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PROBLEMS
OF
ENVIRONMENT AND POPULATION
IN ESTONIA

BY

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RAAMATUKOGU

Problems of Environment and Population in Estonia.

By Edg. Kant.

Methodological Introduction.

In biology the ecology of individuals is called autecology, but the ecology of communities — synecology. Thus we can and must divide human ecology into aut- and syn-ecology.

Up to the present time anthropoecological research has practically developed in these two directions. The physiological influence of weather and endemic nutriment (i. e. "*geophysiology*") as well as the influence of climate and landscapic character on human spiritual life (i. e. "*geopsychology*"), have been in some instances, successfully investigated, but so far only by non-geographers¹⁰). This is comprehensible, as the psychological and physiological result of environmental influence on man is a peculiarly subtle and complicated problem, in the solving of which the geographer-specialist is not by far so favourably situated as, for instance, the physiologist, doctor or experimenting psychologist. Such research might be named autecological.

It must be emphasized, however, that so far the chief problem in human geography is the distribution of population — man's dependency on environmental factors, assuming the form of a communal response, appertains essentially to the domain of human synecology. It must be remembered, however, that the significance of environment and its influence on man and population changes with the force of collective achievements over nature. This is not so well accomplished by the individual, as by a social entity. Even where man seems to act as an individual he is really utilizing spiritual and material social aid. It appears in the fact, that everything man makes or does bears a social seal. The more social life is

developed, the smaller the role of environment, and the greater that of the human spirit.

In investigating the dependency of population and environment, we must neglect neither economic prehistorical nor historical moments, or separate them from the socio-historical¹⁶), which help to clarify both man's receptive and collective roles in relation to his environment. Different stages of economic development in a similar environment, rule man's relations to natural terrestrial supplies, division of labor and possibilities of the organization of labor and thereby different economic and social types.

We may briefly say, that the different stages of the economic development of the population in a similar or the same kind of environment result in different socio-economical types.

An equal, or more or less equal level of economical evolution, however, brings forth different local forms in different environments.

In investigating the basic lines of the distribution, composition, efficiency and occupation of the population and its ways of utilizing land, social economy can not sufficiently succeed, independent of localism and regionalism, without leaving too many possibilities for speculation and sweeping generalizations. Thus regional research in human synecology changes into an inseparable completion and support in the modologic and typologic investigation of the economical and social conditions of communities and population.

It is of the greatest importance, therefore, that human synecological research does not decline to geographical determinism, which, we are sorry to say, has hitherto often happened in human geography, but that it should develop along the lines of geographical possibilism, i. e. it should both take into consideration the economical and social development of the population as well as appreciate the influence of geographical environment.

In the following summarized contribution to regional human ecology it is our problem to point out the influence of various environmental conditions on the population of Estonia, as this influence has for some time transformed and manifested itself in the present relations of the population to its environment.

Environmental Conditions and Chief Geographical Divisions of Estonia.

The peninsula of Estonia, between the Gulf of Livonia and Gulf of Finland and the basin of Lake Peipsi with the appertaining archipelago in the Baltic Sea as outpost, fits very characteristically into the oval of the northern European area, which Sten De Geer²⁾ has summed up under the name of Baltoscandia.

The general physiographical characteristics of Estonia, as well as of the rest of Baltoscandia, are — besides the above-mentioned peninsular configuration — a widely distributed moraine topography and its appurtenance to the area of surface elevation connected with former marine boundaries and traces of transgressions. This appears chiefly in the differences of regional originality in the coastal areas of the Baltic Sea above and below the former marine and ice-dammed-lake boundaries. The geographical effects of the ice-age would, undoubtedly, have been much greater, had they not sunk under the marine and lacustrine level after the retreat of the ice.

The traces left by the highest sea-levels in the form of coast- and surf-lines are often contemporaneously represented far inland and are generally called the highest marine or Baltic boundary. This boundary, although genetically metachrone, is of great significance, especially from the point of view of the geography of civilization and human ecology, as it encloses in general those areas, where man has been occupied economically with more easily cultivatable, stoneless, fertile and flatter areas. We may say that, in the Baltoscandian lands, the so-called highest marine or Baltic boundary in the Swedish, Finnish and Estonian territories is of the greatest significance.

In Sweden the line is very marked, whereas, in Finland it is not so distinctly traced. It must be remarked, however, that areas above this boundary in Finland are often comparatively fertile just because the abrasion and denudation of the sea has not reached them⁶⁾.

We very often come across the above-mentioned fact especially in observing and comparing Estonian territory above and below the marine boundary.

The most important differentiating fact is, of course, that

while in Fennoscandia the supramarine areas appertain to the glacial erosion-territory, in Estonia the highest region, i. e. above the marine boundary, is prevalently glacial accumulation-territory. A glacial moraine-sheet in relief, only partly affected by lacustrine but not by marine abrasion and composed of an untouched boulder-clayey and boulder marlaceous surfacecovering with fluvio-glacial deposits here and there is preserved in relief. Therefore, in Estonia there is a supramarine or rather superaquatic region (by which we mean all areas, above the marine and lacustrine boundaries) the great reserve for more conveniently cultivatable areas. The subaquatic region, however, consists of the areas below the marine and ice-dammed-lake boundaries.

Thus we perceive, that after the continental ice-retreat large parts of the present Estonian territory were covered with water, and some even repeatedly.

Besides the surface and surface-forming material of ice-age origin all this is of considerable significance in the formation of the existence sphere of ecological conditions in Estonia, and is of much greater influence than has hitherto been shown.

Undoubtedly, the two regions indicated, differing in genetical, morphological and ecological background, are Estonia's most essential and chief natural geographical divisional foundation, in the limits of which a more detailed geographical or environmental subdivision can be made.

Granö⁴⁾, who more than a decade ago divided Estonia into geographic (landscapic) units, distinguishes so-called landscapes of four, three and two categories of matter. Of these the landscapes of four categories of matters represent the most perfect geographical harmony, but their utilization in human ecology and economic geography is difficult because between them in places the transition zones are too wide. On the other hand, the landscapes of two categories of matter, express too little geographical harmony and are too indefinite. Therefore, in the natural subdivision and especially in the investigation of the economic geography of Estonia, the landscapes

of three categories of matter should be considered as the most acceptable and productive, the more so, as they are easily adaptable to the communes, which, as administrative units, are the foundation of various statistical summaries.

As we have already indicated⁸⁾, the detailed geographical division of Estonia into landscapic units by Granö, may be divided into sub- and supraquatic regions. It is also essential, that the landscapes of the three categories of matter fit well into the limits of ecologico-geographical division (see map I). This division is also supported by Tammekann's later map²⁵⁾ of the distribution of landscapic types, where the so-called hilly, striated and table-landscapes are situated in relief in the supraquatic region, and the flat landscapes predominate in the subaquatic region. We must, however, omit the coastal landscapes of northern Estonia from the supraquatic region (see map I, landscapes 15—17 incl.), which, although plateau landscapes, essentially appertain to the subaquatic region. The statistical inventory, which we have compiled by harmonizing the communes with the landscapes of three categories of matter according to data from the population and agricultural census, ministry of agriculture, valuation lists, and the administration of taxes, gives us support, once more, from the economic-geographical and human ecological standpoint.

Depending on the kind of formation, composition and the entire territory of late- and post-glacial evolution, the above-explained basic lines are reflected in the character, density and partition of natural vegetation, cultivated areas, settling and network of roads and also in the map of the distribution of the statics and dynamics of the population. This means, that by the above used division we have to deal with the fundamental and chief ecological division of Estonia.

Historical Aspect of the Relations of Environment to Population in Estonia.

The settlement of the above-mentioned two chief ecological regions of Estonia differs in age, the supraquatic region showing older vegetation, and the subaquatic region older human colonization.

In the maximum extension of the Baltic ice-dammed lake, the

Estonian archipelago and the present coastal areas were expansively flooded by water, while at the same time in the areas north and north-west of the ice-margin great masses of ice were still present. Also, the Estonian peninsula — the present supraquatic region — was covered with arctic vegetation. After the Baltic ice-dammed lake had found an outlet into the North Sea, the water-level fell perceptibly and larger and larger areas became more accessible to the immigrating vegetation from the south and south-east. But this expansion of terrestrial vegetation was followed by a regression of vegetation owing to the transgressions of the sea.

Therefore, the age of natural vegetation in the present Estonian territory varies; while in the supraquatic regions it was able to develop to some extent untouched, in the subaquatic areas it was more perturbed and younger. As Lippmaa¹³⁾ has explained, these differences are not reflected in the present natural vegetation, as the long period of time following the transgression has brought with it a certain balance. In the stabilization of natural vegetation, the character of the superficial deposits and their composition were of conclusive significance. The differences in the latter circumstances cause the chief differences of vegetational evolution between the super- and subaquatic regions. According to Thomson's²⁶⁾ research into forest history, the conceivable differences in the quantitative composition of forests above and below the so-called marine boundary vary at all times during the postglacial period.

The temporal and spatial distribution of the fir is especially interesting. In observing the whole territory of Estonia we notice that the fir predominated during the subatlantic period.

On the other hand there is the regression of the fir, which expresses itself in the diminishing quantity of pollen in the upper strata. This is especially abrupt above the marine boundary i. e. first in the supra-marine region, and seemingly depends on man's agricultural activity, especially as the result of burning for cropping. The pollen analysis also gives certain indications of the probable commencement of the advance and distribution of human settlement.

The influence of human intervention has obtained predominant significance in the contemporary map of Estonian vege-

tation. In course of time man has in various ways modified natural vegetation to a greater extent than could be imagined, for instance, according to the population map. Commencing, in reality, in the boreal period, the increasing influence of human activity on vegetation expressed itself chiefly during the subatlantic period, in the course of which the climate changed to a damper and cooler one — the present climate, which in the cross-section of the last 60—70 years, as Frisch³⁾ has explained, shows a marked maritime change.

First, during the subatlantic period the influence of human activity represents, on the one hand, a destructive factor, which expresses itself in the destruction and transformation of vegetation and natural plant communities, and on the other hand, a creative factor, which appears in the form of derivative or artificial plant communities.

Human activity as a creative factor in the formation of vegetation appears in the form of cultivated plant communities. The history of cultivated plants and arable lands is, at the same time, also the story of the sedentary colonization and fixed settlement of land, and the same natural conditions are as effective in the extension of cultivated surfaces as in the distribution of settled population.

We can perceive again, that the difference in the living value between the sub- and supraquatic regions is quite obvious. As we have previously⁸⁾ indicated by the relative method and Laasi¹²⁾ by the help of absolute method, it has been still more explicitly shown that arable land is both sparsely and densely partitioned throughout all Estonia. Still there appears, in strong lines, a well marked difference in the regional survey of density in the distribution of arable land. The following factors, all of which, to a greater or smaller degree, originate from the glacial and post-glacial evolution of Estonian territory, might be the causes of such a regional distribution of arable land: the general relief, together with height proportions, pedological composition and draining conditions. The regional coincidence of these causes has concentrated the larger and denser parts of cultivated land into the supraquatic region. The primitive woodlands of this triangle have, in the course of time, been transformed into predominating arable land areas.

The lower or higher living value of the Estonian territory is well indicated in Tammekann's²⁴) dot-method map of the distribution of population. In the human ecological and economic-geographical aspect we are interested in the relative distribution which we have explained in the cartographic appendix map, scale 1:1 500 000 (see map II). This map plainly demonstrates the great differences in the relative density of rural population, where the compact land settlement is especially characteristic of the supraquatic region.

These great differences in the distribution of population are not only contemporary, but originate from the settling and populating process begun in remote times. Being ancient woodland to almost their full extent, these virgin forests have, in the course of time, been obliged to give up more and more room, with the spread of settlements, to utilizable and cultivable lands. Here the nature of the soil and drainage conditions have all the time shown their selective influence in directing and concentrating human settlement.

In connection with this, we are interested in determining to what time we should ascribe the origin of the great and increasing weight of pedological factors, and also the remarkably greater attractive influence of the supraquatic region on the process of settling and the density of population. It is, undoubtedly, a convenient introduction to the ecological understanding of the relations of contemporary circumstances in population and environment.

As shown by archeological research¹⁵) the earliest traces of man's existence on Estonian territory, appertain to the boreal period, i. e. 7000—5000 B. C. The greater part of the Estonian stone-age finds belongs to the neolithic period, i. e. the 30-th and the first half of the 20-th centuries B. C. All these finds, as the distribution map of neolithic finds (see fig. 1) indicates, occur regularly near the water — near rivers, lakes and sheltered bays. This confirms the fact, that the stone-age inhabitants of Estonia were first fishermen and hunters. The difference between the sub- and supraquatic regions does not appear in any way in the survey of stone-age settlement.

The more fertile areas of the supraquatic regions must surely have attracted the half-nomadic, primitive, fishing and hunting tribes at a very early time, because, as we know, the more fertile

areas are richer in fish and animals. The surface and soil factors, however, must have become of standard importance later, when land cultivation and cattle-breeding became the chief branches of economical activity. Although the beginnings of land-cultivation reach back to the end of the stone-age, they were not of great significance at that time. In general the same can be said of the bronze age (1300—500 B. C.).

A perceptible transformation in the distribution of settlement takes place in the iron-age, viz. in the so-called Roman iron-age (0—400 A. D.). The principal features of settlement distribution (see fig. 2.) have been fundamentally transformed in comparison with the neolithic period. The soil factor has become of standard importance and, accordingly, settlement of the higher and more fertile areas of the superaquatic region appears with remarkable distinctness. This transformation in settlement distribution and conditions evidently took place during the early iron-age with the transition to the cultivation of land, which up to the Roman iron-age had already become the means of livelihood.

We perceive quite plainly, therefore, that the influence of natural environment on the population is not, in itself, determinant, but depends to a very great extent on the economical and cultural stages of the evolution of the population itself. Thus, the standpoint expressed in the methodological preface, that man's relation to natural environment is regulated by various stages of economic development, is confirmed.

The distribution of settlement continues in the middle iron-age (400—800 A. D.). It is particularly noticeable, that, beginning with the 5-th century A. D., in the then uninhabited or very sparsely settled Western Estonia and the Estonian Archipelago tombs and finds commence to appear. The growth and expansion of the population increases even more markedly in the late iron-age (800—1200 A. D.). The way in which the march of settlement continued in the historical period (i. e. after 1200 A. D.) is, in its chief features, clear, but insufficiently documented in detail. Settlement distribution covers wider and wider areas, but the difference between the super- and sub-aquatic regions is all the time preserved, developing into the

features of contemporary settlement. In order to illustrate the character and course of this process the author of the present work has compiled relative maps (see fig. 3. and 4.) of the same area, viz., the Virumaa district, concerning which there is comparatively utilizable material. These maps should be especially instructive, as the area under observation pertains to the characteristic transition zone from the supraquatic to the subaquatic region.

In historical times, i. e. beginning from the XIII century, the evolution of economical forms has gone through no perceptible fundamental transformation. The chief basis of existence was, as formerly, agriculture and cattle-breeding; only with this difference, that in the XIII century the two-field crop system prevailed, while later the three-field system came into use, continued until the middle of the XIX century. The fundamental change took place only about the middle and the second half of the XIX century and commenced progressively to express itself also in the concentration and transformation of population density. In a long historical aspect these changes can be compared only to the settlement and economic revolution, which took place in the Roman iron-age. These transformations depend chiefly on the abrupt changes of social and economical circumstances, and the economical modes and stages of advance into the new epoch.

In the middle of the XIX century the Estonian rural population lived in a period of almost secluded economy. The economical circumstances of the rural population were entirely derived from the middle ages, with all their rural communism. Then entirely new conditions took their place. As a result of social reforms the communal lands were divided and money-rent and property in land introduced. This, in a way increased the wealth of the population, destroyed rent-service and the secluded form of household economy and created a free exchange-economy with a developing monetary and market-economy. On the other hand it helped to increase the class of landless proletariat, their migration to cities, urbanization and emigration.

At the same time, and this is very important, a great change took place in the towns, where, up to this time, a very small part of the population dwelt. Now the urban population began rapidly to increase. On the one hand the town laws took away the corporative arrangement (guilds) from the citizens and in so doing de-

veloped free professions. On the other hand, urban trade and developing industry increased together with the increasing wealth of the rural population. This was especially facilitated by the improvement of communications, by artificially built roads and railroads, which shortened distances. With these new possibilities for expansion the market must have greatly influenced farm economy. Thus Estonian economical development, beginning in the second half of the XIX century, enters an entirely new epoch — the stage of accelerated communication, machinery, and lively inland traffic, market and monetary-economy. In short, the period of machinery and capitalism commences.

In connection with this, the most important environmental conditions are positional factors and spatial and temporal distancial relations, which, as we have seen do not depend only on natural environment, but also on man's intervention in environment through artificial roads and means of communication. At the same time the crowding of the population into the cities begins to progress. A perceptibly new aspect appears in the distribution of population: urban agglomeration (see fig. 6). Owing to distancial relations and the attraction of marketing-centres the country is divided among the urban centres into more definite hinterlands (see map III).

Still, even in this stage of development, the latent influence of natural fundamental conditions makes itself felt in many ways. The most essential and interesting of the circumstances that appear, herewith, is, no doubt, the fact that the depopulation of the countryside in the superaquatic region develops more rapidly.

The short survey of these questions, however, is the task of our next chapter.

Contemporary Relations between the Population and Environment in Estonia.

The demographic conditions in the increase of the Estonian population are not very suitable, mainly on account of the results of the World War and the subsequent War of Independence.

The picture that we get of the augmentation and mobility of the Estonian population, according to the census of 1922—1934 is indicated in the following table:

Population of Estonian Towns, Boroughs and Communes.

Census of	Towns	Boroughs	Communes
	number of inhabitants in thousands.		
28. XII. 1922	263.4	35.4 ²⁾	791.9
1. III. 1934 ¹⁾	331.1	26.7	764.5

As we see from this synopsis, the population of Estonia has, in general, grown slowly. At the same time the relations of the urban and rural population have changed quite perceptibly. Thus, in contemporary Estonia we have a marked process of urbanization. The growth of the urban population does not proceed through natural increase (in towns mortality exceeds birth-rate), but mechanically, by the migration of rurals to cities.

Of the Estonian demographic problems we shall try, in the following, to explain, on a human ecological background, chiefly, the migration of rurals into the cities and their urbanization, which is closely connected with many other problems.

On surveying more closely the growth of the Estonian urban population, we must seek the causes of the migration of rurals into the cities first on a regional basis, as the increase of town population is not uniform, but just the opposite—regionally exceedingly heterogeneous. The abovementioned circumstance appears most definitely on the chartogram (see fig. 7), where we have indicated the „net“ increase or decrease of population in towns during the decade of 1922—1931.

As this figure testifies, the most rapid growth is in those towns of Estonia which fall completely or almost completely, with their hinterlands, into the supraquatic region. On the contrary, the coastal towns, or generally speaking, the towns, together with their hinterlands, belonging to the subaquatic region are either decreasing or increasing slowly.

1) Preliminary Summary. — 2) Including former boroughs, which, in the mean time have received the rights of towns.

The especially perceptible increase in the towns appertaining to the supraquatic region raises the questions:

- 1) from what rural areas do the urban immigrants originate? and
- 2) why do they migrate into the towns?

It is comparatively easy to answer the first question. It is quite evident, that those communes, which depopulated become more rapidly belong, in the first place, to the hinterlands or the marginal areas of the fastly growing towns. With regard to its „immigrants“, only Greater Tallinna (i. e. Tallinna including its suburban satellite Nõmme) is an exception, as it is the capital, which envelopes the whole country with its commercial and administrative significance. It is evident from the preliminary data of the census of 1934 that the urban immigrants originate chiefly from the hinterlands surrounding the towns. Lastly, the greater horizontal mobility of the rural population of the supraquatic region is shown in relief — see fig. 8, which we have compiled from the data of the census of 1922.

The second question, why the rurals migrate to towns to such an extent, and why this takes place just in the supraquatic region, is more difficult to answer. The opinion, that the stagnation of the population or its slow growth in the coastal towns and the more rapid growth, *in extenso*, of the interior towns is due to the cutting off of Estonia from Russia, is not correct. The separation of Estonia from Russia has, of course, influenced the relations of the towns and their hinterlands to some extent, but the marked exodus of the rural population began long before Estonia became independent. Thus, even before Estonia became independent the towns of the supraquatic region grew comparatively more rapidly⁹⁾.

We must, therefore, look here for the most essential causes.

The causes of the crowding of the population into cities can be generally divided into three categories:

- 1) The possibilities in towns, of increasing one's earnings and obtaining a better standard of living in the towns than in the country through employment.
- 2) The opening of new roads, the improvement of all other roads and evolution in the means of communication, which

are at the same time both the prime condition and the result of the growth of towns, and facilitate going to the city, i. e., the "rurbanization"²³) of the country population.

Furthermore it is necessary

3) to have forcible circumstances in the country itself, to thrust out the inhabitants, who have become accustomed to their own sphere of life. This might be named rural-repulsion.

The cause of the exodus of the rural population before Estonia's independence was, undoubtedly, the shortage of land. 58% of the whole land was in the hands of a small number of estate-owners — principally German nobles in the Baltic region — while only 42% belonged to the smaller landowners, the Estonians.

As we have previously explained, the exodus of the rural population of Estonia did not cease in the period 1922—1934, notwithstanding the land-reform (which apportioned *Latifundia* among the landless rurals by legislative action) and the small increase in the population of the country generally. Therefore, we are still more interested in the migratory element of the country population.

As the depopulation of the countryside appears mostly in the supraquatic region we might say, as has been done, that these areas are overpopulated taking into consideration the natural carrying-power of the existence sphere. This conjecture seems to be confirmed, for instance, by the greater density of the rural population in the supraquatic region in proportion to the general surface (see fig. 5). But in the following we see that this surmise is superficial and incorrect.

In the first place the ratio of the density of population to the whole area is not sufficient decide the question of overpopulation.

In order to appraise the density of the agricultural population of Estonia from this standpoint, we must consider the distribution of the level of productive and consumptive factors. But, we are sorry to say, there are very little data concerning the regional distribution of consumption.

As to productive factors, the graphs (see fig. 9. and 10.) show the density of farm population in proportion to arable land and

„yield-land“*), and that the agricultural population, of the productive areas is most sparse just in the wealthier supraquatic region which is being depopulated.

The density of population on arable land and the distribution of the average-sized farm land show, in the cartographic comparison (compare fig. 9. and 11.) an almost inverse reciprocal tendency. We must, therefore, look for the causes of the migration of rurals into cities elsewhere than in simple overpopulation.

Fig. 15. on the correlation chart summarizes the relations between the density of farm population and the average size of farm arable land. We see from this, that the average size of farm arable land regulates the density of rural population to arable land. This average size of arable land depends, as we see, from the distribution of the percentage of the same. This distribution in turn reflects the previously indicated difference between the sub- and supraquatic regions in the character of the superficial deposits and their composition.

As the partial significance of arable land is so weighty in the distribution of the density of the agricultural population, so, for a better future understanding, we shall observe the means of utilization of arable land, as on that depend the relation and rotation of the different crops as well as the general result of agriculture. From fig. 14. we perceive that here also the characteristic difference between the sub- and supraquatic regions appears.

With a few exceptions the subaquatic region is more backward, whereas the supraquatic region is more advanced in the agricultural stage. In the first — self-supporting economics predominate, with the raising of food-cereals (rye, barley) and potatoes, in the second — market-economy with dairy-economics and fodder-raising.

The regions varying in the development of farm-economy differ also in agricultural mechanization (see fig. 12 and 13).

*) According to the data from the Bureau of Statistics of the Estonian Government the following are the proportions of the „yield-land“ units:

1 ha arable land = 1.00 yield-land unit.

1 ha meadow land = 0.25 „ „

1 ha pasture land = 0.15 „ „

Thus the sub- and supraquatic regions differ noticeably in the level of economical development. This should be of fundamental importance in explaining our main problem.

Undeveloped farm economy with its food economy, poorer connections with the market, a lower level of consumption and the satisfaction of a simpler life seem to be the reasons which keep the rural population in the subaquatic region. Less developed mechanization and the low productivity of labor, i. e. lower rationalization, have the same influence.

On the contrary, the rationalization and greater productivity of the more developed mode of economy, better connections with the market, greater dependence on the fluctuations of this latter, a higher level of consumption and demands for a higher standard of living, i. e. *rurbanization* of the country seem to be the causes of rural "repulsion" in the supraquatic region.

Further, so far as the quicker growth of the towns in the supraquatic district is concerned, it is natural that the possibilities of existence and expansion in them, as well as their magnetic force, become so much the greater the more their hinterlands are characterised by the development of the market-economy and barter already means a larger consumption in the cities of the articles produced in themselves or through their instrumentality in their hinterlands.

If as previously explained in several instances, we take the greater density of population on arable land as an exponent of food-economical structure, we may say, that with the increasing population density of the arable land area the "repulsion" force of the hinterland decreases.

On the other hand we must also estimate the quantitative relation of hinterland and town population. The higher this is, the more possibilities of development the town economy has and the urban population can also increase,

Summarising the above, we come to the following conclusions:

1) the growth of towns is directly proportionate to the number of the inhabitants of towns and hinterlands and

2) inversely proportionate to the density of the population of the hinterlands on arable land.— The following graphic summary (see fig. 16) demonstrates this concerning Estonia.

To this rule only Petseri, a town which shows the highest relative increase in Estonia, is an exception. The cause of such a relative crowding of population may be said to be the high quantitative relation (28:1) between the population of the town and its hinterland, as well as the circumstance that Petseri became a new administrative district-center after the independence of Estonia.

Otherwise the Petseri hinterland (formerly a part of the Russian Pskoff government), like all Russian frontier areas, was for historical reasons the most backward in its social and economical development. Although situated in the superaquatic region, the Petseri district (see map I, landscapic units 31—33) economically shows the greatest resemblance to the most backward areas of the Estonian subaquatic region, which appears markedly in relation to the overdensity of agricultural population on arable land (see fig. 9).

This again confirms the standpoint in our introduction that in the same or similar environmental conditions various socio-economical types depend on different stages of economic development.

Appendix I

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Contents

	Page
Methodological Introduction	3
I. Environmental Conditions and Chief Geographical Divisions of Estonia	5
II. Historical Aspect of the Relations of Environment to Population in Estonia	7
III. Contemporary Relations between Population and Environment in Estonia	13
Appendices :	
Appendix I. List of References	20
Appendix II. Figures and Maps	22

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