population. The specific weight of the rural inhabitants in the villages of this category increased by 48% from 1989 to 2014. The growing share of the population living in increasingly smaller villages presents a challenge for the provision of critical services such as health care, schooling/education, transport, and provision of goods to cover daily needs, for example food.

## Discussion and conclusion

Many rural mountain areas across the world have been facing depopulation. Depopulation was particularly widespread in the post-Soviet socialist space, including Georgia. The case presented in this paper—Oni municipality in the Racha region—is a typical example of depopulation in the mountains of Georgia (Government of Georgia 2017) since the demise of the Soviet Union. Oni lost more than 50% of its inhabitants between 1989 and 2014/16, that is, within one generation. What remains unknown is population dynamics before 1989. Depopulation may be much older, as documented for North Ossetia, where it reached back at least to the 1880s, hence to Tsarist times (Gracheva et al 2012).

In Oni municipality, depopulation since 1989 has been driven by the difficult socioeconomic and political situation in the country during the transition from a planned to a market economy, accompanied by years of unrest in the early 1990s, which led to political and economic disruption and decay of infrastructure. Problems were exacerbated in 2008 by the war over South Ossetia, a region neighboring Oni.

Depopulation is the combined effect of outmigration and negative natural growth due to a marked reduction of the birth rate. Moreover, the number of children per woman has gone down, as has the number of women in the childbearing age group (20–49 years), especially in rural areas. Women thus appear to be more mobile, or forced to be more mobile, than men in this age group.

Population aging has advanced strongly. It is particularly incisive in depopulated areas, as the number of the active population may fall below a critical threshold. In Oni, the situation is dramatic in rural areas, where 37.3% of the population are in the old age group (65 years and over). This is an extremely high value in international comparison. The remaining population concentrates at lower altitudes, a downward move also noticed elsewhere in the mountain world.

Depopulation and aging have repercussions beyond demography. Aging is likely to curtail the local potential for innovation and development, as elderly people are, overall, less active than the younger ones (UN-ECOSOC 2015). Depopulation also presents a challenge for effective provision of services, as villages get smaller and smaller, but not less in number. There will be a need to increase medical and social care, which will lead to an increase in costs, while public finance (tax receipts) will decline, as less people will be economically active. In addition, land abandonment may become an issue or is already one, similar to many mountain areas in Europe, and increasingly also in developing countries (eg for Nepal; see Jaquet et al 2015). Forest encroachment will gradually replace the typical traditional patchwork of forests and open grazing lands and meadows and thus reduce landscape diversity and biodiversity (Stöcklin et al 2007).

To stop the downward population trend, creation of employment within reachable distance is necessary. This will help keep younger people in the region and may raise birth rates. Wherever possible, intervention should rely on the regional resource potential, which includes mineral waters, hot springs, a healthy climate, and varied mountain landscapes, inviting investment in a recreational economy. A special taxation regime could be a lever to stimulate the local economy. The Georgian Mountain Law, for example, adopted by Parliament in

2015 and entering into force in 2016 and 2017, foresees a 3-year tax exemption for investments that promote sustainable local resource use and employment (UNDP Georgia 2015). Moreover, preparatory work is currently under way for establishing national parks and protected landscapes. While this will exclude large-scale investments in industry or tourism, smaller and small-scale initiatives remain possible. Evidence from across the world shows that such initiatives have a positive effect on development in and around protected areas. Prospective fields include gastronomy and accommodation, nature tourism, (branded) local food products including medicinal plants, and small-scale industry (Hammer et al 2016). To allow such activities, protection must go beyond classical nature conservation. Protected areas must be designed as multifunctional "living or working landscapes" that provide instruments for local development, including education and skills training (Mose and Weixlbaumer 2007), and promote the initiatives of local people.

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## Supplemental material

**FIGURE S1** Child–woman ratio in Oni municipality for 1989 and 2014 according to the census (number of newborn to 9-year-old children per 1000 women aged 20–49). (Prepared by the authors, based on GEOSTAT data)
**FIGURE S2** Age–sex pyramids for 1989 and 2014 in percent, Oni municipality. (Prepared by the authors, based on GEOSTAT data)
**FIGURE S3** Total dependency ratio in Georgia and Oni Municipality in 2014, per 1000 persons. (Prepared by the authors, based on GEOSTAT data)
**TABLE S1** Distribution of the rural population by size of villages in 1989 and 2014.

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