Analysis of the Demographic Situation in Kuldiga Region and Suggestions for Further Research

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Abstract. **This article considers the dynamics of the natural population growth (E) indicators of Kuldiga Region over the past 28 years and gives a geo-ecological analysis of the favourability of the Kuldiga Region territory for its inhabitants, based on four environmental factors. This article specifies that E value in Kuldiga Region is higher than E values in Vidzeme and Latgale territory, but it is the lowest in Kurzeme regions. In order to find out the reasons for this phenomenon, such environmental factors have been analysed in the article as intensity and horizontal gradients of the anomalous magnetic and gravitational fields.**

Key words: **anomalous magnetic and gravitational field, horizontal magnetic and gravity gradients, Effect on the natural population growth**

INTRODUCTION

The 20th and the 21st centuries are characterised by rapid decrease of E value, both in the world, as a whole, and in Latvia. Foreign environmentalists, such as Richard Kingsford, believe that the Earth has entered the sixth period of mass extinction.

Since 1994 and up to now, negative E values are observed in some parts of Latvia, and this slows development of the country and adversely affects all spheres of life.

The main priority objective of the modern world, including Latvia, is to preserve the population. When analysing the development trends, we can see that the demographic degradation leads to self-destruction of the state. The extent of depopulation is so big that the birth-rate stimulation by social measures can not solve this problem.

More than 17% of Latvian population live in areas, where E value is lower than -8. These are Ludza, Krāslava, Rezekne, Balvi and Daugavpils Regions (Table 1) [1].

TABLE 1

AVERAGE E VALUES IN LATVIA AND IN FIVE REGIONS OF LATVIA (2000 - 2005), (PERSONS / 1,000 INHABITANTS / YEAR) [1]

Territory	2000.	2001.	2002.	2003.	2004.	2005.
Latvia	-5,0	-5,6	-5,1	-4,9	-5,0	-4,9
Regions: Ludza	-12,6	-11,5	-13,2	-13,3	-14,2	-15,1
Kraslava	-10,4	-10,0	-12,9	-11,4	-11,7	-11,5
Rezekne	-9,0	-8,9	-11,0	-10,7	-10,7	-11,7
Balvi	-9,5	-8,8	-10,4	-10,4	-12,0	-11,5
Daugavpils	-8,4	-10,8	-9,4	-9,2	-8,8	-11,6

Slightly higher E values are observed in the Kurzeme territory (Table 2) [2,3,4].

TABLE 2

AVERAGE E VALUES IN LATVIA AND KURZEME REGIONS (PEOPLE / 1000 INHABITANTS / YEAR) [2,3,4]

Territory	Years					E*
	1970.	1980.	1990.	1999.	2008.	
Latvia	+3,3	+1,3	+1,1	-5,5	-3,18	-0,08
Kuldiga Region	+0,3	-0,9	+1,1	-3,3	-4,87	-0,20
Ventspils Region	-1,8	+0,2	+2,7	-5,2	-1,30	-0,14
Liepaja Region	+2,8	+1,1	+2,3	-5,6	-3,66	-0,08
Talsi Region	+2,1	+1,1	+3,6	-2,2	-3,36	+1,24
Dobele Region	+4,7	+4,3	+4,2	-3,3	-2,61	+1,70
Saldus Region	+2,9	+2,6	+5,3	+1,2	-2,37	+1,90

*E- average value of the natural population increase during the period from 1970 to 2008

As seen from Table 2, the highest E value is in Saldus Region, but the lowest one is in Kuldiga Region. Figure 1 allows to visually compare the E values of Kurzeme territory by regions.

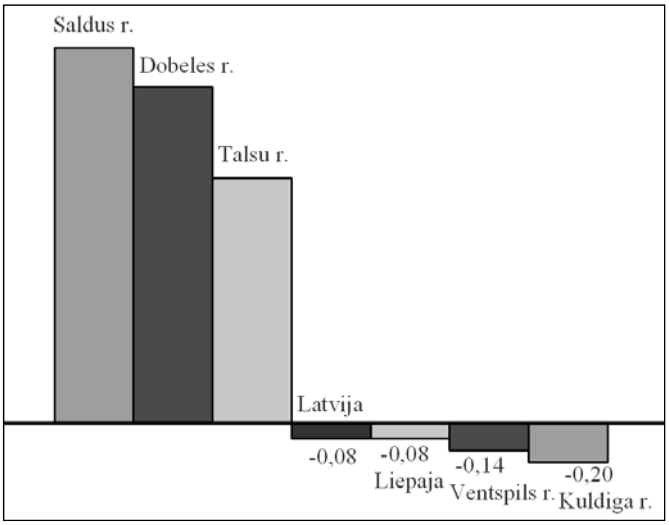

Fig. 1. Average E values in Latvia and Kurzeme regions [2,3,4]

Rapid decrease in E values can be characterised as a demographic crisis. Naturally, a desire appears to understand the reasons for the decrease of demographic figures and find the ways to improve the situation.

The nature and society are currently experiencing deep changes, which causes and dynamics are not yet fully understood. However, it is definitely clear today that significant environmental changes lead to changes in demographic figures and that the effect of environmental

factors is important to be taken into account for spatial planning.

At the turn of the 20th-21st centuries, there was a transformation of ideas about the settlement system. Until the 20th century the main purpose of spatial planning was infrastructure optimization in the settlement system. According to a new interpretation, the settlement system is considered as a living organism. The main focus is shifted from the infrastructure to health, recovery of generations and welfare of the population.

Change in the idea of the settlement system has caused interest in the impact of environmental factors on the population and the desire to understand, which environmental factors improve or adversely affect demographics.

Tables 1 and 2 show E value, which is different in each region. This is logical, because there is a different impact of natural environmental factors. Depending on the physical quantity of the affecting environmental factors, the population receives a positive or negative effect. This implies the need to establish the boundaries of zones of favourable and unfavourable influence. Today it is called the geo-ecological zoning.

The geo-environmental zoning map allows analysing the potential use of the territory for settlements, as well as deciding on feasibility of reconstruction of residential areas and its direction. Geo-ecological zoning allows locating new development, focusing only on areas favorable for the functions.

Today we know the following factors that influence the health and demographic figures of the population:

1. Thickness of the sedimentary cover of the Earth;
2. Tectonic irregularities of the basement and sedimentary cover;
3. Radiation conditions of the territory (alpha and gamma radiation);
4. Intensity of the anomalous magnetic field of the Earth (AMF);
5. Value of the anomalous magnetic field gradient;
6. Strength of the anomalous gravitational field (AGF);
7. Value of the gradient of the gravitational field of the Earth.

Maps of the crystalline basement and the tectonic map of Kuldiga Region have not yet been drawn up. There are also no maps of radiation fields (alpha and gamma radiation). It should be noted that the information of these maps is particularly important for Kuldiga Region, because its territory is located on the crystalline basement rocks with extremely radioactive solids - rapakivi granites. It is very important to know where radioactivity is increased, in order to take the necessary protective measures against excessive penetration of radiation inside the house, prior to its construction.

The information regarding the impact of AMF and AGF on organisms in Latvia has already been prepared. In 2009, the Spatial and Regional Development Research Centre of the Riga Technical University conducted the research "Effect of Geophysical Factors on Demographic Processes and Spatial Organization of the Human Environment", which considered the impact of AMF and AGF on demographics of the population. Four geophysical maps have been compiled – the AMF Intensity Map, the Map of the Anomalous Gravity Field in Latvia, the Map of the Horizontal Gradients of AMF in Latvia and the Map of the Horizontal Gradients of the Gravity Field in Latvia, on the scale of 1:750000 (author - Dr.geol. V. Vetrennikov). With the data of the maps, we can estimate the favourability of the Kuldiga Region territory with account of four parameters: impact of the intensity and horizontal gradients of AMF, as well as impact of strength and horizontal gradients of AGF on demographic figures.

AMF OF KULDIGA REGION

In accordance with the map of the AMF intensity of Latvia [1], Kuldiga Region is located in a weakly negative and weakly positive AMF zone with the intensity value from 0 nT to +300 nT. The range of these AMF intensity values is optimal for the population health (Fig. 2). [1]

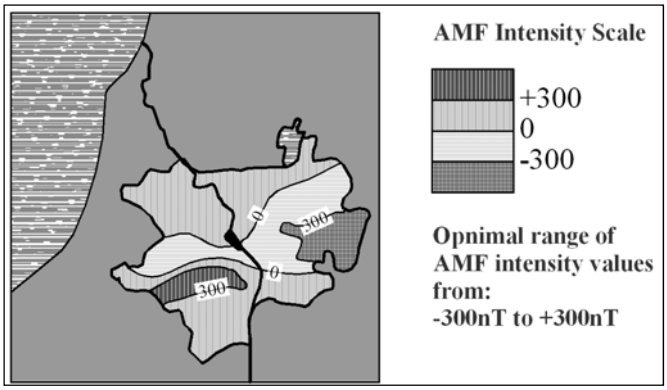

Fig. 2. AMF Map of Kuldiga Region [5]

The analysis of the map of the AMF horizontal gradients in Latvia also suggests that, according to this factor, Kuldiga Region is a favourable territory, because it does not have areas where the gradient value exceeds 200nT/km (Fig. 3). [1]

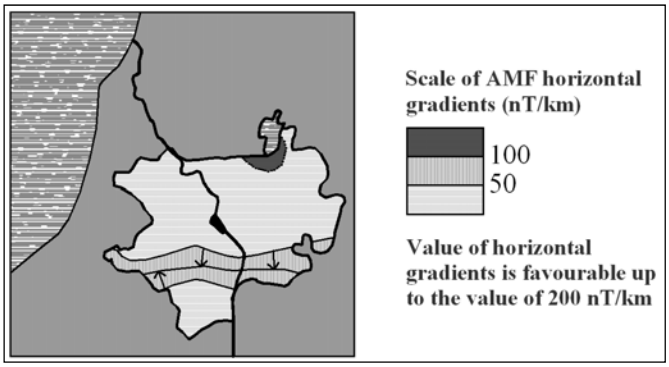

Fig. 3. Map of AMF horizontal gradients in Kuldiga Region (nT / km) [5]

MAP OF AGF IN KULDIGA REGION

Map of AGF in Latvia allows judging on the degree of favourability of AGF to organisms in Kuldiga Region. AGF of Kuldiga Region contains two zones: the northern zone with

negative values of the field and the southern zone with positive values of the field (Fig. 4) [1].

Fig. 4. Gravity field in Kuldiga Region [5]

The zone of negative AGF values is characterized by parameters from 0mGal to (-12) mGal. The zone of positive AGF values is represented by parameters from 0mGal to (+14 mGal). The negative anomaly (-12mGal) is located in the northwestern part of the territory. The positive anomaly (14 mGal) is located to the southwest of the Lake Vilgales.

In the current situation with the increased intensity of the external magnetic field, recovery of generations takes place only in the most intense AGF zones [1]. Therefore, the most promising territories for the region development are located in the southern part, where the best of them are located between the anomalies from (+10 mGal) to (+14 mGal).

The space researches have shown that, in the positive GF zones, organisms successfully assimilate calcium and form a solid bone system with the active bone marrow. In its turn, the bone marrow is able to synthesize the amount of haemoglobin required for the organism. Milk production in female bodies is also related to bone marrow. Synthesis of organic substances (proteins, fats, amino acids) is active in positive AGF. Production of amino acid ATP (adenosine triphosphate) is particularly important for the body. If the organism has enough ATP, all metabolic processes take place actively. In the event of the negative AGF, all processes are slowed down. Taking into account the specific behaviour of the organism in AGFs with different strengths, the development of the settlement system should focus on the areas with the positive AGF sign and the high strength of the field.

Next, let us consider the particular features of the Kuldiga Region's location on the map of horizontal gradients of the gravity field (Fig. 5).

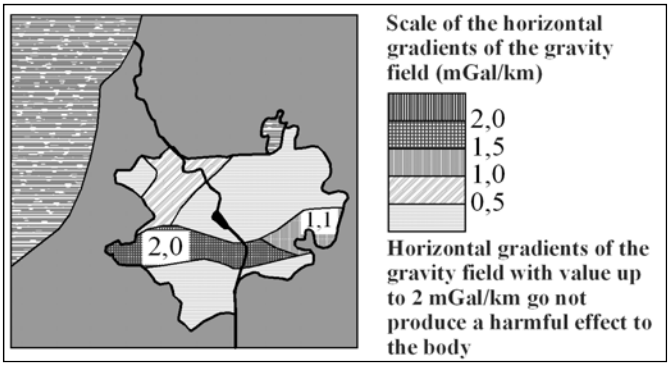

Fig. 5. Map of horizontal gradients of the gravity field in Kuldiga Region [5]

Territory of Kuldiga Region is divided in the middle by the broad gradient strip. It stretches from the Lake Velgales in the western part of the region to the town of Sabile in the east. The value of horizontal gradients in this zone is 2.0 mGal / km. This value of the gradient is negatively perceived by the body and that is why territories with horizontal gradients values above 2.0 mGal / km should not be populated, but should be used as natural areas. The horizontal gradient values in the rest of the region are not high and exert a positive effect on organisms.

CONCLUSIONS

Kuldiga Region is located in the Kurzeme territory. E values of the region are higher than E figures in Vidzeme and Latgale, but lower than those in other areas of the Kurzeme territory.

The impact of four environmental factors on the human body is known. The analysis has shown that:

The AMF parameters across the entire region are favourable for the development of organisms;

The parameters of horizontal gradients of AMF have low values and have a positive influence on the development of organisms;

The northern part of the region has negative AGP values, which negatively influence metabolic processes in the body and block the development. In the southern part of the region (the zone of positive AGF values), the effect of the field is favourable and stimulates the development;

The values of horizontal AGF gradients in most of areas of the region are favourable for development of organisms, except for the central strip from the Lake Velgales to the town of Sabile. It is not recommended to locate populated areas within this strip.

The following has remained unexplored for the territory of the Kuldiga: the effect of the crystalline basement of the Earth's crust, tectonic disturbances and radiation conditions of the territory. Given that the demographic figures are, in general, the result of influence of the environmental factors, it is important to find out the value of the other environmental factors and complete geo-ecological zoning of the region; this will provide the information for the best use and development of the region..

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[5] Figures made by author.

Ludmila Kartunova – Doctor in Architecture
On 19 February 1987, the Moscow Institute of Architecture issued a diploma of Candidate Science and awarded a degree of Candidate of Science.
On 27 March 1991 the Attestation Commission of the Council of Ministers (Protocol No. 9c/10) in Moscow awarded the degree of Senior Scientific Researcher to Lyudmila Kartunova under speciality "Urban development, district planning, landscape design, and rural populated places development".
On 23 February 1993 the Riga Technical University awarded to Lyudmila Kartunova a degree of Doctor in Architecture (Dr. arch.).
The last three employments – State Construction LPI (Urboecology Manager), Urboekoloģija Ltd. (Member of the Board), and Spatial and Regional Development Research Centre of Riga Technical University.
Lyudmila Kartunova is a member of the Latvian Association of Architects, a member of the Latvian Artists Association, a member of the Latvian Association of Scientists, a member of the Society of Physiology, a member of the European Coastline Protection Society, a member of the Kurzeme Ecology Society.
For the last 30 years, the scientific interests of L. Kartunova are focused on researches of the population's response to the effect from changes in geological environmental factors and climate, due to physical changes of the Sun.
L. Kartunova is the first in Latvia who has raised the question on the necessity to consider the effects from geophysical and geological factors on population and environment in spatial planning (1988), has drawn the public attention to marine transgression process development (1992) and has advised the radon gas control in Latvia (1995).
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Ludmila Kartunova. Kuldīgas novada esošās demogrāfiskās situācijas analīze un priekšlikumi tā uzlabošanai.
Saglabāt tautu, veicināt iedzīvotāju paaudzes veiksmīgu atjaunošanu- mūsdienu absolūtais prioritātes mērķis. Ņemot vērā, ka demogrāfiskie un veselības rādītāji pārsvarā ir dabas faktoru ietekmes rezultāts, svarīgi noskaidrot, kādi ir ietekmējošo faktoru lielumi katrā pētāmajā teritorijā un veikt to ģeoekoloģisko zonējumu. Uz esošo pētījumu bāzes tāds zonējums tika veikts Kuldīgas novadā un noskaidrots četru vides faktoru ietekme (anomālā magnētiskā lauka intensitāte, anomālā gravitācijas lauka spriegums un anomālā magnētiskā un gravitācijas lauka horizontālo gradientu lielumi). Veiktā analīze parādīja, ka AML intensitātes parametri un AML horizontālo gradientu parametri visā Kuldīgas teritorijā ir labvēlīgi organismu attīstībai. Bet novada Z daļā AGL spriegumi lielumi un AGL horizontālo gradientu lielumi Centrālās daļas joslas robežās, no Vergales ezera līdz Sabiles pilsētai, nav labvēlīgi apdzīvoto vietu izvietošanai.
Konstatēts, ka Kuldīgas novada teritorijā nav pārbaudīti tektoniskie, radiācijas apstākļi un nav izpētīta kristāliskā pamatklintāja ietekme uz iedzīvotāju demogrāfiskiem rādītājiem. Izteikta hipotēze, ka kristāliskā pamatklintāja paaugstinātā iežu radioaktivitāte var būt par cēloni samērā zemiem dabiskā pieauguma rādītājiem. Tā kā demogrāfiskie radītāji ir atkarīgi no vides faktoru ietekmes; ļoti svarīgi atklāt citu vides faktoru lielumus un pabeigt reģiona ģeo-ekoloģisko zonējumu, kas nodrošinās iformāciju reģiona labākai attīstībai un izmantošanai.

Людмила Картунова. Анализ существующей демографической ситуации в Кулдигском крае и предложения по её улучшению.
Сохранить население, способствовать дальнейшему процессу успешного восстановления поколений – самая приоритетная задача нашего времени. Учитывая, что показатели здоровья населения и демографические показатели являются, в основном, результатом влияния факторов природной среды, важно установить физические величины воздействия факторов среды на каждой территории выполнить её геоэкологическое зонирование.
На основе проведенных исследований, для Кулдигского края было выполнено геоэкологическое зонирование по четырём параметрам среды - интенсивности аномального магнитного поля, напряженности аномального гравитационного поля,уровню градиентности аномального магнитного и гравитационного полей. Проведенный анализ показал что параметры АМП на всей территории края и параметры горизонтальных градиентов АМП благоприятны для развития организмов; однако, в северной части края значения АГП и значения горзонтальных градиентов АГП центральной полосы от оз. Велгалес до г.Сабиле неблагоприятны для развития организмов. Здесь не рекомендуется размещение населенных мест. Для территории Кулдигского края остается неизученным влияние: кристаллического фундамента Земной коры, тектонических нарушений и радиационных условий территории. Высказана гипотеза о том, что повышенная радиоактивность пород кристаллического фундамента может быть причиной относительно низких показателей естественного прироста населения края. Так как демографические показатели зависят от влияния факторов окружающей среды, очень важно определить показатели остальных факторов среды и завершить геоэкологическое зонирование региона, обеспечив информацию для лучшего использования и развития региона.