

Regional development in the arctic regions

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Abstrakt

Předložený příspěvek se snaží zmapovat procesy regionálního rozvoje v arktických oblastech. Pochopení těchto procesů v extrémních podmínkách může přispět k lepšímu porozumění aspektům regionálního rozvoje u nás. Příspěvek se konkrétně zabývá problematikou rozvoje v Sør-Varangeru, municipality v kraji Finnmark, Norsko. Cílem příspěvku je ukázat, jak tento proces probíhá u obyvatelstva, které je vystaveno silnému socioekonomickému a environmentálnímu tlaku.

Abstract

The presented paper strives to map the processes of regional development in the arctic regions. Understanding of the processes and principles regulating the development under extreme or untypical conditions can lead to better understanding of regional development in other areas with more complex conditions. The paper is dealing with problematic of development of Sør-Varanger Municipality in Finnmark County, Norway. The aim of the paper is to analyze the development process as perceived through population changes under strong socio-economical and environmental pressure.

1 Introduction

The theme of the submitted paper is the problematic of regional development in arctic regions. At a first glance, the chosen topic may appear absurd, but in our opinion, under the extreme conditions of arctic environment the understanding of some of the basic principles of regional development could be easier.

The Arctic is defined as a circumpolar region that includes apart from the islands of Greenland and Iceland the northern part of Alaska, Canada, Norway, Sweden, Finland and Russia.

There are various definitions of the delimiting boundary. The contemporary geographers prefer the delimitation defined by the position of the 10 C isotherm during the month of July.

In a similar manner, the boundary of the Arctic region is defined by the biogeographers: The Arctic is the area north of tree line, that is, north of the

boundary between taiga and tundra. Another criteria use the Arctic Circle - the southern limit of the arctic region is defined by latitude 66 degrees, 32 minutes North. Above this latitude the sun does not set on the day of the summer solstice and does not rise on the day of the winter solstice.

The Arctic Circle location varies by 2.5 degrees of latitude on a 40 000 year cycle. Currently the location is moving northward about 8 meters a year. In this article, the last definition of the boundary will be used.

Figure 1: Arctic region.



Source: *the The Perry-Castañeda Library Map Collection*. The tree line was added at NSIDC based on information from *National Geographic 1983, Armstrong et al. 1978, and Young, 1989*. (Taken from the NSIDC Arctic Climatology and Meteorology Primer (<http://nsidc.org/arcticmet/>))
Reference area marked by the red rectangle

Human activity influences the land for many years. Due to a very short vegetation period, the revitalizing /recuperating ability of an arctic ecosystem extremely long and is counted in years, often in tens of years. Upsetting the ecological balance presents a real possibility if special precautions are not applied.

General description:

The Arctic is an area of harsh climatic conditions; permanent human settlements are with little exception located in the southern margins. There is a significant share of the Inuit, Saami and Paleo-Asiatic ethnic groups in the population. Traditional means of earning a livelihood are still in abundance (reindeer husbandry in the tundra, fishing and fur animal farming), even though most of it flourishes only under government subsidy plans.

Specific climatic, vegetation and socio-economic conditions will be described in greater detail in Chapter 2 of this paper, dealing with a more precisely defined area of interest.

Substantial part of the non-native population has been attracted to otherwise unappealing regions by job opportunities in industrial operations (mining and subsequent processing) and in services. There are also many military contingents which, if not in complete isolation, represent an important socio-economic element in each community.

Another significant group in the population is the scientific community concentrated around research stations.

Many of the inhabitants chose to live in the Arctic only temporarily, mostly on account of higher income, better possibility for a career progress and / or fringe benefits offered by most governments as incentives for attracting population to otherwise adverse conditions (free health care, tax advantages etc).

In the whole Arctic region, the amount of socio-pathologic phenomena is above average, in the whole spectrum from alcoholism and drug abuse to suicide, homicide and domestic violence. Many governments strive to mitigate the substance abuse by making the communities “dry” (total prohibition) and exercising rigorous control over import of alcohol, which in turn leads to flourishing bootleg and smuggling operations. The problem of substance abuse and in particular alcohol abuse is especially serious among the native population, which due to genetic predisposition has a lowered tolerance to alcohol ingestion.

“Among Chukotka Inuit, 40 per cent of deaths are attributed to injuries, of which 80 per cent are considered alcohol related. In the Lovozero district of the Murmansk region, where the Kola Saami live, about 90 per cent of Saami teenagers (under 16 years old) use alcohol, and one in nine Kola Saami youngster is addicted to alcohol. Alcohol problems are typical for people living in the region’s remote rural settlements. This problem is especially acute in places where the Indigenous people live in close proximity. Those living in close proximity comprise 7.9 per cent of the total regional population but account for 16.6 per cent of those diagnosed with alcoholism“(p. 8 –9, Riabova, 2004)

The governments strive to maintain settlements in this inhospitable environment in attempt of territorial control; apart from that, the prevailing reason for existence of a settlement is an adjacent mining operation (precious metals, base metals, coal) or a similar economic venture (a transport hub for shipping of the mining products etc).

Where communities are unable to support themselves, significant part of their budget is balanced by government subsidies, which accounts for existence and development of both hard and soft infrastructure.

2. Area description

Our area of interest (AOI) is the European Arctic, northern extreme of a region known as Fennoscandia, influenced by the Golf stream and remarkable by a climate much warmer than for instance an area of the same northern latitude in Canada. Average temperatures for summer and winter are in Appendix 1.

Natural conditions:

The part of Fennoscandia that falls within the defined boundaries of the Arctic is located at the north-west extreme of the taiga forest; it is sparsely covered by vegetation on its southern limits and the tree line (dividing boundary between the tundra and tree land) is found within its boundaries.

There is little lumber fit for chemical wood production (cellulose) and mechanic wood production (sawmills). During the Bronze Age the county had big pine tree forests, but as a result of human activity (timber cutting, forest fires) and changes of the climate most of the county now is barren, mountainous and marshy and partly covered with birch tree forest and birch tree scrubs. In several locations, a pine/spruce forest suitable for logging and forestry activities is found, but at present these are minimal.

Past and present of the Human settlements:

First time the area is mentioned in an “official” document goes back to approximately 900 A.D. For centuries, tax collection was the main reason for attention Fennoscandia was receiving.

The first permanent or semi-permanent settlements other than Saami were started approximately in the 15th century, when a Norwegian population of peasant fishermen was brought from south to fish for merchants from Bergen and Trondheim. Towards the end of the 18th century, several relatively prosperous fishing villages were firmly rooted along the coast.

Trading exchange with Northern Russia was very important for the local economy for many centuries. Until the Revolution in 1917, Russia offered a large market for fish in exchange for corn and other agricultural products unavailable locally. The ending of this trade after the Revolution meant the loss of an important trade for the fishing communities.

The modern history is marked –apart from the Russian revolution in 1917 - by discovery of the Nikel-Pechenga mineral deposit between the wars (under Finnish jurisdiction then) and by territorial changes during WW II that gave shape to current political boundaries.

Our attention is aimed at Finnmark, Norway’s northernmost county. The administrative center of the county is in Vadsø. Finnmark covers 15% of total area of Norway’s mainland, but in 2003 it was inhabited by only 1.6% of country’s population.

The development of the county’s population exhibits various trends. Starting in 1989, a growth to a big total of 76,629 in 1995 can be observed. In following years, a slight decrease occurs to a current 73,514 (2003). Population in this part of Norway is located mostly along the coastline. Compared to the country’s average, life expectancy is lower; the numbers are more pronounced for male part of population (e.g. between 1996 and 2000, the life expectancy for males was 75.5 years in Norway and 72.7 in Finnmark). For females, the corresponding numbers are 81.1 and 79.9, respectively.

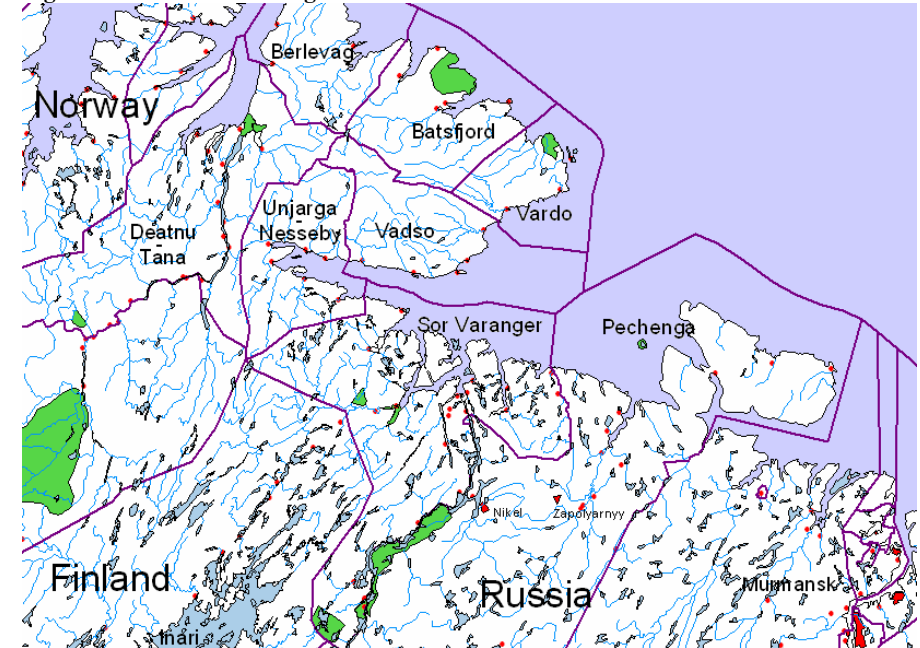
The county of Finnmark has also higher unemployment rate than the country’s average, with high seasonal oscillations (very high values during winter, sharp decline in spring and summer, recurrent growth in autumn).

The population of the area is quite active, with many leisure activities and pastimes covering the whole spectrum from cultural to sport and outdoors recreation. There is a multitude of NGOs.

Due to its unique geographical position, the Finnmark county represents an area where different cultures meet – the Saami, Norwegians, Finnish and Russian cultural habits interact and blend into a rich mixture.

Recently, a considerable influx of immigrants from many countries has been influencing the social atmosphere of the bigger population centers, adding elements from Russia, Sweden, Finland, Germany and Denmark, but also from remote places like Afghanistan, Somalia, Thailand and Iraq.

Figure 2: Administrative regions in the Area of Interest.



Full analysis of the whole county of Finnmark is beyond the scope of this paper; our attention is turned towards municipalities covering the Varanger peninsula and the area south of the Varanger Fjord.

These municipalities account for 35% of the county’s population; their geographical delimitation is shown on Fig 1.

With codes adopted from the Norwegian administrative authorities and the Statistic Office of Norway (www.ssb.no), the municipalities in question are the following ones:

- 2002 Vardø
- 2003 Vadsø
- 2024 Berlevåg
- 2025 Deatnu - Tana
- 2027 Unjarga-Nesseby
- 2028 Båtsfjord
- 2030 Sør-Varanger

The largest (by area) is the Deatnu-Tana, the smallest Vardø. In population, the situation is different; highest values are shown for Sør-Varanger and lowest for Unjarga-Nesseby. The latter has also the lowest population density.

An overview of basic characteristics for all municipalities can be found in Table 1.

Table 1: Basic Characteristic for year 2003 (3 highest value is bold).

Region	Area km ²	Population 1 January	Δ pop. 94-03	Average age	Density	Unemployed	ur	Share of University graduate
Vardo	601	2 496	-17,4	39,9	4,07	164	11,9	12
Vadso	1 259	6 122	-4,2	36,4	4,89	179	5,6	25
Berlevag	1 120	1 193	-7,7	39,9	1,05	54	9,6	12
Deatnu - Tana	4 055	3 068	-6,3	38,4	0,75	87	5,8	16
Unjarga-Nesseby	1 442	929	-13,3	42,7	0,64	31	6,5	15
Batsfjord	1 434	2 404	-2,8	36,5	1,64	145	10,4	11
Sør-Varanger	3 967	9 547	-3,9	37,6	2,40	221	4,5	21
Finnmark	48 637	73 514	-3,9	36,8	1,51	2 250	5,9	20
Norway	323 758	4 552 252	5,3	38,0	14,06	92 160	3,9	23

Source: Statistics Norway, Statistikk om Finnmark.

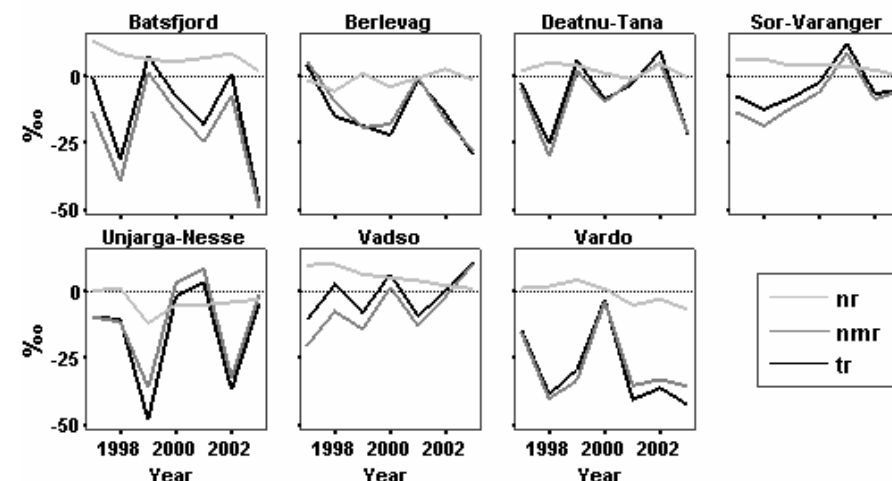
Note: Norway is Mainland. Δ pop. 94-03 - Change population 1994- 2003 in %. Employees 16-74 years by place of residence. Unemployed persons registered at the Employment Offices (Annual average.). Density - Density Population per habitant on 1 km². ur - Unemployment rate in % (Annual average). Share of University graduate in % and data for year 2002.

Maps of population density and population age distribution can be found in Appendix 2.

One of the most conspicuous features of the area is the population decline. The trend is generally downward, but there are differences among the individual municipalities.

Utilizing demographical indicators, we will carry out evaluation of population development in the municipalities in question in time period 1997 – 2003 (see Figure 3)

Figure 3: Demographic rate



Source: Statistics Norway: StatBank Norway.

Note: nr – Natural increase rate, nmr - Net migration rate, tr – Rate of total increase population

The overall population growth exhibits large variability, especially for smaller municipalities. The latter phenomenon can be up to certain extent attributed to a scaling effect.

The variability is most pronounced in case of Unjarga-Nesseby (the municipality with the lowest population). With exception of Vadsø, in 2003 the trend was downward in all municipalities. Lowest values were reached in Båtsfjord, Vardø and Berlevåg.

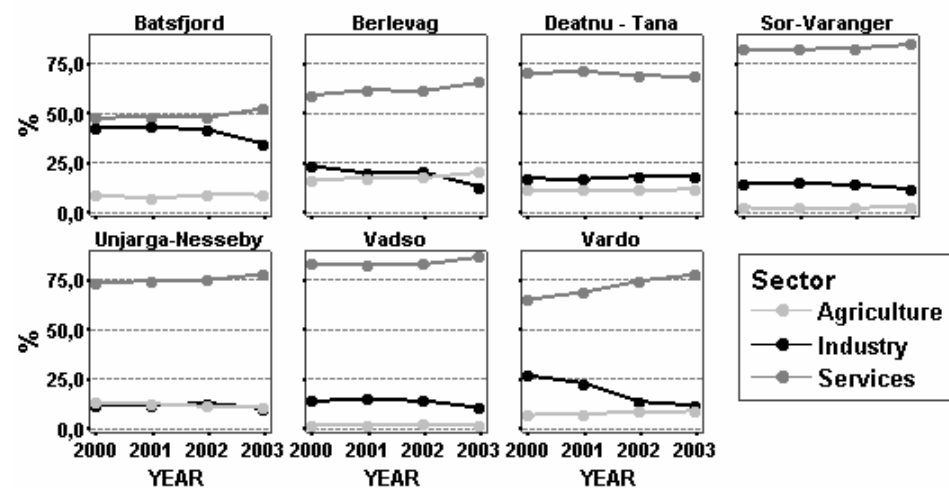
The most significant factor influencing the overall population growth and decline is in all municipalities the migration behavior of the population, which accounts for major part of the variations. Therefore, for evaluation of migration we can use criteria normally used for description of overall population trends.

The natural population growth has negative values for most municipalities. In case of Berlevåg and Deatnu – Tana oscillates around zero. The highest negative values are observed in Unjarga-Nesseby, where the natural

population growth has been negative since 2000. This municipality has also the highest average age.

Municipalities located on the northern coast of the county experience the most serious problems with population decline. In order to increase population in these areas, it would be necessary to attract population in younger age groups. The path to this goal is not straight and consists of many steps, often requiring significant changes in social environment of the municipalities. The most significant factors in this equation are availability and pricing of housing, social services (especially day care centers and pre-school facilities). Proper attention to these issues is expected to have positive impact both on net migration and natural population growth. From the point of view of labor market structure, in all municipalities we can observe prevalence of the service sector. The highest difference is found in Båtsfjord, where the ratio of employment in industry reaches almost identical values as the employment ratio in services. In Sør-Varanger and Vadsø the development is very stable; also the level of employment in various sectors is more or less identical in these municipalities. In the remaining municipalities, the ratio of employment in agriculture (which for these purposes includes also fishery and forestry) is higher. The most pronounced changes in labour market can be observed in Vardø.

Figure 4: Employment Structure.

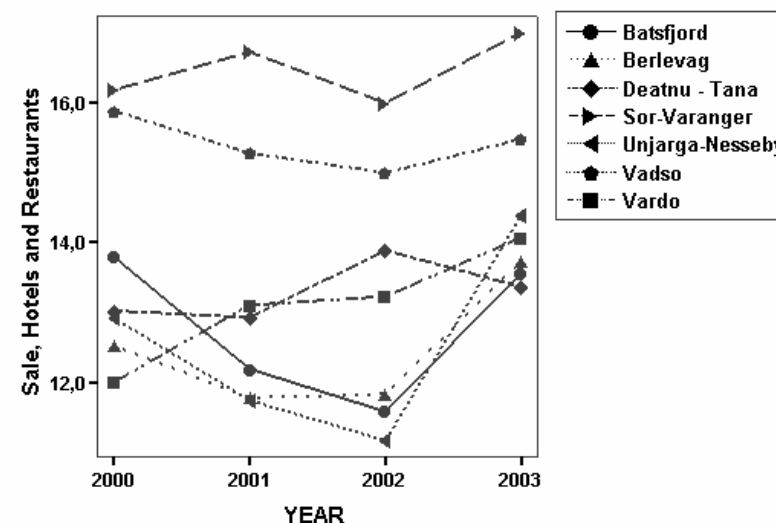


Source: Statistics Norway: StatBank Norway.

Note: Sector Agriculture including forestry and fishing.

In this area, the market has a comparatively stable structure. A slow decline of the share of population employed in industry and a mild increase of employment in services can be observed. In local centers in Sør-Varanger and Vadsø the share of population employed in agriculture is significantly lower.

Figure 5: Employment rate in Sales/retail, Hotels and Restaurant in %.



Source: Statistics Norway: StatBank Norway.

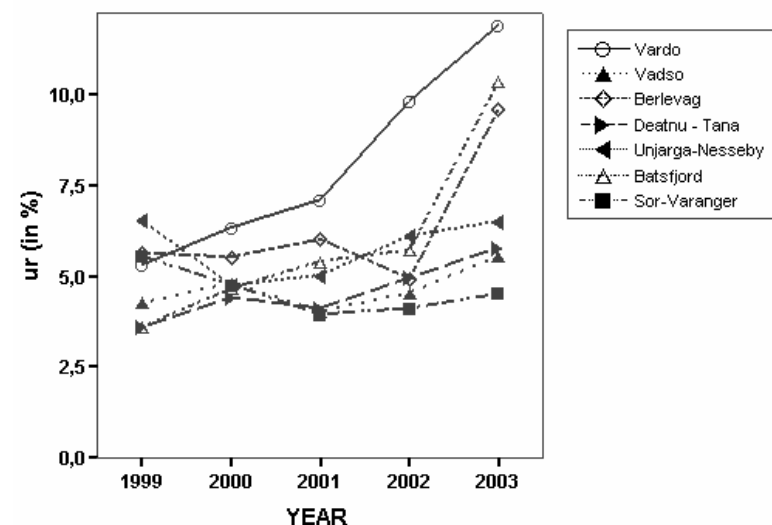
In recent years, tourism and eco-tourism has gained importance as a factor in development of the investigated area. In order to evaluate its importance properly, we use values of employment in Sales/retail, Hotels and Restaurants. In Figure 5 the increase of the monitored parameters is clearly visible in all areas. From this point of view, the best position in the area belongs to Sør-Varanger, followed by Vadsø. The lead of Sør-Varanger has increased between 2000 and 2003.

One of the most important socio-economic indicators is the unemployment rate. In the described area, there has been an increase since 1999. Exceptions are the municipalities of Sør-Varanger and Unjarga-Nesseby. The highest growth of the unemployment can be found in Vardø, where in 2003 the yearly average of unemployment rate reached 11.9%, with yearly maximum of 15% in the month of April.

These values are considered very high for the area in question.

The next highest values of unemployment rate are found in Båtsfjord and Berlevåg.

Figure 5: Unemployment rate in % (Annual average)



Source: Statistics Norway: StatBank Norway.

As in the demographical development, the unemployment rate the situation is most serious along the northern coast. It is apparent that there is direct relationship between both phenomena, which indicates a necessity of a complex approach in any strategy leading to improvement.

The answer lies in attracting (and keeping, which may be even more difficult) of young population group by creating employment opportunities and social conditions that would compensate the remoteness of the area, harsh climatic conditions and comparative lack of more sophisticated cultural facilities and events.

3 Development Scenarios for Sør-Varanger

In the following chapter, we will describe in detail individual development scenarios for the Sør-Varanger municipality together with their evaluation.

The Sør-Varanger municipality is one of the important settlement centres in the Finnmark County. The initial settlement started as a cluster of fishing villages; the original inhabitants of the area are the Saami.

The proximity to Russian border plays a crucial role in the economical and social development of the Sør-Varanger municipality – it is the only municipality in Norway that shares the border with Russian Federation.

Prevailing part of the border is created by the Pasvik (Paz) river, which flows from Lake Inari in Finland.

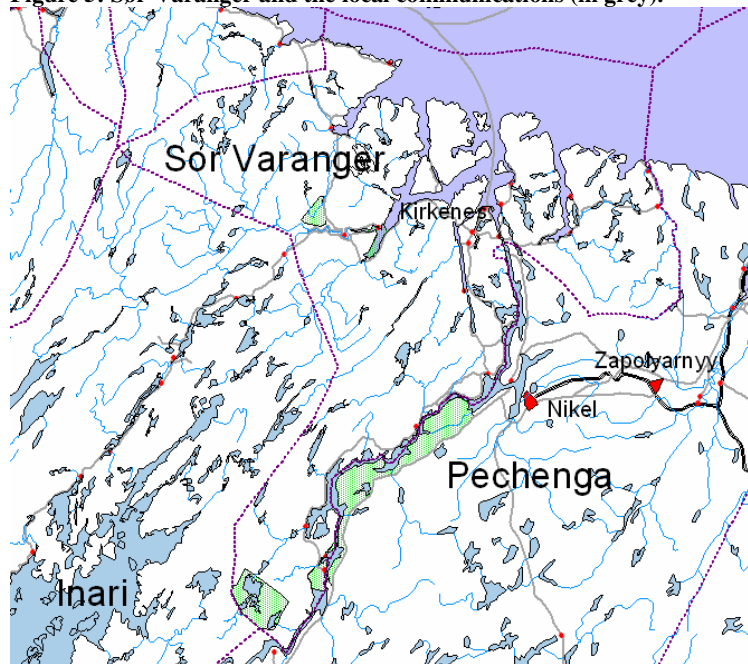
All of the Norwegian part of the Pasvik catchment falls within the boundaries of the Sør-Varanger municipality. The river is a major water body and a prominent feature in the landscape as well as in the economy, history and social development, as it has represented a natural dividing line between Norway and its neighbours

There is 5 Russian and 2 Norwegian power plants on the river with total output in excess of 1300 GWh. The river was an important renewable resource for several commercial fishing operations in the past. It is a part of a unique ecological system of wetlands protected in the Pasvik Natural Reserve in Norway and the Pasvik Zapovednik in Russia. The area adjacent to the river is also a recreational zone of growing importance.

Main source of income on the Norwegian side was –apart from employment in services – work in an iron mine in Bjørnevattn close to Kirkenes.

Since 1930, the Norwegian government has carried out many incentive schemes for development of reindeer husbandry and subsidized farming, with various level of success.

Figure 5: Sør-Varanger and the local communications (in grey).



The centre of the Sør-Varanger municipality is the town of Kirkenes, best known for its world-class port.

The town has a rich history from the times of WW II and a long tradition of friendly relationship with its Russian neighbours. Substantial part of the population of Sør-Varanger has relatives in Russia.

During the Cold War, the Norwegian-Russian boundary became a borderline between NATO and the Warsaw Pact. A heavily guarded barbed-wire fence was erected along the boundary and the cross-boundary intercourse was severely limited.

The dissolution of the Soviet Union has led to renewal of relatively normal border traffic; the cross-border roads and the boat traffic along the shore came back to life.

The opening an iron ore mine in Bjørnevatn, a settlement several kilometres south of Kirkenes, marked the onset of the industrial era in the region. The mine was a major source of employment in the municipality, providing work for approximately 1800 workers. It closed its operation in 1997 due to dropping prices of iron ore and increasing production costs.

Today (1.1.2004), Kirkenes, the municipal centre of Sør-Varanger, has 3,299 inhabitants and Bjørnevatn 2,373 inhabitants. After the closing of the mine, the most important enterprises include service industries, ship repairs, and various initiatives directed toward northwestern Russia.

Table 2: SWOT ANALYSIS Sør-Varnager

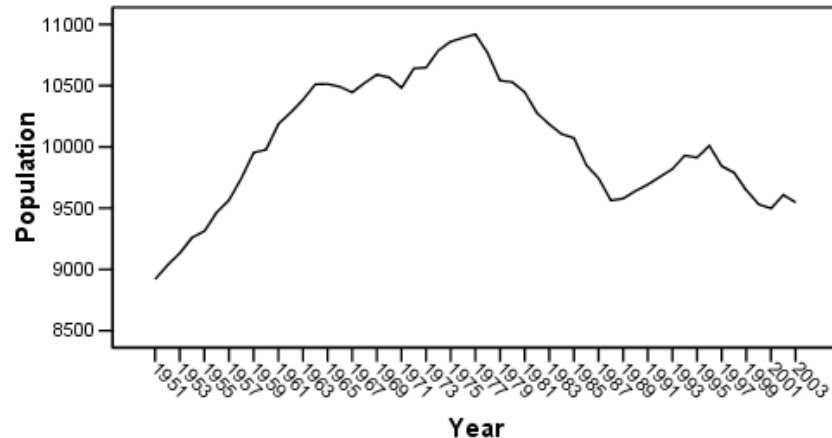
STRENGTHS <ol style="list-style-type: none"> 1. Economic incentives 2. Geologically interesting area - potential for precious/base metals, gemstones 3. Proximity to the North and Barents Sea oil and gas deposits 4. Proximity to the ocean as transport route (Northern Maritime Corridor) 5. Proximity to a potential strong commercial partner. 6. Good ties with Russia, knowledge of conditions 7. Availability of government and EU grants for development 8. Large quantity of pure fresh water 9. Deep-sea port open year round 10. Pristine environment, (low population density) 	WEAKNESSES <ol style="list-style-type: none"> 1. Strong competition among eligible organisations, favouritism. 2. Large distances, difficult and expensive logistics (specially exploration and mining) 3. Vulnerability of fish monocultures to water-borne fish diseases 4. Vulnerability to oscillations of Russian economy and changes in legislation and political atmosphere 5. Limited opportunities for farming (mostly possible dairy farming only) due to climatic conditions 6. Harsh climate, long winters
OPPORTUNITES <ol style="list-style-type: none"> 1. High potential for (eco-) tourism 2. Development of the Kirkenes port in relation to oil and gas exploitation of North Sea, Barents Sea, Related industrial growth of the area. 3. Potential for mining development 4. Potential for fish farming, sea and fresh water 5. Improve cooperation among scientific, ecological, industrial, administrative elements 	THREATS <ol style="list-style-type: none"> 1. Deterioration of the environment by all levels of human activity if not managed sensitively 2. Pollution of coastal waters by crude oil manipulation in the outer harbour 3. Industrial (other than oil) pollution of coastal waters 4. Environmental damage to unique pristine areas by exploration and/or mining 5. Increase of taxation through growing influence of EU administration 6. Negative environmental impact of big-volume tourism 7. Overproduction on salmon in Norway and subsequent drop of salmon prices 8. And whatever may happen in Russia...

The area has a comparatively good transport connection in terms of ground communication as the only ground transport line from Russia passes through. The seaport of Kirkenes is one of the major transport hubs of the Barents Sea due its excellent natural characteristics (deep enough to receive large ships, free of ice year-round).

Kirkenes has an airport capable of receiving commercial jet traffic and has direct daily connection with Oslo and Tromsø.

The chart of long-term development of Sør-Varanger shows 2 local peaks. The first one is found in 1977 when the population of the municipality reached 10,919 inhabitants, the second one in 1996 (10,010 inhabitants).

Figure 6: Population development in Sør-Varanger



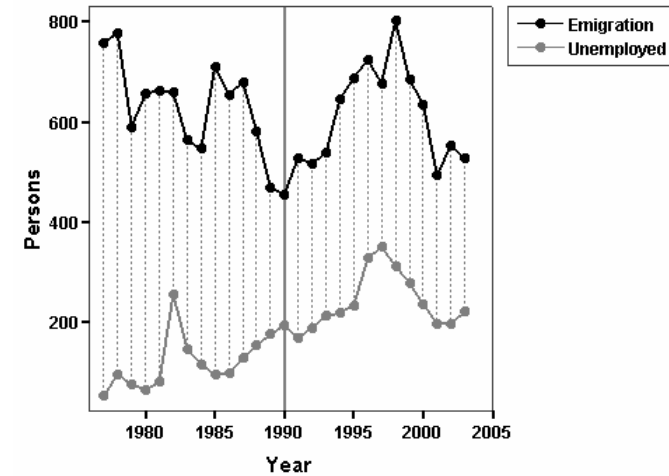
Source: Statistics Norway - StatBank Norway

The population changes are predominantly influenced by migration. In this section a closer attention will be paid to emigration from the area of interest; we shall attempt to determine a relationship between the development of population and the job market situation expressed through the unemployment level.

This analysis will be carried out for the time period 1977- 2003, for which both indices are available. The amount of population migrating out of the AOI during the observed period oscillates and reaches highest values in 1978 and 1998. The minimum of emigration is found in 1990.

The amount of unemployed shows a growing trend with two local peaks, 1982 and 1997 respectively.

Figure 7: Emigration and unemployment in Sør-Varanger, 1977 -2003



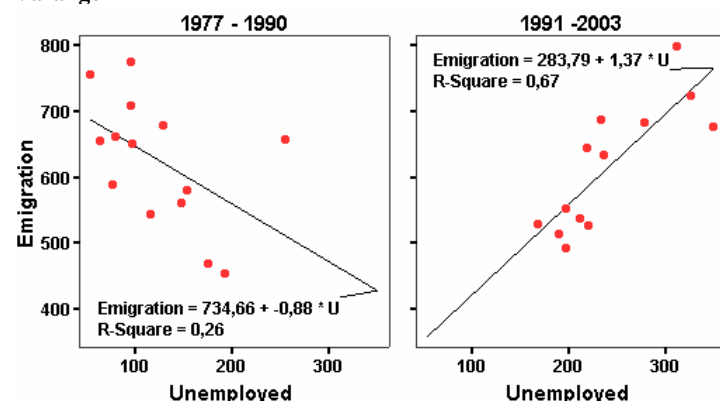
Source: Statistics Norway: StatBank Norway.

Note: Unemployed persons registered at the Employment Offices. Annual average

The relationship of emigration and the job market situation shows two different trends – before 1990 and after. The reasons for emigration out of the AOI prior to 1990 were not closely related to the job market situation. The regression model explains only 26% of variability. The relationship between variables is inversely proportional – while the emigration was growing, the unemployment was decreasing.

The opposite situation can be observed after 1991, when the growth of unemployment critically influenced growth of emigration. Under certain conditions, a delay of influence of unemployment on emigration can be observed. By this regression model 67% of emigration variability can be explained. This fact is confirmed by the chart shown in Figure 6 – unemployment peak in 1997 is followed by emigration maximum in 1998.

Figure 8: Development of relationship between emigration and unemployment, Sør-Varanger



From the analysed data, it can be concluded that the character of the job market has changed. After 1991, the unemployment can be considered one of the most significant factors influencing the outflow of population.

Taking into account the fact that it is mostly young people between 20 and 29 years of age that represent the most mobile part of the population, the decline of the population natural growth is also explained.

The analysed facts conclude that the job market situation is of vital importance for the population changes in the AOI.

In the following section, we pay attention to the development scenarios compiled from our analysis and from the Regional Development Plan for the Sør-Varanger municipality (currently under reading for approval).

One of the primary goals is creation of job opportunities; with this criterion in mind, the following development scenarios were proposed:

Scenarios:

1. CONSERVATION (-100 job places)

Slight decline population, decrease of quantity as well as quality of services (or at best maintenance of current state) but leads to improvement of environmental quality. Loss of job opportunities - approx 100.

2. MARKET-ORIENTED EXPLOITATION OF RENEWABLE RESOURCES (100 job places)

- Wind generators / power stations on the coast of the sea.
- Agriculture development - reindeer herding with better implementation of incentive programmes (size x quantity of the reindeer)
- Freshwater fish farming in Pasvik river and adjacent lakes, farming/harvest of the Kamchatka crab

3. INDUSTRIAL DEVELOPMENT (800 job places)

- Development of harbour and related infrastructure as main oil/gas terminal. Possible conflict of interest with similar facility built in Murmansk.
- Development of harbour and related infrastructure as shipping/reloading facility (include railway link to Russian). No conflict with 3a)
- Expansion new hi-technology in communication and international communication. This may be used in telecommuting and that stabilization of the settlement.
- Development of quartz, gold and diamantes mining and
- Utilisation of the Sør-Varanger ASA facilities (the abandoned iron mine) for other (industrial) purposes. (brown field..)

4. ECOTOURISM (50 job places)

- Build infrastructure of small camps, which are more nature-friendly with info centres/guides.
- Create observation platforms/campsites for bird watching and other non-intrusive activities.
- Development of access communications with emphasis on erosion prevention and drainage of wetlands.

5. TOURISM (100 job places)

High level services / infrastructure development related with tourism (camp sites, communications, access to river/lakes, restaurants/accommodation facilities)

Quantified correlations (both positive and negative) between individual scenarios were also analysed; the results are presented in Table 3.

Table 3: Scenario conflict and coherence

	1: Conser- vation	2: Market- oriented expl. of renewable resources	3: Industrial development					4: Eco- Tourism	5: Tourism
			3a	3b	3c	3d	3e		
1: Conservation	x								
2: Market- oriented exploitation of renewable resources	- - -	x							
3: Industrial development	3a	- - -	+	x					
	3b	- -	+	+++	x				
	3c	0	+	+++	+++	x			
	3d	- -	+	+++	+++	+++	x		
	3e	-	+	+++	+++	+++	+++	x	
4: EcoTourism	++	- -	- -	-	+	- - -	0	x	
5: Tourism	-	-	-	+	+	- -	0	+	x

Source: Expert estimated regional development authority.

Note: Scale - - - to + + + (negative = conflict, positive = mutually supportive)

With the amount of created job opportunities as the main priority, the best results are produced by combination of #2, and #3 (the Industrial Development and Market-oriented exploitation of renewable resources).

As the scenarios stated in Table 3 represent theoretical possibilities and can hardly happen individually in isolation, we need to compound them into aggregated scenarios (AS):

AS 1 = #3 + #2

AS 2 = #3b + #3c + # 5

AS 3 = #4 + #5

AS 4 = #1 + #5

The aggregated scenarios are in sequence proportional to their economical effect, measured in terms of created job opportunities and assumed consequent population increase.

Nevertheless, this approach suffers from a common shortcoming of most analytical works based strictly on economical factors. This point of view is

rather superficial, as it tends to disregard or assign lower weight to all other criteria. A regional development is not represented only by economical performance of an area, but needs to contain a social and environmental component.

Importance of these components is particularly clearly visible in the arctic area; therefore, a simple economic analysis is not sufficient and a more complex tool needs to be applied. An instrument called Regional Competitiveness Index, first mentioned in works of Krugman (1995) and Porter, M.E. (1996) and also used and further modified in LEADER project, has been found to fit this purpose better.

From the point of view of evaluation of economical potential, sustainability of various development scenarios and feasibility of different approaches, it has been decided to utilize the following 12 components / principal dimensions of territorial competitiveness defined in the LEADER methodology concept:

- Physical resources
- Environmental conservation
- Human resources
- Cultural Identity of the region
- Know-How and Skills
- Governance
- Institutional capacity
- Activities and business firms
- Markets and external relations
- Economic structure
- Image and perception of region
- Social welfare

Detailed evaluation of development scenarios through the LEADER components is beyond the scope of this paper; nevertheless, we feel the necessity to stress the importance of the environmental factor in the Arctic areas. The methodology and the detailed analysis and evaluation using the LEADER approach including the methodology is described in IRON CURTAIN (2004).

A very expressive example can be found in the east vicinity of the AOI, where in the Pechenga municipality a mining/metallurgical operation of the

Nikel-Pechenga combine carried out for decades with complete disregard for the environment has turned hundreds of square kilometres of the countryside into a technogenic desert (Appendix 3). The Combine itself produces sulphur dioxide in yearly amounts equivalent to quadruple of the whole Norway, accompanied by a whole spectrum of heavy metals in airborne particles and industrial sewage released directly into the Pasvik river.

The negative trend has been stopped, mostly owing to recently installed filters financed from foreign sources, but according to biological and botanical observations, it may take decades before any visible improvements in terms of vegetation and wildlife return to the affected area take place.

4 Conclusion

The influence of globalisation in terms of interdependence of phenomena from regions recently considered too far apart to have any bearing onto each other is increasingly visible. In our opinion, complex analysis of these regions and their mutual relationships is of paramount importance.

The example shown in this article demonstrated the advantages of working with an arctic region where most factors are clearly separated and can be revealed, described, analysed in much easier manner than in regions with more complex relationships due to a more exposed geographical position.

We believe that a similar analysis performed on a tropical region can yield results of equal importance revealing other category of relationships and interdependencies.

The wavelength of events and phenomena in the Arctic is measured in terms of decades from the point of view of ecological equilibrium and the ability of the ecosystem to recover. Including the ecological situation is absolutely necessary in any plan of sustainable development; the regional planning in the Arctic means ability to forecast and deal with situations in far future.

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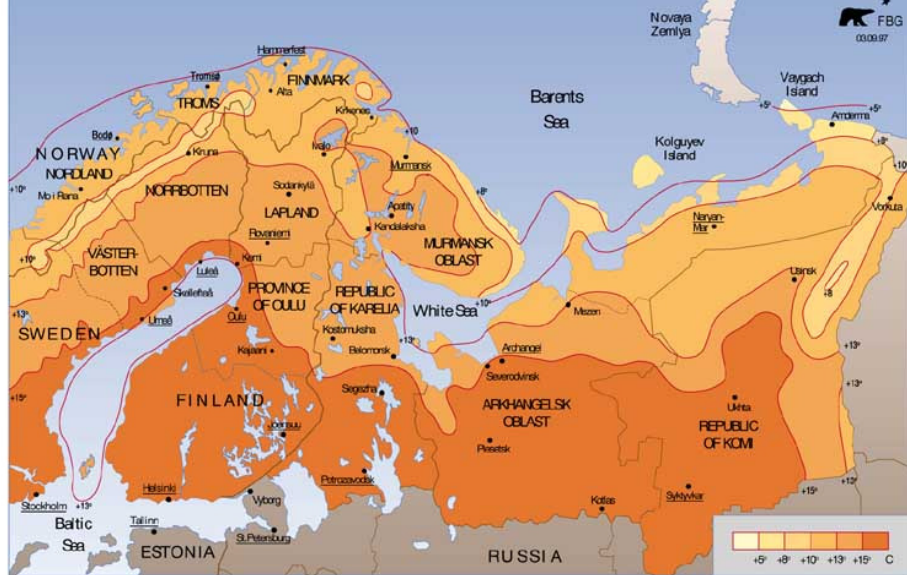
Appendix 1

Figure 1.1: Average temperatures, January



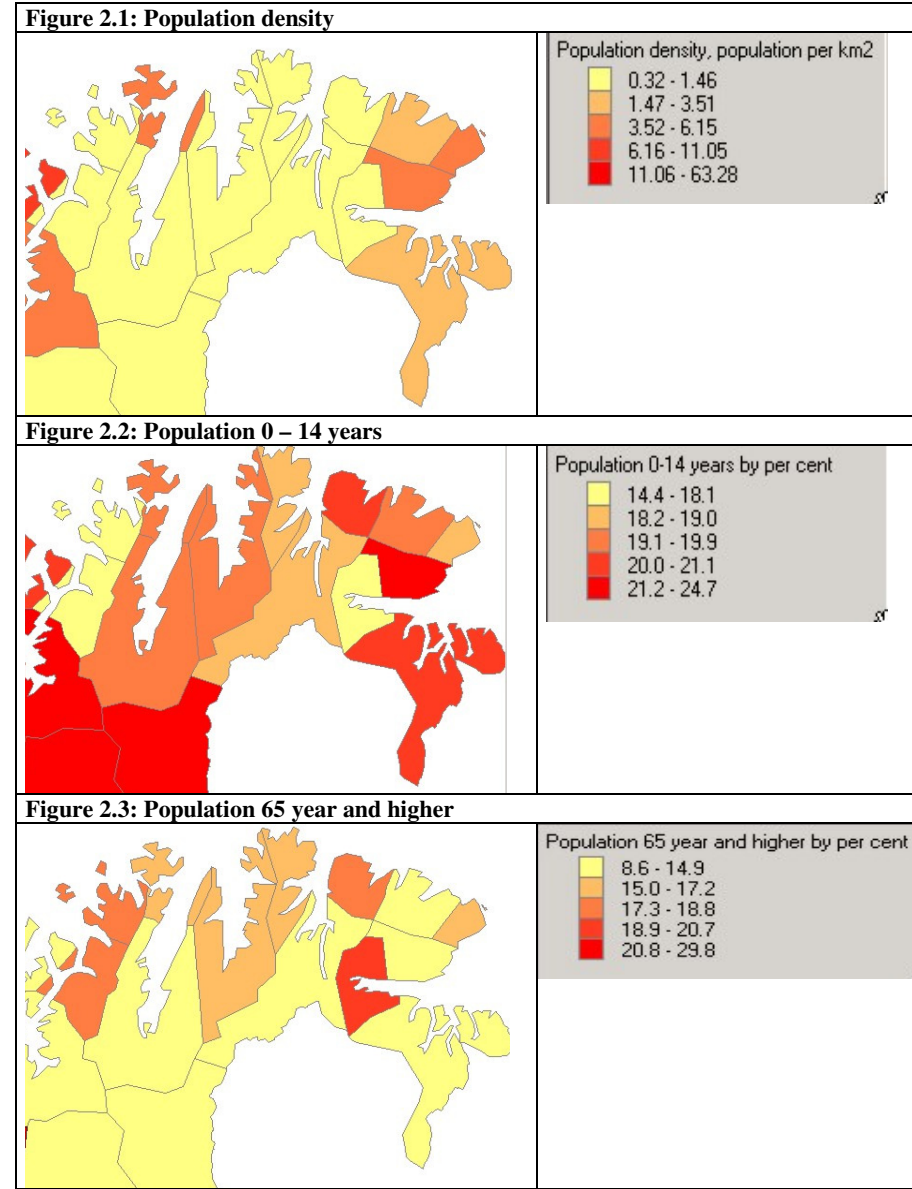
Source: <http://arcticcentre.ulapland.fi/barentsinfo/maps/02.html>

Figure 1.2: Average temperatures, July



Source: <http://arcticcentre.ulapland.fi/barentsinfo/maps/02.html>

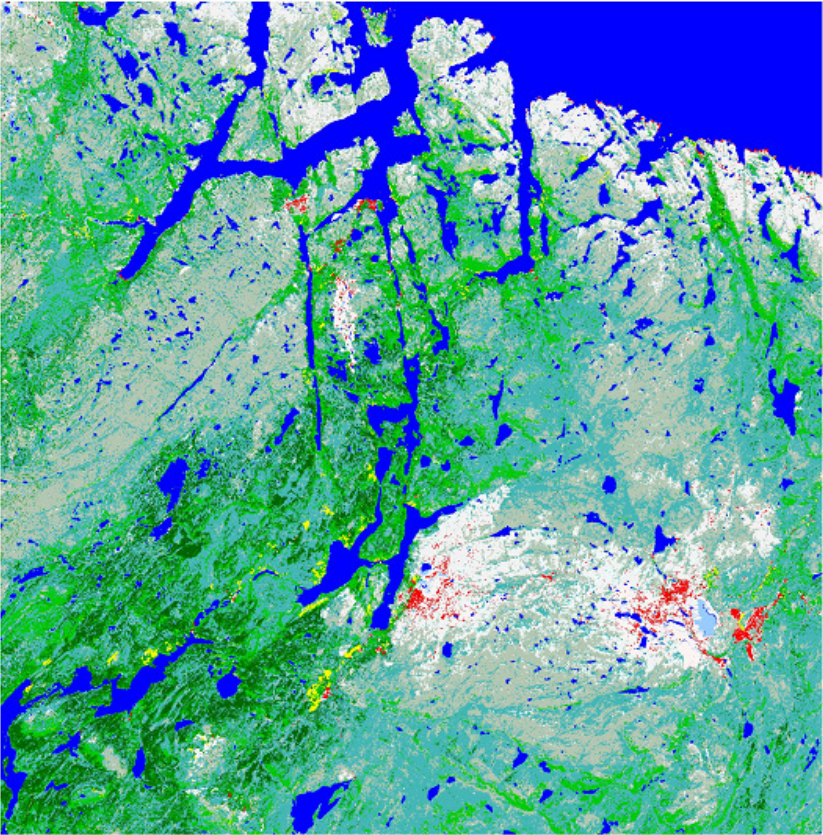
Appendix 2



Source: Statistics Norway: StatBank Norway.

Appendix 3

Figure 3.1: Land Use in Reference area (comparable with figure 5)



0 25 50 km

Legend

- | | | | |
|---|---------------------------|---|---------------------------|
|  | built-up areas |  | others |
|  | forest |  | natural bare ground |
|  | deciduous forest |  | anthropogenic bare ground |
|  | mixed type forest |  | snow covered |
|  | coniferous forest |  | heathland |
|  | grassland |  | bog |
|  | water | | |
|  | open water | | |
|  | water with high turbidity | | |

Source: Interconsul. Internal report.