



# MEGATRENDS



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Besides all the original scientific contributions, the book includes references, notes, explanations to photos, workshop summaries, and other materials which have been used in relation to the project.

In addition to this book additional information are available in:  
Rasmus Ole Rasmussen (ed): Analyzing Megatrends, TemaNord 2011:529.

### Nordic co-operation

Nordic co-operation is one of the world's most extensive forms of regional collaboration, involving Denmark, Finland, Iceland, Norway, Sweden, and three autonomous areas: the Faroe Islands, Greenland, and Åland.

Nordic co-operation has firm traditions in politics, the economy, and culture. It plays an important role in European and international collaboration, and aims at creating a strong Nordic community in a strong Europe.

Nordic co-operation seeks to safeguard Nordic and regional interests and principles in the global community. Common Nordic values help the region solidify its position as one of the world's most innovative and competitive.

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# Foreword



One of the most striking global phenomena seen over the last decade has been the swiftness with which changes penetrate the Arctic. The winds of change are blowing in this part of the world and the Arctic is moving from a rather isolated to an accessible geopolitically central part of the world – and in a far more positive way than during the Cold War. The future of the Arctic will be radically different to the reality we know today.

The main driver for change is climate change. Global warming is happening faster in the Arctic than in any other place on earth with profound consequences for global, regional, national and local societies while at the same time presenting new challenges and opportunities. Another important driver here is globalisation the consequences of which have now embraced the Arctic and will have significant implications for Arctic societies and their peoples.

The purpose of this book is to draw attention to the most important changes – the megatrends – presented by a number of scientists. In the long run it is not enough to confirm that the ice is melting. We have to move forward, if we are to secure the future for our Arctic world and ensure that developments happen in accordance with the wishes and priorities of the societies in the Arctic.

A handwritten signature in blue ink, consisting of a stylized 'L' and 'E' followed by a horizontal line.

Lene Espersen  
Minister of Foreign Affairs





# Executive summary

The current pace of global change has already had a decisive impact on the Arctic. To understand the current and likely future situation in the Arctic it is important to acknowledge the pre-conditions, challenges and tendencies at work here.

Some of these developments should be characterised as megatrends because they overarch and impact on everything else. They are trends deemed so powerful that they have the potential to transform society across social categories and at all levels, from individuals and local-level players to global structures, and eventually to change our ways of living and thinking.

We have identified the nine megatrends;

## **1. Increased urbanisation – a global trend also including the Arctic**

Urbanisation is a process where society is transformed from predominantly rural characteristics in terms of economy, culture and lifestyle, to one which can be characterised as urban.

It leads to a further concentration of the Arctic population on fewer and larger places – with increased diversification of the economy, social relations, and cultural activities.

It entails a complex set of processes, not only in where people live and what they produce, but in who they are, how they live in terms of economic well-being, political organisation and the distribution of power, demographic structure and social relations.

The pace may differ in different parts of the Arctic, but the trend is the same!

## **2. Demographic challenges – the old stay while the young leave**

A decline in birth rates leads to a reduction in the number of people in the active workforce. This, combined with a general ageing of the population, results in increased old age dependency rates.

Stagnating or declining predominantly rural regions are experiencing the temporary out-migration of young persons seeking educational opportunities, usually resulting in the permanent out-migration of young and well-trained persons.

As relatively more women than men leave, this has a profoundly negative effect on the social life and the economy through opportunities for marriage, maintenance of family life and family relations etc., as well as through the loss of educational skills.

A few municipalities – basically the urban ones – can show a positive net in-migration, most of them in relation to either new economic activities creating jobs, or educational opportunities attracting youth segments.

## **3. Continued dependency on transfers and the exploitation of natural resources will continue to dominate the Arctic economies**

The Arctic continues to be a region of economic contrasts. The international economy supports modern large scale, capital intensive production, while the traditional economy exists in small individual or family groups.

Growing global competition combined with the over-exploitation of natural resources creates structural and economic crisis in many Arctic/Northern communities.

Exploited to the limit, these living resources are not expected to provide the necessary economic surplus to enable further welfare development. In addition, “traditional” activities remain vulnerable to international opinion in relation to the environment and animal welfare.

Growth in the Arctic tourist industry will continue with an increasing emphasis on large vessels and land-based tourism.

Future extraction of the vast land-based resources of the Arctic will increasingly be based on “company-towns” generating few jobs in established communities.

The most significant shift in the economy, however, is from primary and secondary towards tertiary sector jobs funded through transfers from royalties and governments.

The Arctic will remain a high cost production region because it is located far from markets, it is sparsely populated and it is situated in a harsh environment. In most parts of the region development occurs along “frontiers” with a limited infrastructure and with few available workers.

#### **4. Continued pollution and ongoing climate change will have a significant impact on the nature and environment of the Arctic.**

The future will see challenges such as increasing temperatures, melting of sea ice and glaciers, sea-level rise and probably also increased precipitation in some areas and drought in others.

Whether or not they are fatal themselves, anthropogenic forces add to the stress on local ecosystems. Their combined effects can be cumulative with substantial causality. In some cases innovative approaches might reduce the impact of these processes.

Biological diversity could be significantly impacted if climate change continues at its current pace, though the new composition of species is likely to be based on heat-tolerant fast adapters, resulting in patterns where these “invasive species” will tend to re-structure local ecosystems.

Management of renewable resources is a complex and highly advanced exercise, with several different layers and players. The challenge here is to provide management systems such as co-management approaches where the different levels of interest meet in order to provide a means of regulatory control and follow up schemes while at the same time remaining open to outside involvement.

Especially in the Arctic, where cross-boundary interests between nations, regions, and communities are often involved, it seems obvious that resource management could benefit from such experiences.

While pollution from outside the Arctic is a recognised problem which may increase with rising levels of activity

in the Arctic, pollution from internal Arctic activities needs also to be addressed.

#### **5. The Arctic needs to generate more Human Capital by investing more in its people**

The advent of what is often characterised as the “knowledge economy” requires the enhancement of human skills and talents which will be the key to the next development process. As education has a leading role to play new initiatives are needed to enable communities to take charge of their own development processes.

The service sector, providing wage work in administration, education and social services, has become the main income source for most families in the Arctic. These sectors serve as the economic mainstay for local communities and are also increasingly necessary for the maintenance of many of the traditional renewable resource activities.

Ensuring the availability of educational opportunities and the jobs that enable young people to remain in the community, or at least in the region.

Establishing job opportunities for women is important as they tend to be the main source of an educated workforce in most of the Arctic, and already tend to be a primary source for labour in the public sector’s service activities, while unskilled or technical jobs tend to be taken up by incomers.



## **6. Changes in the nature of interaction between the public and private spheres will impact development**

While most of the Arctic is still characterised by a large public sector with state authorities involved in most regulation and planning measures, processes supporting the delegation of power and responsibility to lower administrative structures have been widely introduced, promoting and maintaining strong local autonomy and democratic accountability.

Of similar importance is the fact that the private sector is now gradually moving into fields which used to be dominated by the public sphere, most prominently in retail sale, housing and professional services.

Access to natural resources has long been subject to such a process. In fisheries Individual Transferable Quotas and Community Quotas have turned into forms of private ownership. And most prominently, Russia has experienced a process where privatisation has entered into a broad spectrum of basic economic activities such as mining and smelter industries.

Due to the high costs of establishing infrastructure and maintaining connections in the Arctic, however, the public sector will prevail as the major provider of such services.

## **7. Renewable energy will contribute to a “greening” of the economy.**

The Arctic has major potential in terms of developing non-fossil fuel based local energy resources including substantial freshwater sources which may be the basis for further development.

Energy is a key component for development, and a major challenge here is that the Arctic is among the most sparsely populated areas in the world and with obvious difficulties in establishing energy-related infrastructures.

The current impetus to “green” the economy reflects three major concerns: the need to tackle climate change and other environmental problems; the desire to strengthen energy security by reducing dependence on oil and gas; and the need to stimulate job-creation through local renewable energy production in many rural areas.

The inflow of consumer goods to the Arctic in combination with a more urban lifestyle generates a substantial amount of waste material. Increasingly, the regeneration and re-use of some products and increased use of recyclable materials will provide a new approach to waste management, while other non-recyclable materials are converted into energy.

## 8. Increased accessibility provide opportunities as well as new risks

The much predicted easier ocean access to transport and resources in the region will generate increased shipping, but also create new risks for the environment.

It may provide inhabitants, at least some, with better connections to other parts of the world, but the costs may still be a limiting factor.

It will, however, provide the cruise liner industry with easier access. This may not however be of particular benefit to small Arctic communities as they have only a minimal ability to benefit from mass tourism. The necessary infrastructure costs – port facilities and hotel beds – are prohibitive and the risk that they are never able to prove their economic viability remains great as such communities would be at the economic mercy of the cruise line companies.

Ubiquitous low cost communications technology will change the relationship between citizens and states. In some areas, however, uneven capacities and problems over access due to socio-economic limitations will undoubtedly remain an issue due to charging systems based on the amount of traffic.

The compound effects of the impact of numerous inter-related components raise the question of whether this is voluntary or forced. Globalisation has a penetrating effect.

## 9. The Arctic as a new player in the global game

The Arctic is no longer an isolated or remote region. It is a member of the global society, often at the centre of global attention and fundamentally influenced by global changes,

Increased global interest is however a potential source of tension between the need for exploration and the requirements of conservation. This balancing act requires effective governance. Resource development, therefore, ought to be conducted in the framework of “stewardship”, with a greater emphasis placed on sustainability and the principle of inter-generational equity.

The complexity and rapidity of the changes experienced require that substantial effort is made to maintain a proper “stewardship” in and among the Arctic states and that concern for this fragile area of vital importance includes relevant stakeholders and global society more generally.

In this context however, the need for new data, knowledge, and information is required for a further in-depth understanding of the interaction between the different systems and in order to fully understand current and potential future changes.



# Introduction

The world is changing, with many major trends at work, each contributing to the shaping of the basic framework of development in the Arctic. Some of these developments may best be characterised as megatrends because they overarch and impact everything else.

Climate change is a recognised reality. Perhaps the most obvious consequences of this are the ongoing changes in the accessibility of the Arctic region and its resources. This will have a future global impact as well as a “local” Arctic one.

The new situation in the Arctic is increasingly highlighted both in the scientific literature and in the everyday life experiences of local people with the issue of future environmental consequences at the centre of both debates. Moreover, while some see these changes as representing a challenge to traditional lifestyles others envision the embracing of the new opportunities they afford.

In the economic field new development options will bring significant change. For example, the current prevailing system of wages and contracts could gradually be replaced by one built around transfer payments based on royalties. This might lead to new types of social stratification, inequity in wealth distribution and eventually to a change in perceptions of deprivation. The informal economy, encompassing subsistence activities such as individual, family- and community-based hunting and fishing, will however continue to play an important role.

Parallel to these Arctic-focused issues a number of global processes of importance can also be identified. Interest in the Arctic region has intensified with the economic prospects afforded by the melting ice, thus granting increased access to the region and its resources.

Economic and social life in the Arctic will continue to be exposed to the likely impacts associated with increased access to the rich mineral and energy resources stored there. But as most of these activities are promoted by, and in need of, support from external sources of capital, they can quickly become subject to decisions made by outsiders with very limited influence exercised by local communities.

## **Challenges and Dimensions**

To understand the current state of Arctic affairs, it is of the utmost importance to outline the set of pre-conditions, challenges and tendencies that influence contemporary and future issues in the region. Arctic geopolitics is intertwined with a number of developments.

Environmental changes in the Arctic are caused by various mechanisms including climatic change, global warming, environmental pollution and hazards including Persistent Organic Pollutants (POPS), Arctic haze, heavy metal poisoning, and the impact of global Green House Gas (GHG) emissions.

A variety of consequences emerge in relation to these human-induced actions. One set of questions here relates

to the exploitation and management of current and potential resources of alternative and fossil fuel energy. Others concern terrestrial and marine resources, sea-transport and increasing tourism.

The shifting geopolitical interests of the Arctic and some non-Arctic states have been characterised through the development of new geo-strategies and approaches to multi- and bi-lateral diplomacy involving dialogue, partnerships and international cooperation. At the same time “struggles” for geopolitical advantage and new objectives for dealing with the new geo-strategic dynamics and with the various available responses to emerging security threats and risks have become central to the policy-making process and are thus now fundamentally important for the stability of the region.

These processes have been accompanied by the transformation of the region’s knowledge-generating capacity and its ability to share and accumulate knowledge about the Arctic and rapidly exchange and disseminate it. We can clearly see here a growing emphasis on the need for the integration of science, diplomacy, public policy and the evaluation of the Arctic as a new intellectual frontier that lays the groundwork for multi-disciplinary research, innovation in science, “know-how”, technology and policy. “Tools” such as tele-medicine, long-distance education, video-conferencing, satellite operation possibilities, digital democracy and nano-technologies, etc., could all play a part here. Thus far, however, few of these have actually been used; their mere existence nevertheless indicates the potential inherent in such new ways of cooperating or influencing the shaping of the Arctic’s geopolitical framework.

Generalisations are not always plausible as each case-study or specific aspect of geopolitical dynamics requires a detailed analysis and may present its own particularities. It is undeniable, however, that the impact of external factors such as environmental disasters – combined with

the indeterminate consequences of global warming on the Arctic and the current fluctuations in terms of world market prices for raw materials – creates unrealistic expectations in respect of the desire for fiscal independence. This is particularly so when seen in the light of the still prevailing dependence on external transfers. This again has a profound influence on political, economic and geostrategic behaviour.

### **Scope of the book**

This book is limited to a discussion of some of the areas that shape the major trends in the Arctic and in so doing it mainly relies on existing scholarship, documents, reports and other official materials. The forecast of major mega-trends is limited to the *de facto* developments which are already in place or may come to the fore in the near future.

We have identified the following trends:

- increasing urbanisation
- increasing demographic challenges
- fundamental changes in the nature of Arctic economies
- changing environments and changes in the way these are dealt with
- increasing resource exploitation pressures and the emergence of more robust protective measures to counter them
- the continuing need for access to human capital
- the increasing importance of public-private solutions
- the emergence of renewable energy and green economy scenarios
- renewed questions over accessibility
- wider acknowledgement of the Arctic’s position in the new global system

The impact of unforeseen global processes or unexpected developments should also however be taken into consideration. Thus, major trends in Arctic geopolitics have to be seen through the prism of Arctic particularities where the Arctic is seen as a distinct region. Arctic diversity and the specifics of the “High Arctic” environment compared to that of the southern parts of the Arctic states should also be acknowledged here.

It is hoped that this book will be useful for policy-makers from across the region and beyond. Hopefully dissemination of the state of knowledge and information on the various processes of transformation connected with policy, governance and physical and economic evolution in the Arctic will also benefit other parts of the globe.

### **What are MEGATRENDS?**

*Identifying MEGATRENDS is about identifying the development processes that will have a major impact on the future of Arctic societies in a mid- to long term time perspective.*

In a situation where the future cannot, in principle, be predicted it makes sense then to try to identify *trends* in terms of developments over the next five years and *megatrends* attempting to characterise what is presumed to hold for the next 10 to 15 years. Politicians may however make decisions that alter the fundamental conditions. Demographic projections may be revised by rapid changes in the economic fundament or due to fundamental environmental changes. Countervailing actions to the process of globalisation may centre around an increasing focus on local values. Economic reform processes based on increased “marketisation” – the “triumph” of market forces – may be met with the demand for commercialisation to stop.

Thus by combining more general development trends with expected as well as perceived major events which

may influence the development paradigm it is possible to identify and outline general trends which can be determined with varying degrees of confidence.

Megatrends then represent what we can term relatively safe development directions that will undoubtedly change society. They are trends that are deemed so powerful that they have the potential to transform society across social categories (politics, economics, technology, culture, etc.) and at all levels from the individual and local players to global structures. They will change our ways of living and thinking.

Some trends tend to be quite obvious. Worldwide – as well as in the Arctic – the ageing of the population is a well described phenomenon leading to an increasing focus on the problems caused by increasing dependency ratios. But does ageing automatically lead to increasing dependency on pensions, and thus on transfer payments? Or will the ongoing shift from manual to a greater emphasis on intellectual and social labour raise the level of demand for other aspects of life such as acquired knowledge over a lifetime of experiences?

Simply attempting to extrapolate empirically determined development trends may result in projections that are misleading. It has been shown time and again that predictions about future development paths – even by think-tanks and knowledgeable individuals – have been proven wrong primarily because of the inability to predict or foresee major shifts in technological paradigms.

Other trends are less dependent on empirically recognisable patterns and rather more on imaginative “outside the box” thinking. Trends and megatrends are, to a greater or lesser extent, time-bound. They are not as ephemeral as cultural fads but over time they can nevertheless, potentially, change the focus of development.

**Identifying megatrends**

How can we distinguish between “real” megatrends and more or less random events which may at any particular moment in time look important, but in the longer perspective turn out to be just “small ripples in the water”? A generally accepted approach to this problem is to acknowledge that no one definition of megatrends exists, while in addition, it is clear that there is no simple way of reaching a commonly accepted position. It depends very much on the type of questions asked.

The more or less acknowledged procedures can be summarised like this:

- A good kick-off point is a mind-mapping procedure providing a start-up overview.
- A second step can be a structural analysis focusing on long term empirical trends. This serves as a basis for identifying the internal and external elements/factors determining mechanisms of change and adaptation.
- Thirdly, we require a qualitative analysis of expert’s statements on drivers and hypotheses regarding future development within specific fields.
- The mind-mapping approach serves as a fourth step where multiple threats are rationalised into key points and trends.
- And finally, a fifth step generalises these trends into megatrends.

**The process**

The approach utilised in the context of this analysis is a combination of the above-mentioned methods (see vol. 2 for details). It is, on the one hand, based on the empirical identification of the major development characteristics and processes of change of recent decades in order to facilitate an analysis of the dynamics which have caused

the changes and thereby to evaluate the likelihood of events similarly happening in the future.

At the same time major expectations regarding the future of the Arctic which have been identified in research reports, government documents and through the working groups of the Arctic Council provide the other main input to the analysis. The documented as well as *perceived* future development trends each provide an important contribution to the analysis.

A third vital input comes from a group of scientists who are internationally recognised specialists in their fields, and who have provided their individual perceptions of future development paths based on their own research. Their contributions have been cooperatively transformed into the format of this report. They have also been involved in the drafting of the report’s conclusions.

**The entire story... or illustrative cases?**

It is impossible in a megatrend setting to try to cover all possible aspects of life in the Arctic. Major inputs already exist as fragments and more or less completed overviews, such as the *Climate Assessments*, the *Arctic Human Development Report* and the report on *Arctic Social Indicators*. Similarly the findings from the *International Polar Year 2007–2008* are important as more recent inputs to the discussion.

This surfeit of information undoubtedly however causes confusion and is not conducive to the development of a precise understanding of the background mechanisms driving the processes and the changes that are emerging. Many aspects left out of the analysis may be considered by the reader to be important if not vital to fully understanding the development process and its implications. But as noted previously, the intention here is not to predict the details but rather to try to outline some of the major trends that may impact many – and

in some cases most – aspects of life. In this context an approach which opts for a narrower focus on a limited number of cases will be more important than one which attempts to include a large variety of cases in a futile search for “comprehensiveness”

It is through the analysis of the cases presented that the role of specific trends appears, and by combining these emerging trends with other findings taken from the scientific literature, public documents, working group reports and conference presentations, that the megatrends can be identified.

The case studies have been chosen in such a way that each reflects several important aspects of future development in the Arctic, including the environmental, the social, the economic and the cultural dimensions of development.

In several cases the involvement of external competence is included by means of researchers from the Nordic and neighbouring countries. The contributors are listed at the beginning of the report with their original contributions included in Volume II of the report.

### **Generalising the trends/megatrends**

In order to move from the individual cases to a consideration of the general characteristics of the megatrends the cases were originally arranged into a number of overarching themes and in this final overview of megatrends included as cases in the relevant places by means of two processes:

Exploratory; by using past and present trends leading to the description of likely futures

Anticipatory; by analysing predetermined visions of the future, based on the identification of the drivers, actors and trends in the studied system, while by outlining the megatrends consisting of the definition of the hypotheses, a cross-consistency analysis, and the selection and validation of the megatrends can be implemented.

### **From Nordic Cooperation to the Circumpolar North**

Much of the Nordic land area and its surrounding marine waters is situated in the Arctic region. The Nordic countries work together to improve living conditions for populations in the northern areas and to support the Arctic population’s social and cultural development. This cooperation also includes work on protecting the fragile and unique Arctic natural endowment, aiming at ensuring the region’s resources are being exploited in a sustainable way while conserving biodiversity.

Nordic cooperation is therefore fundamentally involved in issues that relate to this unique and vulnerable part of the world. The starting point for the identification and presentation of megatrends should therefore be the policies of the Nordic countries. This approach does not seek to omit the rest of the Arctic, but it does mean that the presented cases etc., will, primarily be based on examples from the Nordic countries, and then supplemented with examples from across the rest of the circumpolar north.





# Urbanisation

Urbanisation refers to the process through which society is transformed from one with predominantly rural characteristics in terms of economy, culture and lifestyle, to one which can be characterised as urban. It usually also includes a process of territorial reorganisation, leading to a shift in the location of inhabited areas while impacting both population size and the types of economic production processes.

Urbanisation is a global trend which will significantly contribute to the shaping of human life in the future. The Arctic region is no exception. According to the UNEP half of the world's population now lives in urban areas, drawing most of their food and natural resources from the surrounding rural areas. And by 2050, eight out of ten people on the planet are expected to be living in cities.

Since the 1960s, most of the population growth in the Arctic has occurred in urban centres tied to industrial activities, social services and public administration. More recently however, since the early 1990s in fact, there has also been a marked change in this pattern of human concentration. As indicated in MAP 1, growth in total population has slowed in North America and Greenland, and population has declined across Arctic *Fennoscandia* and particularly in Russia. The concentration of population to urban settings has however continued, as illustrated by the colours on the map. In terms of the settlement structure in a “step-by-step” process we have seen people gravitate towards ever larger places. Differences are marked, however, with major parts of the population living in settlements above 50,000 inhabitants in several of

#### MAP 1: POPULATION CHANGE IN THE ARCTIC SETTLEMENTS IN 1990–2010

The map provides an overview of all settlements in the Arctic, with a focus on population change during the period 1990–2010. All settlements with less 5,000 inhabitants are shown as dots while settlements with 5,000 or more inhabitants are shown as circles with an area equivalent to the population number. The colours indicate the changes, with yellow showing places where no changes have taken place, while red indicates those places with a declining population, and blue places with a population increase. The insert shows a map of the northern part of Scandinavia (plus Finland and the Kola Peninsula) where the settlement density is highest.

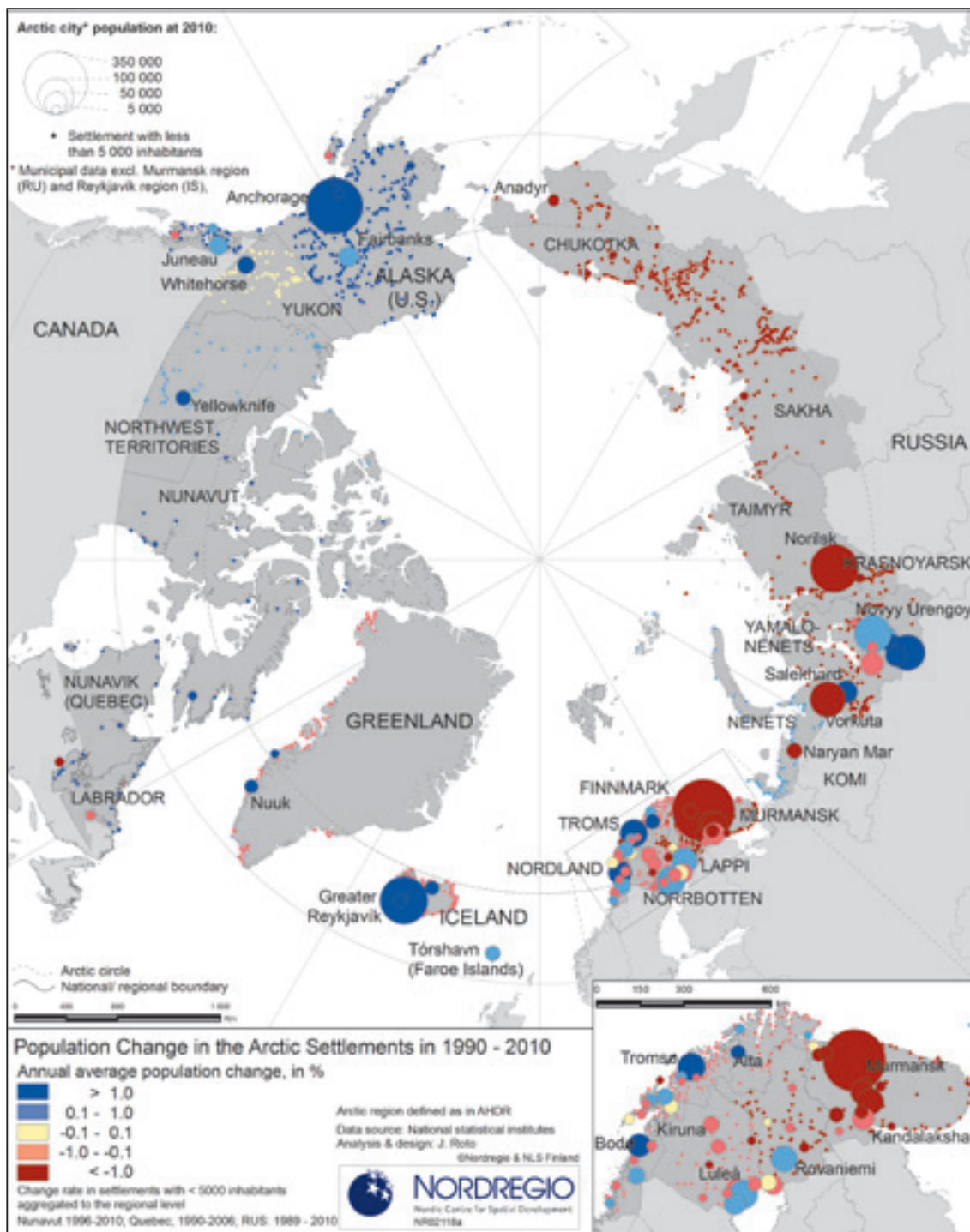
The map highlights the complex nature of the pattern of change and, in addition, that there is a marked divide between regions.

Most of the smaller places in *Fennoscandia* and Russia have been declining markedly in size while a substantial number of the larger places have also suffered the same fate. Changes in the demographic parameters especially in terms of declining birth rates have been a major factor here though out-migration from smaller to larger places, and continued migration out of the region as a whole have also been important here.

The places which have experienced major growth in *Fennoscandia* and NW Russia are places where educational opportunities are available. Similar patterns are shown in the North Atlantic region where Thorshavn, Nuuk, Sisimiut and Thorshavn have been the big receivers, while most of the smaller places have experienced a decline.

In the Western part of the Arctic a few of the smaller places and most of the larger places have experienced population growth while the remainder of smaller places have experienced either moderate growth or decline. There are differences in the reasons for growth. In Alaska in-migration is an important factor, just as the still relatively high birth rates contribute to growth in even the smaller settlements in spite of the fact that out-migration plays an important role here also. A similar situation is experienced in the Canadian territories, although with a different weight on the various parameters involved; Yukon and NWT with in-migration contributing while high birth rates remain important for Nunavut, Nunavik and Labrador.





the Nordic Countries, north-western Russia and Alaska, while still essentially rural populations predominate in Eastern Russia, the Faroe Islands, Greenland and the Eastern Arctic regions of North America, as shown in Map 2. The latter map, however, uses 5,000 inhabitants as the dividing line between urban and rural places. In reality the larger segments of the population in these regions are however clearly to be found in urban settlements according to the available national classifications.

Although the indigenous population has grown at a rate of about 1.5% annually, its share of total population has declined. Consequently, indigenous peoples have become ethnic minorities in all Arctic regional government jurisdictions except Greenland and portions of Canada (Nunavut and the Northwest Territories—NWT). It is expected, however, that non-indigenous population growth in NWT could soon make indigenous peoples a minority there, too, probably within a decade or so. And as discussed in box 2, there are various reasons why newcom-

ers may prefer to stay. Previously the choice of settlement – urban or rural – used to differ between indigenous and non-indigenous groups, among other things due to differences in the choice of vocation and economic activities. The current trend of concentration in urban settings has now become common for both groups, just as economic activity tends also to lead to homogenisation.

Urban life remains one of the distinctive characteristics of Russia's settlement pattern in its far north, with nearly 80% of the country's northern population living in urban environments. Other countries exhibit similar trends, often with sharp disparities by age and gender. The pace may differ in different parts of the Arctic, but the trend is the same!

People move for many reasons, often attracted by the promise of work, higher salaries and a better social life, as urban areas usually offer better opportunities, a diversity of economic activities and more options for education and social networks. At the same time cities are often charac-

## MAP 2: POPULATION IN CITIES AND RURAL SETTLEMENTS IN 2010

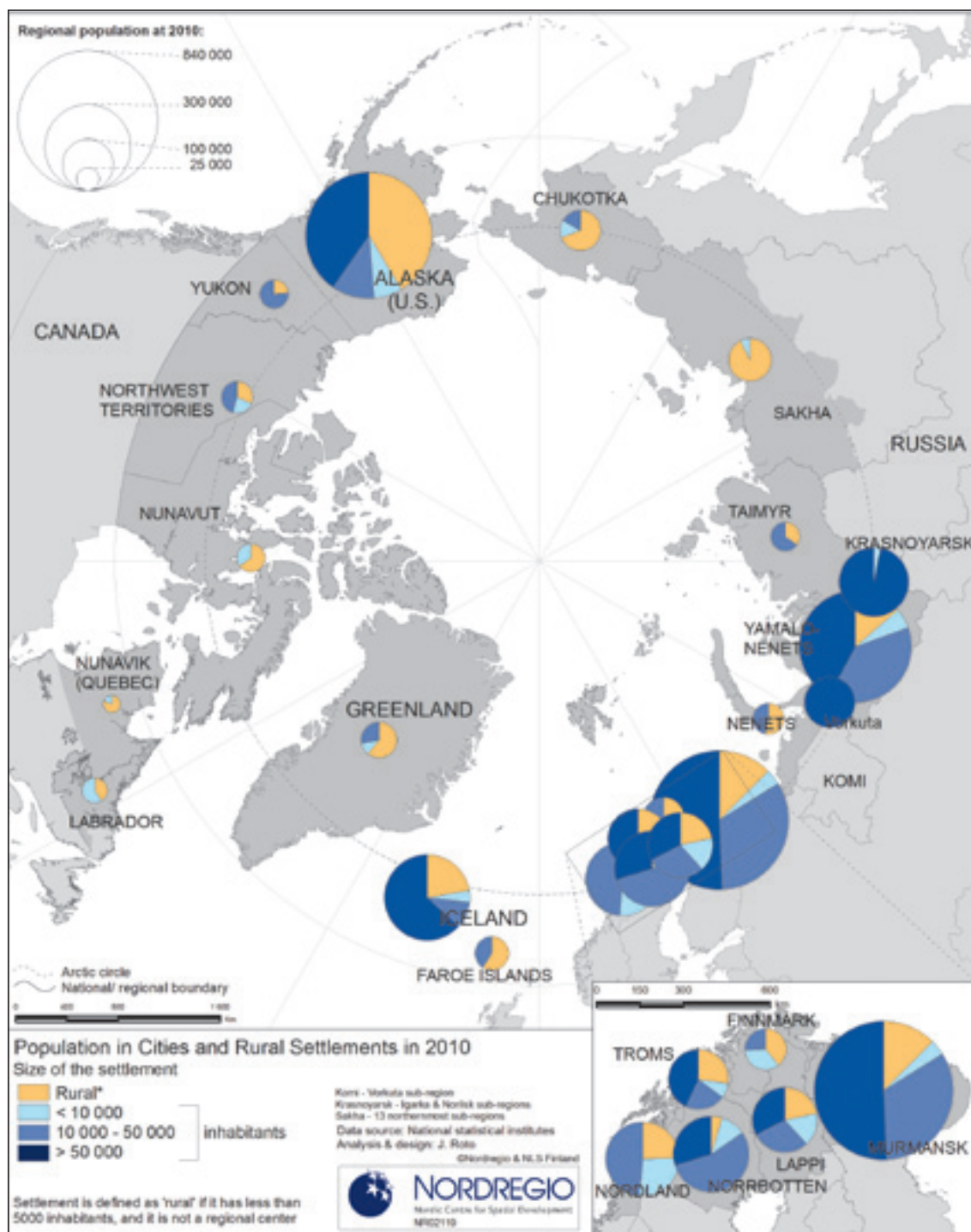
The map provides an overview of the role of different settlement sizes in the Arctic. The settlements have been subdivided in groups of less than 10,000 inhabitants, 10,000–50,000 inhabitants, and more than 50,000 inhabitants, with shades of blue indicating these three groups. At the same time settlements with less than 5,000 inhabitants and not defined as a regional centre are characterised as rural population. The size of the circles is relative to the total population in the regions.

While Alaska, NW Russia, Fennoscandia and Iceland are characterised by

cities with more than 50,000 inhabitants constituting a substantial part of the total population, the NE part of Russia, Canada and the remaining parts of the North Atlantic region have no settlements of that size. The highest concentration of population in large settlements is in Iceland, followed by the Kola Peninsula and Alaska. In the other regions with this size of cities the share is around 25%.

In the regions without larger settlements the share of rural population is instead very high. The largest share of rural population is in Sakha and

Nunavik, between 80 and 90%, but it is also very high in Nunavut, Greenland, the Faroe Islands and Chukotka. These regions are instead characterised by a relatively large part of the population living in rural environments, Sakha with around 90% of the population, followed by Nunavik with around 80% in such circumstances. In Nunavut, Greenland, the Faroe Islands and Chukotka the rural population constitutes more than 50% of the total population according to the definition used.



terised by social stratification. While they can be viewed as hubs in the economic development of their regions they also potentially foster social inequality. In addition, worldwide, cities consume two-thirds of the world's total energy output and produce over 70% of global energy-related CO<sub>2</sub> emissions.

### Distinguishing between rural and urban

The two concepts – rural and urban – are often used without precise definitions. In many cases it is also difficult to determine whether an area could be considered urban or rural. The contrasts of high versus low population density are of course considered indicative, but what actually

#### BOX 1: DEFINING URBAN AREAS



- In Norway a densely populated area is a settlement with more than 200 people and less than 50 metres between the houses. An agglomeration with more than 200 people is registered as an urban settlement.
- In Sweden a locality consists of a group of buildings normally not more than 200 metres apart from each other, and having at least 200 inhabitants.
- In Finland all clusters of buildings with at least 200 inhabitants where the distance between buildings does not exceed 200 metres are defined as sta-

tistical localities. In defining localities, residential, business, office and other buildings used as workplaces are taken into account. Administrative regional divisions do not influence the definition of localities.

The problem of determining the precise boundary of settlements has meant that, since 1989, statistics for settlements have not been generated. Instead municipalities have been divided into three categories:

- Urban municipalities where at least 90% of the population lives in urban

settlements or where the population of the largest urban settlement is at least 15,000.

- Semi-urban municipalities have at least 60% but less than 90% of the population living in urban settlements. The population of the largest urban settlement is at least 4,000 but less than 15,000.

- Rural municipalities, where less than 60% of the population lives in urban settlements. The population of the largest urban settlement should be less than 15,000. Also included in rural municipalities are those where at least 60% but less than 90% lives in urban settlements and in which the population of the largest settlement is less than 4,000.

- In Iceland the Urban nucleus is a town, village or other area within a municipality where inhabitants live in houses standing in the vicinity of one another. The urban nucleus either has its own name or is considered one in the area. Urban nuclei with 50 persons or more are accounted for. Also urban nuclei which previously had 50 persons or more or may reach 50 persons in the foreseeable future will be included.



constitutes a high density here? This very much depends on the overall situation, and often relates to the activities taking place. Three types of criteria generally distinguish between rural and urban situations: the number of inhabitants; the ratio of inhabitants to open land; and the type of economic activity being undertaken. Looking

more closely at the pan-Arctic situation, however, a problem clearly emerges in that different statistical criteria for rural and urban populations are in use. In the Arctic countries various demographic criteria are used with the main definitions outlined in box 1, all according to the national statistical offices.



To comply with statistics in the other Nordic countries, in 1960, Statistics Iceland introduced the notion of the degree of urbanisation. Localities with 200 inhabitants were urban if nothing else was specified.

- Greenland has no clear definition of urban versus rural as all people are live in settlements of different sizes. There is a difference between towns and villages, which was based on their functions. All municipal centres were towns and all other settlements were villages, independent of size. Conse-

quently some of the minor towns were smaller than the largest villages. After the recent municipal reform where the previous 18 municipalities have been clustered into 4, places which used to be characterised as towns have maintained their definition in spite of the fact that they are no longer municipal centres.

- In Russia, people residing in cities/towns and urban-type settlements are considered to be "urban". The city/town/urban-settlement designation means that the majority of the popula-

tion is employed in areas other than agriculture. The exact definitions vary from one federal subject to another.

- Canada consider urban to be continuously build-up areas having a population concentration of 1,000 or more and a population density of 400 or more per square kilometre. To be continuous, the built-up area must not have a discontinuity exceeding two kilometres. Commercial, industrial and institutional areas can also be considered urban even if they do not meet the population and density requirements, including railway yards, airports, parks, golf courses and cemeteries. Rural areas are sparsely populated lands outside urban areas, i.e. outside places of 1,000 people or more, or outside places with population densities of 400 or more people per square kilometre.
- Alaska follows the U.S. Census Bureau definition of an urban area as: "Core census block groups or blocks that have a population density of at least 1,000 people per square mile (386 per square kilometre) and surrounding census blocks that have an overall density of at least 500 people per square mile (193 per square kilometre)."



As indicated in the definitions of urban versus rural areas the settlement characteristics in demographic terms is the most common approach used. In the case of Russia other issues also need to be taken into account, including the economic structures that characterise the place in question. In distinguishing between places issues such as cultural characteristics, service functions, education opportunities and, last but not least, the question of differences in lifestyle, are important.

Settlements depending on land use activities related to the exploitation of renewable resources and with limited industrial activities may be perceived as rural. Contrary to this the availability of industries, a variety of services, access to childcare, kindergartens, schools, medical institutions and universities and research centres are indicators of urban settlements.

In the current context the notion of urban and rural seems to be changing rapidly. While rural societies often are stereotyped in terms of their strong adherence to farming, fishing and hunting, and marked with a high regard for tradition, this may be contrasted with urban areas often typified by alleged impersonal bureaucracy, rationalised specialisation and mechanisation, at the same time however they are also characterised by individuals involved in different social networks, with the option to choose between different jobs and the ability to enjoy a larger variety of cultural opportunities. And this is contrasted by the perception that the rural perspective may be bleak and without significant options for choice and individual behaviour.

Agricultural, hunting and fishing communities are shrinking in terms of population while their economic and cultural relevance is slowly vanishing (See box 3). In many instances immigrants are hired to keep the fishing and agriculture industries alive. In their place many new economic initiatives are developed based on enclave arrangements, for instance in connection with

the establishing of mining and other extractive activities, either with the population staying for a defined and finite period of time, or through on/off working arrangements, generally, two weeks on/ two weeks off (See box 2). In these circumstances the old notion of “the rural” as culturally pure and nationally original quickly becomes obsolete. At the same time economic rationality and the “technologisation” of the human condition; international pop-culture, mass media, the Internet; genetic technologies increases. The transition from urban to rural is not abrupt, but gradual (the rural-urban fringe). And while the above criteria may be helpful in order to separate distinct urban and rural societies, they are not sufficient for societies in the rural-urban fringe, just as increased mobility and access to communication adds to creating more equal characteristics of lives in urban and rural settings. This, for instance, applies to societies where we both have people making a living from traditional rural occupations and people commuting to jobs in urban areas.

Another example is societies which due to centralisation and urbanisation processes have experienced growth, with a corresponding expansion in labour opportunities due to the expansion and decentralisation of some public services and institutions, which in turn has led to a strengthening of local trade and industries. Here we can talk of ongoing urbanisation processes in rural societies.

Iceland, and the Arctic fringe of Norway, Sweden and Finland as well as parts of Alaska and western Russia may be characterised as rural regions with urban and rural-urban enclaves. Accessibility and interaction are keywords in this connection while the notion of urban fringe areas is also central.

In other parts of the Arctic – for instance parts of Russia and Alaska, Canada, and Greenland – the settlements are more or less islands, year round only accessible by

## BOX 2: WHEN PEOPLE DON'T WANT TO LEAVE



The settlement of Fermont in Northern Quebec is a place named after the economic activity, namely the mining of iron. Created initially by a mining company to house its employees, Fermont is very special due to the main building – the wall-screen – built to protect the town from the northern winds. Actually, the building is more than one mile long. Protected by the large construction one finds a whole village for 1,600 employees and their families, swimming pool, school, restaurants, sports facilities etc. Basically it permits residents to live most of their 7-month winter life indoors. The designers of Fermont were inspired by similar projects in Svappavaara iron ore mining town by

architect Ralph Erskine, close to Kiruna in Sweden.

*Québec Cartier Mining Company* was founded in 1957 with their first open pit mine at Lac Jeanine. To accommodate the workers and their families they established the town of Gagnon in 1963. In 1973, they started operating in Mont Wright, Quebec, where they built Fermont. It is located 25 kilometres east of the mine. The company also has operations at Port Cartier. The two places – one in inland Quebec, and the other on the north shore of the Saint Lawrence River – are connected by one of the biggest private railroads in Canada, the 400 km Cartier Railway.

In the 1980s Gagnon was closed,

the mine no longer profitable, and the population moved to Fermont and Port-Cartier. A similar development was supposed to take place in Fermont. The original plans showed an expected closure in the late 1990s with the population to be resettled. Objections from the inhabitants, however, created second thoughts among the administrators! In 2006, *ArcelorMittal* (the world's largest steel maker) purchased *Quebec Cartier Mines* and decided to maintain the iron activities.

Fermont has, due to its very special construction, become an attraction in itself as indicated on the advertisement below:

*"ArcelorMittal Mines Canada (Mine de Mont-Wright) Fermont, Region: Duplessis; Category: Industrial tour. This mining company invites you to explore the fascinating world of the Mont-Wright mine, the largest open-pit mine in Québec. Discover the secrets of iron ore extraction and the concentration process and see up close the mechanical giants used to survey the deposit and experience an amazing outdoor adventure!"* (<http://members.virtualltourist.com/m/p/m/f4bbe/>)

### BOX 3: ABANDONED AND RESTORED VILLAGES

Kangeq is a former settlement in the Sermersooq municipality in south

western Greenland. It has, on-and-off, been inhabited based on the availability



of hunting resources. At the beginning of the 20th century it was established as a fishing village, but abandoned in the late 1960s. The reason was to a large extent connected to the expansion of commercial fisheries and the establishment of the fishing industry in the nearby town of Nuuk. It was an example of the first wave of urbanisation in Greenland, based on the colonial governments' intention to modernise the economy and the housing conditions. Most of the houses in Kangeq are still standing. Some of them have been renovated and serve as leisure-houses for some of the inhabitants in Nuuk. Through this the once abandoned village of Kangeq may be in the process of being revitalised. The village of Qoornoq further into the fjord area around Nuuk is another such example. The village was established in the 19th century and expanded with the thriving cod stock after the warming period took off in the 1920s. The village was formally abandoned in 1971, but already in 1972 the place was made into a summer settlement with houses to rent. In this way the houses were maintained. The organisation "Qoorngooq's Friends" was established in 1991 with the goal of restoring and maintaining the houses worthy of preservation. Qoornoq church had had most of its interior removed when the building was abandoned, and was not being maintained until the Municipality of Nuuk gave permission to restore it in 1993.

airplane or boat thus generating an altogether different notion of rural versus urban attributes.

### Consequences of urbanisation

Even if definitions of what is and what is not “urban” differ from one country to another the interpretation of what the designation urban implies remains quite similar. It is clear that urbanisation entails a complex set of processes, not only in where people live and what they produce, but in who they are, *how* they live in terms of economic well-being, political organisation and the distribution of power, demographic structure (e.g. fertility), and social (and family) relations. All this adds to the distinguishing characteristics separating urban and rural lives in the Arctic, not as an abrupt change from one day to the next, but evolves through a time span. Often the changes in demographics are characterised as a “demographic transition”. A similar model may be applied to the differences in demographic structures and urbanisation in the Arctic, as illustrated in box 4.

Families are becoming smaller as fertility rates decline. The proportion of smaller, non-traditional households is growing and is transforming societal organisations, the role of the family, demographic structures, the nature of work and the way lives are now lived. It also redefines the concepts of individual and social responsibility, and is frequently related to a change in the status of the family, and with the proliferation of non-traditional family forms and new types of households.

Large families have long been a hallmark of Arctic communities and for decades the pattern prevailed in the urban settings. But during the last decade families have become smaller quite quickly, not only because parents have fewer children on average, but also because the extended family typical of rural settings is becoming less common in urban areas. And with the younger population moving to cities the result tends to be similar pat-

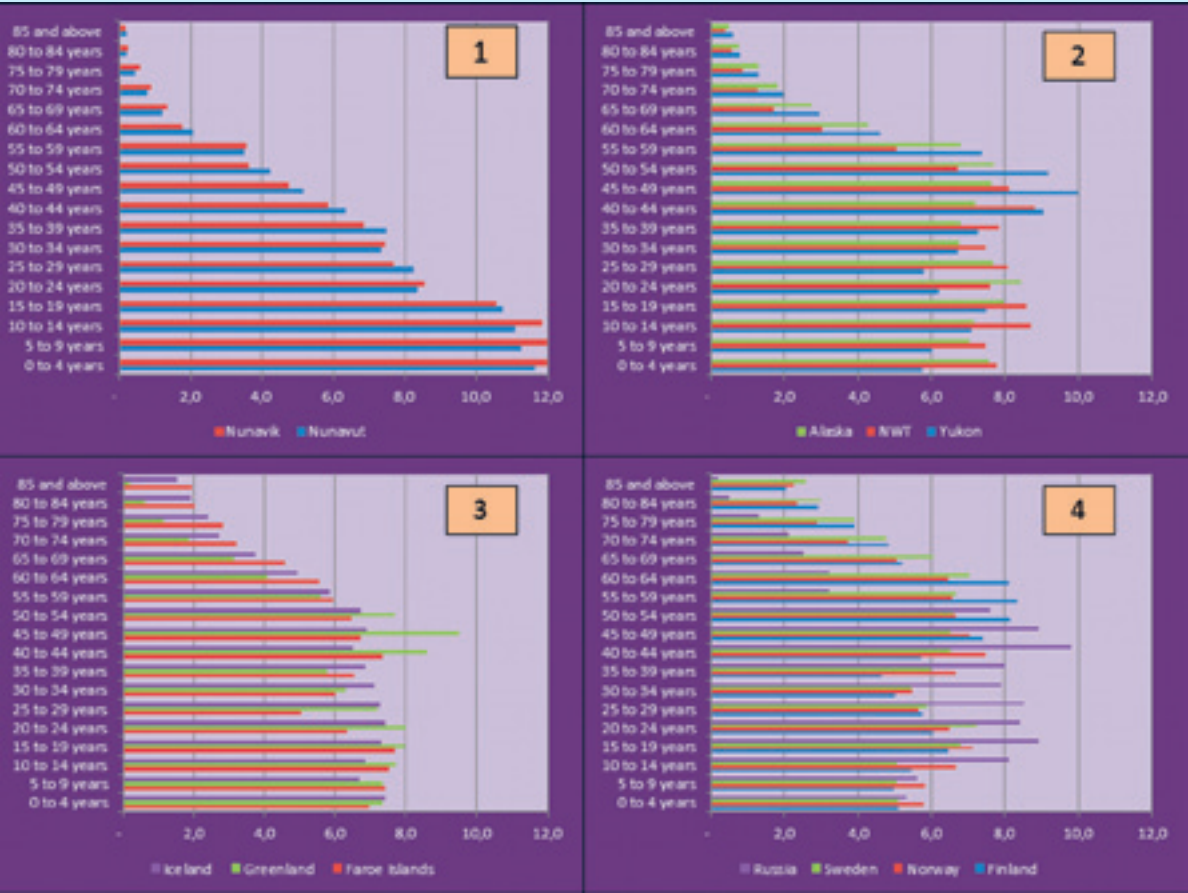
terns in the villages. These changes have been promoted by many causes, including rising incomes, higher divorce rates, lower marriage rates and alternative lifestyles.

And in the urban setting the highest propensities to form separate households are to be found within two principal groups: the young and the elderly. The former includes young people looking for education, later on forming families, but seldom resulting in single parents. And in the case of the elderly separate households have been facilitated by increased longevity and improved health and social benefits (See again box 4). While in previous generations – and still in many rural societies – many of these individuals would have shared accommodation, in the Arctic often as part of extended family groupings. Again, however, mobility, accessibility and longevity as well as being economically and socially active contribute to the new patterns.

The result is that average family size is now less than four persons while average household size is fewer than three, a pattern that resembles most of what is characterised as “the developed world”. Moreover, due to the out-migration of the younger people from the smaller villages to the towns the average household size has declined even further in the smaller places.

The composition of families and households influences the changing well-being of the individuals in households as well as the occupational status of its members. This diversity in living arrangements and family composition contributes to the linkages between living arrangements and work, not least due to changes in economic activity. Historically women always had full-time jobs in pre-urban societies related not only to maintaining the household but also to ensuring the basic economic survival of the family such as the preparation of skin for clothing, for sale, etc. With the shift in the economy, often ascribed to the urban situation, however, much of that work became marginalised as domestic (and unpaid) work. And as a

BOX 4: AGEING POPULATION AND CHANGING HOUSEHOLDS



In recent decades the population structure in the Arctic has experienced dramatic changes. Longer life expectancy, reduced birth rates, and the concentration of the population in larger settlements are among the most important changes here. The first three pyramids show characteristics from different parts of the Arctic, but at the same time

also different steps in the process the Demographic Transition. While the first pyramid shows regions with a greater percentage of children and a smaller percentage of older people, the second pyramid indicates the situation where a decline in births and an increase in the older population shows a transition towards the third situation – an age bal-

anced population. While the first pyramids show a situation characterising the smaller and more isolated settlements with larger families, the last stage is a common characteristic of the urban population. A high level of outmigration of younger people, is illustrated by the fourth pyramid



consequence the participation rate of the population in the labour force has increased.

The decline in average household size has tended to disperse the incomes of consuming units among several individuals instead of retaining them within extended family groups, resulting in a situation where there is more than one wage earner per household – and very often more than one wage earner needed in order to ensure coverage of the family's living costs. As a consequence of these changes in family composition and in the structure of the labour market there is now a risk of deeper polarisation in economic well-being among urban populations, for example between households with two or more workers and those with none.

These labour market and household changes are inter-related with the social relations both in relation to the community and with shifts in domestic relations inside the household and the family. It is most obvious how the changes have impacted the lives of women, both in relation to the labour market, and in their economic position within the family. Women have however gained greater autonomy in terms of decision making, which is perhaps among the most important factors in the present development of settlements. For many women, however, the challenge of balancing work, domestic responsibilities and the imperatives of everyday urban life, have increased, not decreased! It has also been emphasised how the dispersion of extended families in contemporary urbanised societies have added to the reduction of the level of kinship support systems available to these women, establishing the need for other alternatives, as illustrated in box 5.

### Health challenges

It is generally recognised that the health of the Arctic populations has greatly improved over the last 50 years. This is based on a combination of improved housing condi-

tions, a stable food supply and increased access to a wide variety of goods combined with a decrease in morbidity and mortality from various diseases due to improved health services. At the same time, however, the globalisation of the Arctic economies has been accompanied by improvements in the Arctic transportation infrastructure which has increased the general level of vulnerability, for instance, to many infectious diseases such as influenza, SARS and multi-drug resistant tuberculosis. Also environmental pollutants such as mercury and other heavy metals, PCBs, DDT and other organo-chlorines and dioxins which originate in the mid-latitude industrial and agricultural areas of the globe, are increasingly being concentrated in the Arctic as a result of atmospheric, river and ocean transport.

These substances appear in local food sources being a substantial part of the diet in rural areas.

As in most of the developed world also in the Arctic so-called "lifestyle" health problems have increased. Adding to this has been the change from economies that are highly dependent on subsistence hunting and gathering to a more Western-oriented diet as well as smoking, alcohol and drug abuse associated with increases in modern diseases such as obesity, diabetes, cardiovascular disease, and cancer. Also increasing rates of child abuse, alcohol abuse, drug abuse, domestic violence, suicide and unintentional injury contribute to unsatisfactory living conditions, especially for the vulnerable groups of the population such as women, children, and often also the elderly.

As a consequence, life expectancy is lower and infant mortality higher in the Arctic than in Western Europe and North America, especially for the Arctic's indigenous residents. In recent decades modern lifestyle-related health problems have however been met – especially by the younger and wealthier part of the population – with an increased focus on healthier habits such as consumption

## BOX 5: URBAN SHELTERS



According to the 2004 General Social Survey (GSS) in Canada, residents of the territories were three times more likely than provincial residents to experience violent victimisation such as sexual assault, robbery or physical assault. Police reported crime rates in the territories to be substantially higher than rates in the rest of Canada. Specifically, in 2005, crime rates in the North were over four times higher than rates in the provinces. The statistics also clearly show a gender divide in experiences with violence. Between 1975 and 2004, spousal homicide rates in Nunavut, when calculated as a rate per 100,000 couples, were 7.3 for women and 3.6 for men, the highest of all three territories (GSS 2004). According to the Statistics Canada report *Measuring Violence against Women: Statistical Trends 2006*, rates of violence experienced by women in the three territories were 12% compared to 7% in

the rest of Canada. In order to protect the victims of abuse shelters have been established in many of the larger towns.

The report also found that:

- Some 54% of aboriginal women report the most severe and potentially life threatening forms of violence, compared with 37% for non-aboriginal women;
- Where the rates of spousal violence are much higher in the territories than in the rest of Canada, the severity and impacts of spousal violence are also greater;
- 28% of women in Nunavut are victims of spousal violence compared to 7% in the provinces;
- Police report higher rates of violent crimes in the territories, including sexual assaults and spousal homicides;

- *Per capita* rates of shelter use are much higher in the territories than in the provinces, with Nunavut having the highest shelter usage: shelter use in Nunavut on a single day was a staggering 10 times higher than in any of the provinces.

The 2004 Nunavik Inuit Health Survey reveals a significant sexual violence problem in that region. Some 32% of adults stated they were forced or had faced attempts to force them to perform a sexual act during childhood or adolescence, and 20% stated they encountered the same problem as an adult. Among women, half indicated they had been victims of sexual assault or the victim of attempted sexual assault when they were a minor and one-quarter had encountered the same problem as an adult. The report adds that “Violence against men must not be ignored: 16% had encountered this problem when they were minors and 13% as adults.”

In the northern Canadian town of Iqaluit, women are eight times more likely to be victims of domestic violence than the average of Canada. The following web link provides readers with further insight into how Arctic women are supporting each other at Qimaavaik (Inuktitut for “A Place to Run To”) — a safe haven for abused women and children. Through peer support and counselling, they are building self-esteem and healing wounded spirits.

<http://www.explore.org/videos/player/arctic-a-place-to-run-to>

of local and imported organic products and reduction in smoking and drinking as well as increases in exercise and other sporting activities (see box 6).

### **Climate change impact on urban/rural communities**

Climate change affects many Arctic rural communities. Even if data is scarce we nevertheless seem to be witnessing an increasing number of extreme weather events which can impact health and mortality. These events include storms, floods, and unexpected changes in temperature.

A further problem, however, is connected to the changes in bacteria due to changes in temperature, resulting in situations where traditional methods of conservation in respect of meat and fish may be inappropriate. In addition, the possibility of mutations in bacterial and viral diseases may result in the constraining of access to quality water sources. This may lead, especially in connection with sanitation failures, where changes in the permafrost and through storm surges may be responsible for damage that eventually impacts the living environment including the traditional food supply chain, eventually to greater human exposure to such risks. Moreover, there are indications that the projected warming may affect the transport, distribution and behaviour of contaminants, which may eventually lead to further threats to the safety of the population.

Rising temperatures are already changing the Arctic coastline and more drastic changes are expected to have a significant impact over the coming century, especially in those settlements unprepared for such changes. It has already been recorded how reduced sea ice allows stronger waves to form, increasing shore erosion. This may not have been a problem previously but thawing permafrost and rising sea levels now clearly entail significant impacts.

In recent years the impact of warming along Arctic coastlines has been reported, bringing forward examples of towns and industrial facilities which are already suffering severe damage and facing relocation. Among these examples highlighted by the press are the Alaskan village of Nelson Lagoon where sea defences were built to protect the shore from storms. But with the increasing temperatures the shore ice has melted and the protective walls have repeatedly been destroyed by increasingly violent coastal storms.

Similar experiences can be related from Shishmaref, a village on an island off the coast of northern Alaska, where the rising temperatures have reduced sea ice and melted the coastal permafrost. In consequence, the coast has been exposed to erosion by storms which have eventually come to threaten homes, the water system, and other infrastructure appliances, as well as access to hunting grounds.

In the Canadian town of Tuktoyaktuk, which is the only permanent settlement on the low-lying Beaufort Sea coast, erosion has threatened cultural and archaeological sites just as it has forced the abandonment of an elementary school, housing, and other buildings. How bad the situation may become is yet to seen, but as warming continues and the rise in sea-levels accelerates, some expect the place ultimately to become uninhabitable.

And finally, at Varandei, a barrier island in the Pechora Sea, an oil storage facility has been damaged due to coastal erosion which has accelerated recently, supposedly due to changes in climate. This has resulted in the site becoming more vulnerable to storms and rising sea levels.

The above examples illustrate how sites related to human activity may be more vulnerable to the impacts of climate change, and would require preventive measures



to be taken in order to avoid damage that may become life threatening for the population.

While smaller villages seldom have the means to establish such measures, the larger settlements may be in a better position in relation to access to the necessary

means, including funding. But this does not take away the seriousness of the situation and the fact that both urban and rural lives are exposed to the risks caused by a changing climate!

#### BOX 6: URBAN LIVES WITH OR WITHOUT A LINK TO TRADITIONS



Self-sufficiency and self-reliance have been a traditional part of the Arctic food supply process. Changes to consumption patterns started when the Europeans invaded the region. During the 1950s and 1960s a much larger variety of food

products were introduced. In particular, the introduction of supermarkets during the 1970s had serious consequences for consumption patterns. The main items available in the supermarkets are in many parts of the Arctic only imported food,



and the abundance and relative variety in supply has over time supplanted many of the traditional food items. Restrictions on the commercialisation of country/local food have limited its distribution as well as its availability to households that for



ucts are also available in local marketplaces or sold outside the supermarkets as an important supplement to incomes.





# The demographic challenges



Major shifts in the demographic structures of the Arctic are currently taking place and indeed have been underway already for a number of decades. Birth and death rates as well as changes in migration patterns are clearly influencing the development perspectives for many communities. Moreover, the impact of globalisation on everyday life simply adds to the complexity involved in predicting future population trends. The combination of ongoing changes in age group dependencies, which see an ever diminishing number of people in the active workforce, a generally ageing population, and the ever increasing number of qualified persons – especially women – looking for job opportunities in the non-traditional sectors, constitutes a serious problem for many communities. While map 3 highlights the primary challenge – societal ageing – map 4 illustrates the dynamics behind this phenomenon. On the one hand a general pattern of decline in the younger age groups can be discerned while at the

same time a marked increase in the older age groups can also be seen.

An increasing level of interaction with labour markets outside the Arctic has however been developed. In the European Arctic male workers arrive from East European countries and Poland in particular. In Russia, Canada and Alaska the new males come from the “south”. In terms of female workers the majority come from Thailand and Indonesia. This creates a much higher level of diversity in community structures. There is also a need for management approaches able to cope with more diverse social situations including questions of indigenous/non-indigenous and permanent/temporary inhabitants.

Changes in demographic structures worldwide are among the major forces influencing the restructuring of societies and are among the most important factors in the Arctic context likely to precipitate change in the coming decades. Some of the factors were discussed in the AHDR

### MAP 3: POPULATION OVER 64 YEARS IN THE ARCTIC REGIONS

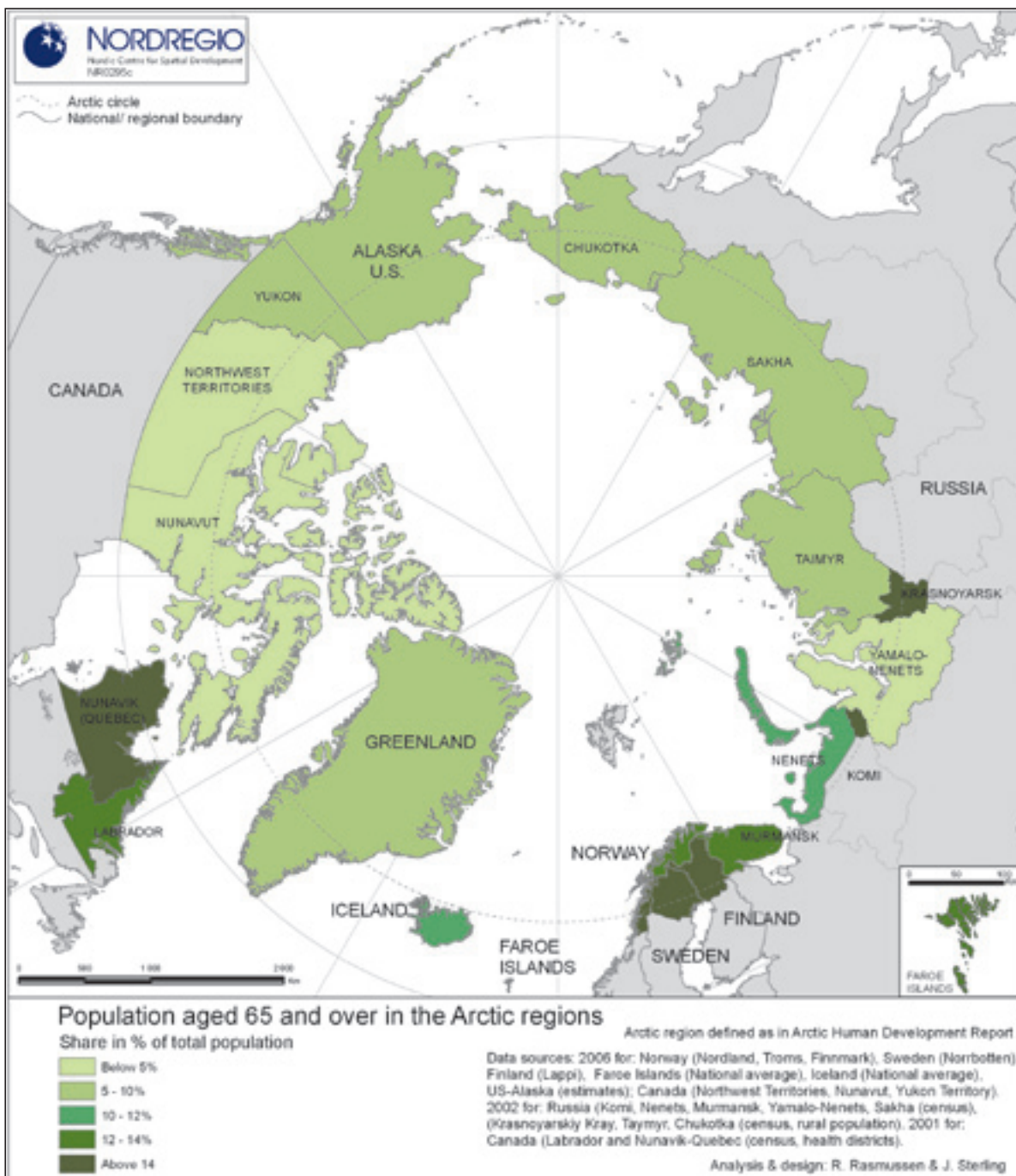
The map shows the share in percentage terms of the population above the age of 64 years as of 2006, and the colours subdivide data into five intervals: the lowest interval showing regions where this age group is below 5% and the highest interval where this age group is above 14% of the population.

The map illustrates an important trend in the Arctic, namely the ageing of the population. Due to longer life expectancy as a consequence of better living conditions, improved housing, better medical services, improved accessibility to hospitals and policlinics, a still larger

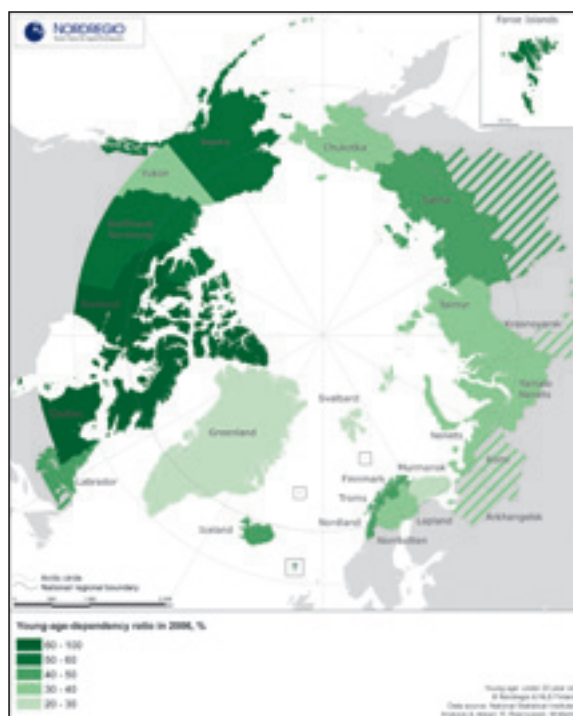
part of the population are moving into what is often considered as the pension age. The largest share is to be found in the Nordic Countries where this process of ageing has been part of the political agenda for the last decade. In parts of NW Russia, for example Krasnoyarsk, this process has also been ongoing for some years while Nunavik and Labrador show levels at the high end of the scale, Nunavik above 14% is similar to Northern Sweden and Finland.

A number of regions, however, remain at the low end. The lowest level – below 5% – is to be found in Nunavut and NWT

in Canada, as well as in the Yamalo Nenets region in Russia. Even though these low level regions can still be found, the general trend of ageing will undoubtedly become something of a common characteristic for the Arctic in the years to come, thus also becoming a potentially significant economic challenge due to the increases in dependency ratios, i.e. how many persons in an increasingly large group outside the labour force should be covered by incomes generated by an increasingly smaller group of persons in work.







(Arctic Human Development Report), and in identifying the social indicators (Arctic Social Indicators) that it is important to monitor in order to get a good idea of the likely parameters of social change. An important element here is the level of infant mortality, as this helps illustrate different aspects of the ongoing social changes experienced, namely, changes in economic performance and the impact on reproduction rates.

The paths which seem to be being followed in the Arctic point in the same direction, only the speed of change differs depending on where the regions are situated in relation to what is referred to as the “demographic transition”. The net results seen in the perspective of recent decades are not too promising, as indicated in box 7 showing the evolution of the population during the period 1990–2010. Parts of the Arctic display a stable situa-

#### MAP 4: DEMOGRAPHIC CHARACTERISTICS OF THE ARCTIC

The map consists of four sub-maps, each providing important information in relation to the demographic characteristics of the Arctic.

The upper left corner map shows the young age dependency ratio, i.e. how many persons below the age of 20 are there, per person, in the workforce, here defined as persons in the age group 20–64 years. Often a selected dividing age between young persons and those in the workforce would be 15 years, but due to the fact that many young people now pursue an education they will be dependent on others for a longer time. By means of the differences in colour five groups are distinguishable. At the high end in dark green are those with a young age dependency ratio of above 60, meaning that for each 100 persons in the workforce aged between 20 and 64 there are 60 or more youngsters dependent on them. At the low end the ratio is down to 20–30, meaning that the group of children and young people is very small, primarily due to drastic declines in birth rates witnessed in recent decades.

As indicated on the map there is a clear divide between North America and

the rest of the Arctic, with only minor exceptions existing to this general rule. As birth rates are still high, and in-migration to Alaska contributes to the group of young persons, the dependency rates are still very high. The exception from this pattern is Yukon with a dependency rate similar to *Fennoscandia*. In Russia, *Fennoscandia* and Greenland birth rates have declined considerably in recent decades, resulting in marked lower dependency rates compared to North America. Deviations from the pattern can be seen in Iceland, parts of Norway, and Sakha.

The mechanisms behind the differences are partly seen on the lower left map, showing the evolution of the population below 20 years old for the period 1991 to 2006. No regions have experienced an increase in the relative share of this age group, and the highest level of decline has taken place in NWT with an annual decline of between 4 and 5%. So the most drastic declines have been experienced in some of the regions with the highest young age dependency rates. The map shows that in spite of the current marked differences in dependency rates, the process of change is

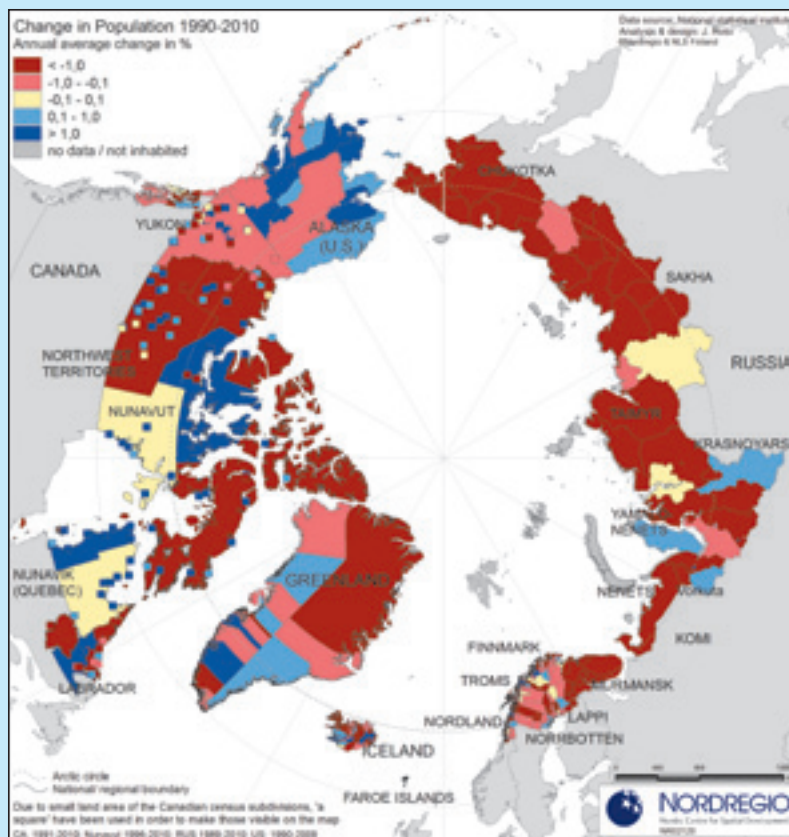
moving in the direction of rather similar patterns in the Arctic in this respect. The upper right hand map shows the old age dependency rates as of 2006. As noted previously the numbers indicate how many persons above the age of 64 are dependent on those in the workforce, i.e. in this case persons from 20 up to 64 years of age. While most parts of the Arctic are in more or less similar situations, the Nordic Countries, NW Russia and Yukon in particular find themselves already in situations with rather high dependency ratios. As is the case with young age dependencies, the process in the Arctic contributes to changes moving the Arctic region as such much closer to the prevailing situation in the Nordic countries. The latter is confirmed by the fourth map in the lower right hand corner showing the evolution of changes in the population aged 65 and above. Contrary to the situation with the young age group where all regions experienced decline, almost all regions are experiencing increases here – and for some quite high levels of increase – in this age group. The only regions with decreases are those in Norway.

tion – all regions marked with yellow – which of course could be interpreted positively. The problem (discussed below) is however the reality of an ageing population and the drastic decline of numbers in the younger age groups which may expose substantial parts of the Arctic to severe problems in the future. Most of the regions show a marked decline in population (in red) while a few marked with blue show population increases during the 15 year-period

used in the context of the map. In regions where newer data is available the process seems not only to be continuing apace but basically it is clear now that most regions have either a stable or declining population.

The Nordic countries, including the Faroe Islands and Greenland, are clearly moving into the final stages of the process of decreasing mortality, while also witnessing declining birth rates, leading to a low natural reproduction

### BOX 7: NATURAL REPRODUCTION OF POPULATION



As described in the text, changes in population size and structure reflect the dynamics of births and deaths (together defining “natural increase” or decrease), and of in- and out-migration (together, “net migration”). Many societies experienced a demographic transition as they modernised, shifting from an older pattern of high birth and death rates; through a transitional state with falling death rates, still-high birth rates, and hence rapid population growth; and ultimately to a modern stable state of low death rates and low birth rates. The theory of demographic transition is however rendered less powerful when we look at real places. For northern places, the complications involve high net migration – people either pulled in by resource and industrial development, or pushed away as resources are depleted or better opportunities open up elsewhere. Differential out-migration by women led to skewed sex ratios in many northern communities, just as out-migration by more ambitious or skilled adults, or college-bound young people, also limited the prospects for future development. Apart from industrial megaprojects such as new mines or energy development, the flow of migration in the

rate balancing out the net out-migration. In other parts of the Arctic, for instance in parts of Arctic Canada, birth rates remain relatively high in many places, leading to a positive growth rate in spite of a net out-migration while in parts of Arctic Russia birth rates are so low that this alone gives the regions negative growth rates. Out-migration further amplifies these trends.

Changes in population size and structure are particu-

larly visible for the communities of the circumpolar north. Many societies experienced a demographic transition as they modernised, shifting from an older pattern of high birth and death rates; through a transitional state with falling death rates, still-high birth rates, and hence rapid population growth; and ultimately to a modern stable state of low death rates and low birth rates.

The notion of demographic transition however becomes



North tends to be out of small places, and toward larger communities to the south or in regional centres that provide wider choices for education, jobs and life. This net out-migration flow leads to population decline, however, only where natural increase is not high enough to offset it. In some North American Arctic regions, for example, high birth rates lead to popula-

tion increase despite net outmigration. So by just looking at average numbers for larger geographical units a lot of significant information is lost. In order to provide further detail, the attached map shows the complexity that appears when geographic details are added. The map takes a circumpolar look at recent population trends, based on data

from the AON-SI project (Hamilton and Lammers 2011). Details from Canada in particular show the major difference between places identified as incorporated (i.e. urban/urbanised) shown as squares, and the un-incorporated (i.e. dispersed population not included in one of the settlements) part of the population.



increasingly problematic as we turn our focus to real places. For northern places, the complications involve high net migration – people either pulled in by resource and industrial development, or pushed away as resources are depleted or better opportunities open up elsewhere. Population changes in the small communities of northern Alaska are dominated by large year-to-year shifts in net migration. Renewable resource-based regions of the northern Atlantic show many examples of out-migration following changes in stock.

In the case of Greenland, net in-migration by Danes in connection with development plans, or later periods of out-migration by both Danes and Greenlanders, contributed substantially to periods of growth or stability, while natural increase maintained upward pressure. Differential out-migration by women has also resulted in skewed sex ratios in many northern communities. Out-migration by more ambitious or skilled adults, or college-bound young people, also limits the prospects for future development.

Apart from industrial mega-projects such as new mines or energy infrastructure developments, the flow of migration in the Arctic north tends to be out of small places, and toward larger communities to the south or to regional centres that provide wider choices in terms of education, employment and lifestyle. This again leads to population decline, however, only where natural increase is not high enough to offset it. In some North American Arctic regions, for example, high birth rates lead to population increase despite net out-migration. Whether population flow to regional or administrative centres depopulates small places or not it will inevitably have a qualitative effect as source communities disproportionately lose younger and more ambitious residents.

Like the discovery or depletion of a mine, problems in the fisheries industry have broad social effects on resource-dependent northern communities. From 1996

to 2005, the North Atlantic Arc (NAArc) project conducted comparative research on adaptive strategies and outcomes among fishing communities. The NAArc project results, together with research by others, suggest a number of theoretical propositions that could have broad relevance to the study of ecological and social change. And besides the obvious role of changing marine ecosystems, migration and demographic change as well as individual and community adaptations are among the major factors.

### **Basic parameters**

Three basic factors are crucial in the demographic development process: Fertility, mortality and the reproduction rate.

In general, high *fertility* is based on a number of socioeconomic factors, and high birth rates often relate to four main factors.

Firstly, where a relatively high proportion of the population is to be found in the most fertile age groups; this used to be clearly the situation in Arctic Canada and Greenland, just as it has been the case in the more densely populated areas of Iceland and parts of Russia. Regionally it is the prevailing situation in what could be characterised as “the periphery”, i.e. regions characterised by relative isolation, and a slower rate of urbanisation.

A second important factor in creating this situation is the influx of population in the fertile age group, usually looking for work or educational opportunities. Consequently there is a close connection here to the general migration pattern. Also here the regional centres turn out to be located at the high end of the scale, while regions characterised by out-migration show the reverse pattern.

A third factor relates to specific regional characteristics connected to, for instance, cultural or religious traditions. These situations are especially significant again in

more remote areas where local traditions are maintained, while the processes of globalisation influence more centrally located places.

Finally, a fourth factor is the process of urbanisation and urban lifestyle where there may be lesser interest in establishing larger families, easier access to, and more knowledge of, contraception and abortion. In addition to these four factors special situations in some regions may also apply, for instance, the role of the influx of a temporary workforce in connection with the starting up of large new construction sites such as power stations, mines and large industrial plants.

High *mortality* rates are generally related to the ageing characteristics of the population thus high values are closely connected to municipalities which are stagnating, not necessarily in the economic sense, but in relation to the demographic dynamic. Stagnation occurs for various reasons, for instance low reproduction rates or in relation to situations where migration patterns show high levels of out-migration (of young people). This pattern is increasingly becoming the case in many Arctic regions. As is the situation with birth rates, the highest level of mortality rates are clearly found in the more remote and isolated regions.

The natural *reproduction rate* in this connection (birth rate minus death rate) gives an idea of the ability of a region to reproduce itself population-wise. In this context the Arctic regions are generally positioned very differently where the three dominant factors are: birth rates, death rates, and the net reproduction rate. The Nordic countries generally experience a balanced or negative reproduction rate, for instance Finland is situated exactly on zero. The western Nordic regions however enjoy a more positive result, with the Faroe Islands (5.0%), Iceland (7.5%) and Greenland (8.7%) showing reproduction rates in the absolutely highest positive part of the Nordic range.

As noted, the eastern and the western parts of the Arctic show marked differences. The general trend in the North American part of the region shows positive net reproduction rates, these are lowest in Yukon, with Alaska and Northwest Territories at intermediate levels, while Nunavut is situated at the high end of the scale. In Russia the opposite situation is the case where several regions show negative net reproduction rates, for instance Murmansk *Oblast* down to -1.3 while other regions such as Sakha witness the highest scores in the Russian north.

Even though marked differences remain between the regions it is important to note that the general trend across all regions has been one of decline in the net reproduction rate in recent decades, and that the ongoing changes in lifestyle, as discussed in connection with the process of urbanisation, are likely to deliver the situation in most regions into balance. And while positive natural reproduction has managed to maintain a relatively balanced situation for many communities experiencing net out-migration, this cannot be expected to remain the situation in the future.

### Age structures

One of the clearest general social characteristics of the Arctic region is the relatively high proportion of children and young people it contains. Several regions are still characterised by a population distribution with the classic pyramid or cone shape associated with developing countries in the second phase of demographic transition. Birth rates are still higher in many parts of the Arctic. This pattern has however undergone a number of significant changes over the last decade thus creating a new situation!

While in several regions of the Arctic in the early 1990s more than 15% of the population was in the age groups below 15 years today levels are generally below 10% and decreasing. In part the explanation for this is of



course the general ageing of the population in the European, Russian and the North American parts of the Arctic. And one of the most important factors in this process has been that of urbanisation and changes in family structures which see only one to two children instead of the previous situation with three or more as the general pattern.

On the surface there are very clear regional differences in the Arctic. The average numbers from the regional level however hide the fact that each of the regions is characterised by the existence of marked differences between urban and rural settings.

In Greenland, especially the capital region which is by far the largest urban area, the family structure is generally rather similar to the average for the Nordic countries. Marked differences however emerge in the eastern and northern parts of Greenland where the young aged population is still much higher than the national average. Similarly, in the Faroe Islands the process of de-populating several of the rural areas has taken its toll especially on the young aged group which has moved to the capital region. Thus, contrary to Greenland, the more rural areas of the Faroes are experiencing a comparative reduction in the young age group where the decline is most marked in the capital area.

In Iceland the drop in the number of young people is substantial all over the country, but especially in the eastern and north-western parts of the country. The reason is similar to that in the Faroe Islands, namely, the out-migration of younger persons, while the older persons stay behind. The young group move to the capital region, especially Reykjavik, where a relative decline in the young group has been registered as well, but is not comparable to the situation in the more remote regions.

In Fennoscandia the situation is characterised by many years of out-migration by young people while a general ageing of the population has led to a low proportion of

persons in the age groups below 20 years. Attempts to try to retain some of them in the region when the situation was first recognised back in the 1970s by establishing regional universities and colleges have however had some success. Nevertheless, this approach has not managed to fundamentally address the problem of out-migrating youth which is once again on the rise. Similar situations can be witnessed across the rest of the Arctic where educational opportunities tend to attract the youth elements thus maintaining birth rates and contributing to population reproduction.

A key issue in relation to the age structure is the increasing ageing of the population. From situations in the early 1990s where the share of population over 64 years was generally well below 10%, and in many regions was substantially lower, the situation today is close to 10% and above. Also with the old age part of the population internal differences *within* regions, primarily between urban and rural areas emerge. While the younger part of the population is more mobile an increasing proportion of the workforce is now concentrated in the larger settlements, providing a situation where the share of the old age group is on the decline in urban areas and on the rise in rural ones. The situation in the Faroe Islands in many ways provides a model for this process, illustrating a clear pattern of ageing in the remote and rural regions, while the capital region has maintained a relatively low level of older age groups due to the high in-migration of younger persons.

In Greenland the ageing process is of course also ongoing, but here the option of better old age services in the larger settlements where their children and grandchildren have settled becomes a reason for moving. Another reason is the out-migration of older people to Denmark which generally reduces the size of the older age group as on retiring many Greenlanders simply chose to move to Denmark where their children and grandchildren live.

### Dependency and gender

Instances of high young age dependency reflect two very different situations. On the one hand we have the situation of stagnating or declining regions where high birth rates in combination with the high out-migration of younger persons seeking educational opportunities show a relatively high number of children, and thereby a high dependency rate. In some situations the children are left behind with their grandparents while their parents – sometimes single mothers – look for better opportunities in another region. Often the children are only reunited with their parents when they have settled with jobs, housing and suitable social conditions.

On the other hand a high young age dependency rate also includes regions with high in-migration of young parents and their children to regions undergoing economic expansion. As already noted the limited change in Greenland has less to do with stagnation in old age characteristics and rather more to do with out-migration as a strategy for many older persons, eventually leading to the maintaining of the dependency rate. The situation in Iceland has for many years been more or less the opposite, namely, an influx of young Icelanders which to some extent has compensated for the general ageing pattern in the country.

One of the most striking features of most peripheral and semi-peripheral regions in the Arctic is the deficit of women, both in balanced or declining population, primarily due to out-migration, and further the very high proportion of women with a higher education (See box 9 for further explanations and trends). Northern and rural areas are dominated by a medium to high deficit of women, while those municipalities with a surplus of women are predominantly to be found in urban areas and in the more densely populated areas. The very extreme female deficit areas are usually those connected to highly specialised male activities, previously fisher-

ies, agriculture, forestry and mining, but also military installations.

These marked regional gender differences have been a characteristic of the region for several decades, but have evolved further over the last 10–15 years, characterised by an out-migration of women especially from rural areas. Among the consequences of this is a situation where women have become dominant in relation to high and higher education, a pattern which has emerged in most of the developed countries, and relates to some general tendencies in relation to the gendered division of labour.

Comparative research from a number of northern regions (Alaska, Greenland, the Faroe Islands, Newfoundland and Iceland) seems to indicate very similar patterns regarding affinity to rural community life. Some details regarding these differences are discussed in box 9. Compared to males, more females consider, and also eventually tend, to migrate permanently away from their home community and region, primarily to look for job opportunities which better fit their qualifications and thus provide opportunities outside those traditional economic activities in these communities.

This is not, however, only a “northern” issue. Even though the processes of globalisation have different effects on various rural areas a general pattern has emerged in the context of the restructuring and decline of the agriculture sector, the growth of the service sector and an increasing emphasis on technology. These economic and social changes fundamentally affect women.

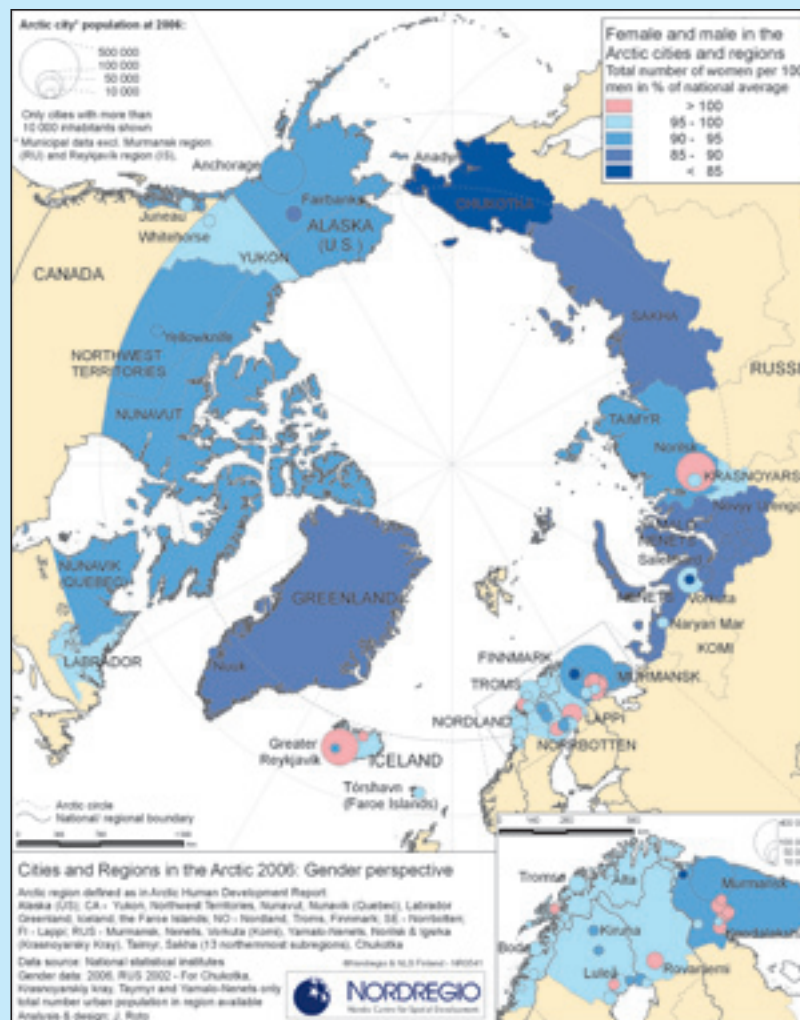
Rural areas experience marked demographic, social and cultural changes, and as the process of change in the dependency structures becomes more evident throughout the Arctic, affecting rural areas in particular, areas where women predominate as the providers of primary care for children and other dependent people. In addition, women tend to experience negative short-term and

long-term consequences in terms of careers, earnings and pensions, and this has significant consequences for migration patterns.

All these changes contribute to the continuing out-mi-

gration of young and well-trained persons from regions which are predominantly rural. As a majority among those who leave are women, this creates profound negative effects on the social life of that rural area and on the

## BOX 8: THE GENDER IMBALANCE



The process of urbanisation in the Arctic has resulted in a situation where the traditional gender based division of labour has begun to disappear and has been replaced by a situation where the social and economic role of individuals increasingly becomes determined by individual interest and qualification. As a consequence more females tend to migrate permanently away from their home community and region. Gender-based differences in choice are nothing new in the Arctic. In connection with large scale resource development projects, young and middle-aged males in search of work have chosen to become migrant workers, leaving their communities for a shorter or longer period of time. Seldom, however, have they left the community permanently. Only if the job turned out to be of a more permanent character, or generated substantial incomes, did they arrange with their families to follow them and settle in the new town or village. Females, however, seem to migrate more permanently away from the North.

The accompanying map show the ratio of women to men in percent of the national average. So the map does not necessarily show whether, in absolute numbers, there are more or less men or women in the regions, but rather to what extent the differences in numbers deviate from the national averages.

rural economy for instance though opportunities for marriage, the maintenance of family life and family structures, while it also has a significant influence on various other cultural activities. Furthermore, it contributes to

the deterioration of the institutions of the social infrastructure and to the decline of services of public interest, eventually leading to a loss of population and to observ-

At the provincial level most provinces and territories in Canada have an excess of males. The exceptions, however, are Yukon with a ratio females/males of 0.99, Alberta 0.98 (due to the oil industry), with NWT down to 0.97, and Nunavut at 0.96. All figures are from the 2006 Census (Statistics Canada 2006).

The 2006 census data from Alaska (Alaska Department of Labour and Workforce Development), gives Juneau a females/males ratio of 1.00, Anchorage 0.98, and Fairbanks a ratio of 0.94. The average for Alaska is 0.95, but several

boroughs and census areas are substantially lower, such as Haines (0.93), Valdez-Cordova (0.89), Kodiak Island and North Slope (0.93), Bristol Bay (0.85) and the Aleutians (0.51 and 0.55 for East and West respectively). Some of the low figures have to do with the presence of military bases etc. In Greenland, it is only the larger towns, including the capital Nuuk, which are close to an even gender distribution. Smaller towns typically have a female deficit of around 20%. In the villages two out of three have a deficit of women exceeding 20%. In fact several

villages show a female deficit exceeding 40% or more.

The Second World War continues to have a remarkable impact on the population structure of Russia. In 1950 six out of 10 persons were females, and even today females are still 54% of the population, compared, for instance, to the Nordic countries (DK: 50.5%, FI: 51.1%, Isl: 49.8%, NO: 50.4%, SW: 50.4%) and North America (Canada: 50.5%, USA: 50.8%). Moreover, in the Russian North the proportion of females is generally at a higher level.





BOX 9: WHY STAY? WHY MOVE? WHAT ARE THEY LOOKING FOR?



A Greenland related survey on the question of mobility, conducted in 2008, revealed substantially different concerns for the future in relation to young men and women. Many more women than men pointed to education – for themselves as well as for their children – as the most important reason to move to another place. Questions related to family and networks were also among the major drivers for moving. There are far more men than women who point to career and jobs as the major reason to move. Men are more fixed on the physical and infrastructural opportunities a new living-place has to offer, such as public transport, housing etc. The major drivers are shown in the table, subdivided into those preferred by women versus those preferred by men.

The most frequent responses	% response		Difference males-females	
	Males	Females		
Salaries/wages	28,9	23,9	4,9	Preferred by males
Options for overtime	5,6	2,9	2,6	
Making use of existing qualifications	13,8	11,7	2,1	
Career opportunities	15,1	14,4	0,6	Equal distribution
Not interested in a job	3,9	3,5	0,5	
Concern regarding the working environment	10,2	11,0	-0,8	
Use of existing education	10,6	13,3	-2,8	Preferred by females
Options for pursuing further education	12,0	19,2	-7,2	

ably lower fertility rates thus endangering the medium to long-term development of these regions.

The relatively high number of women employed in the service sector has been argued to represent “an escape valve” away from the traditional rural structure based on agriculture which has become highly mechanised and masculine, towards a new, more diversified socio-economic structure in which women participate and receive both a salary and social protection. Furthermore, it is also stressed here that women often initiate the diversification of the rural economic realm by creating businesses, thereby generating both income and jobs.

These patterns can be seen as being connected to a number of gender-related differences in aspirations and approaches to change. Firstly in relation to the question of work and work-related activities the perception of customary male activities related to renewable resource exploitation seems to be “sticky”, in the sense that the male discourse – or perhaps the prevailing discourse in respect of males – has difficulty in moving on from what once were key activities, but now constitutes only a minuscule percentage of the available jobs. Contrary to this, the females in their upbringing are socialised into collective activities, more attentive to the needs of others, and consequently much more open to change. As a result, they become less limited by specific job characteristics and less determined by what are considered to be “traditional” and “acceptable” activities.

To use an analogy, males seem to be socialised into path-dependency, creating difficulties in accepting other paths and changes, while females tend to be socialised into situations where adjustment and change are required leaving them prepared to move between job categories and job options. Only jobs related to (new) technology have become status-providing alternatives for males.

Consequently, the adaptation to change through the educational system fits much better with the socialisa-

tion of girls, in spite of the fact that girls are constantly underrated and underrepresented when it comes to filling high-ranking positions, both in academia and in administrative affairs. Finally, the economic needs of the family and also their greater need for social recognition motivates women to look for work within the rural area, which creates social networks more frequently than in larger urban centres, and when this is not possible, the only option will be to look for opportunities outside their communities of origin.

### **Gender and education**

The question of “better opportunities” mentioned above has a lot to do with the marked changes in patterns of education which have taken place during the last 10–15 years. Already in the 1990s women had become a majority group in relation to higher education, but by the late 1990s basically not only the Nordic countries but most of the Arctic, had moved towards this situation. In absolute terms on the country scale there is no doubt about female dominance in relation to the regional consequences of this development. The most obvious characteristic is that there are very few municipalities with a majority of males with a higher education background, marked in green on the map. And in many cases this has to do with the existence of specific male activities, for instance in relation to the military, heavy industry, resource extraction, or the existence of a technical university dominating the community. In communities with a generally high level of persons with high and higher education – first of all the urban areas with one or more higher education institutions – female dominance is limited to a few percentage points. The high level of dominance appears in municipalities representing small towns and other urban settings. This is the case in spite of the fact that it is in these same communities that the highest deficit in respect of women can be seen.



Education is a key component in the drive towards the “knowledge economy” with the pattern being quite clear; the general level of education is closely connected to two factors, on the one hand to the population concentration offering qualified work opportunities, and on the other, towns and cities offering higher education opportunities. These places are “sticky”, tending to be attractive to industries relying on access to a continuous supply of qualified persons. And as women, as described above, have predominant in terms of medium-high and higher education this also has important regional consequences.

It has been argued that the tendencies towards gendered regional structures may diminish over time and that the high migration level of women to urban areas, which has increased their involvement in jobs requiring this level of qualification, may eventually be reversed or at least evened out. Developments over the last decade have not however given much indication of such a change occurring. And in reality the situation is much worse than that indicated by the raw numbers, as a much more marked deficit in most cases can be found in the age group from 15 to 35 years, compensated in the regional average through a small surplus of women in the age group 50 and above. The important age group which should secure reproduction and maintain a high level of skills and knowledge is diminishing, while the old age group dependant on social services and pensions is increasing. The only exceptions here are the capital regions and the university towns.

The tourism industry is clearly dominated by women, and this adds to the number of jobs available, for instance as tour guides, tour arrangers, company managers etc., which combines social skills, language knowledge and education, something characterising many of the ambitious women in the mid- sized towns and communities. Many of the more routine jobs such as servants and

housekeepers at the hotels and restaurants are however increasingly being taken by immigrants or temporary workers from Asia, predominantly from Thailand and the Philippines.

### **Migration**

Another key issue – and probably the most critical in terms of these ongoing changes – is that of changing migration patterns and, in relation to the viability of these communities, the net out-migration rate. The groups represent very different demographic dynamics and thus very different development potentials as well as marked challenges. A few municipalities – basically the urban ones – can show a positive net in-migration, most of them in relation to either new economic activities creating jobs, or educational opportunities attracting youth segments. But the general trend is clearly one of out-migration from rural areas. And in general the out-migrants are either younger people looking for or already possessing skills and qualifications relating to new economic opportunities, or persons of working age looking for jobs.

Generally, mobility in the region is substantially higher than the average situation in the Nordic countries. This has partly to do with the limited level of services available in smaller communities, for instance access to educational opportunities or special medical services, and partly also to do with accessibility where commuting may be limited due to the distances involved and the quality of the infrastructure.

Global migration is having an increasing influence on the region with a number of groups emerging as key to the development process. Two groups – the Thais, predominantly females, and the Poles, predominantly males – are discussed in Box 10, and will be an “issue” to which we will return later in the book.

## BOX 10: NEWCOMERS

The attached graph shows the distribution of the top 10 groups of foreign citizens with residential status in the

North Atlantic region as of January 1, 2009. In the case of Greenland and the Faroe Islands this leaves out the largest

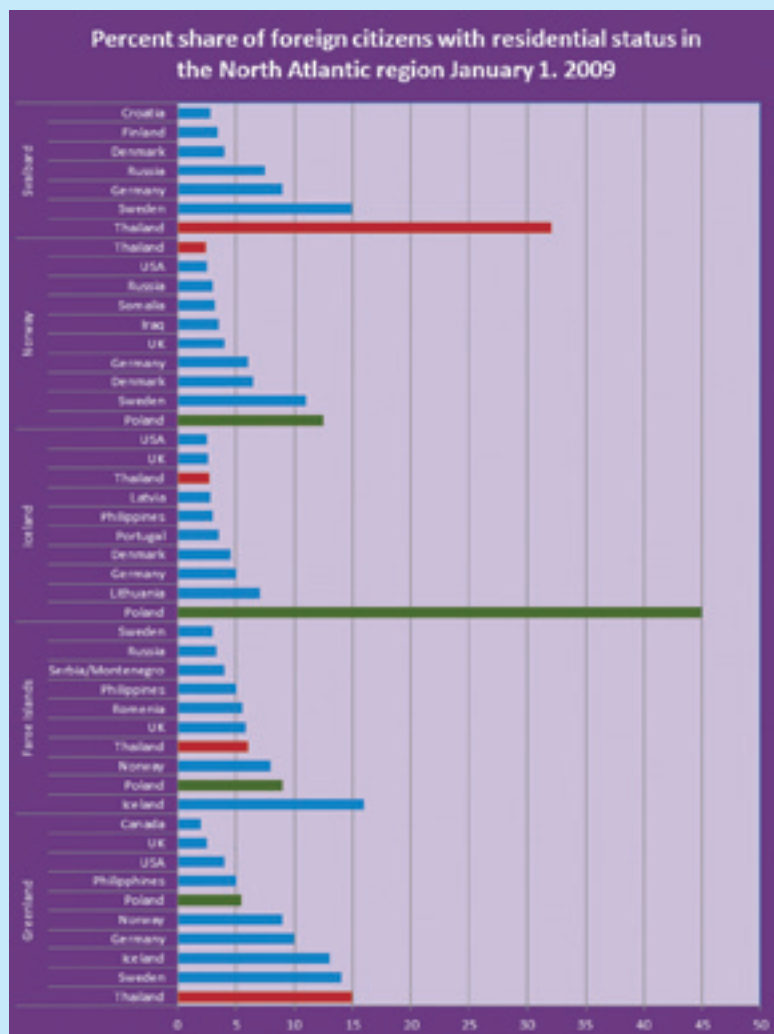
group of foreigners, namely Danes, as all three groups – Danes, Greenlanders, and Faroese are registered as being Danish citizens. Similarly it leaves out Norwegians from the list in the case of Svalbard.

Two groups are important to emphasise here: The East Europeans – Poles, former East Germany, Romanians, Latvians, Lithuanians and Russians, and South East Asians such as Thais and *Filipinos*.

From 1998 to 2009 the total number of Thai citizens settled in the Nordic far north, i.e. Greenland, Iceland, the Faroe Islands and Svalbard increased from 356 to 824. In Norway Thais increased from 1987 persons in 1998 to 7884 persons in 2009. Also in Greenland and Svalbard the Thais are the largest groups of persons with foreign citizenship, while they are number 4 in the Faroe Islands and number 8 in Iceland.

In Iceland and Norway the Poles are by far the largest group of immigrants. This is linked to the building and construction of larger industrial sites in the two countries. In Norway for instance with the Snöhvit gas project in the Barents Sea, and in Eastern Iceland in relation to the construction of the new aluminium smelter. Similarly the construction of hydropower plants in Greenland has attracted workers from Poland.

Further information on the Thais and Poles in the North Atlantic region is provided in boxes 26 and 27.





# Fundamental changes in the nature of Arctic economies

The future Arctic economy will probably be recognisable to anyone familiar with today's Arctic and when looking back on the changes twenty years from now one will probably be able to say that the economy still portrays many of these characteristics but now they are simply more pronounced than ever.

Notwithstanding this however a number of distinct changes are clearly discernable. The major trends are shown in Maps 5 and 6, both related to the divisions of the economy into the three sectors relating to primary, secondary and tertiary activities. While map 6 shows the changes relating to the three sectors characterising the Arctic regions, the fourth map shows how large a segment

of the working age population is actually active on the labour market. The graph and colours on map 5 show how the different regions are situated in relation to economic activity. While the primary and secondary sectors used to be the dominant activities it is obvious that the tertiary sector is now dominant. No region has less than 50% of its working population involved in the tertiary sector while several regions are characterised by much larger percentages.

The Arctic economy contains three distinct but related parts, the international resource economy, the transfer economy, and the traditional economy. The international economy serves worldwide markets producing resources

#### MAP 5: CLASSIFICATION OF THE REGIONS ACCORDING TO THEIR PROPORTIONS IN PERCENTAGE TERMS OF EMPLOYEES IN THE THREE MAIN SECTORS, IN 2006

The triangle below the map shows the colour coding used in the map. Along the lower axis the primary sector – hunting, fishing, and mining – is subdivided in percentages from 0 to 40%. The axis to the right shows the secondary sector – processing, production, constructing – starting from 0 to 30%. And finally the axis to the left shows the tertiary sector – generation of services such as health care, teaching, retail and wholesale, administration, etc., but also including receivers of services such as social benefits, pensions etc. This axis shows values from 50 to 100%. The division of the axes reflects the fact that there are no regions with more than 40% employed in the primary sector, no region with more than 30% employed in the secondary sector and no region where there are less than 50% employed/involved in the tertiary sector.

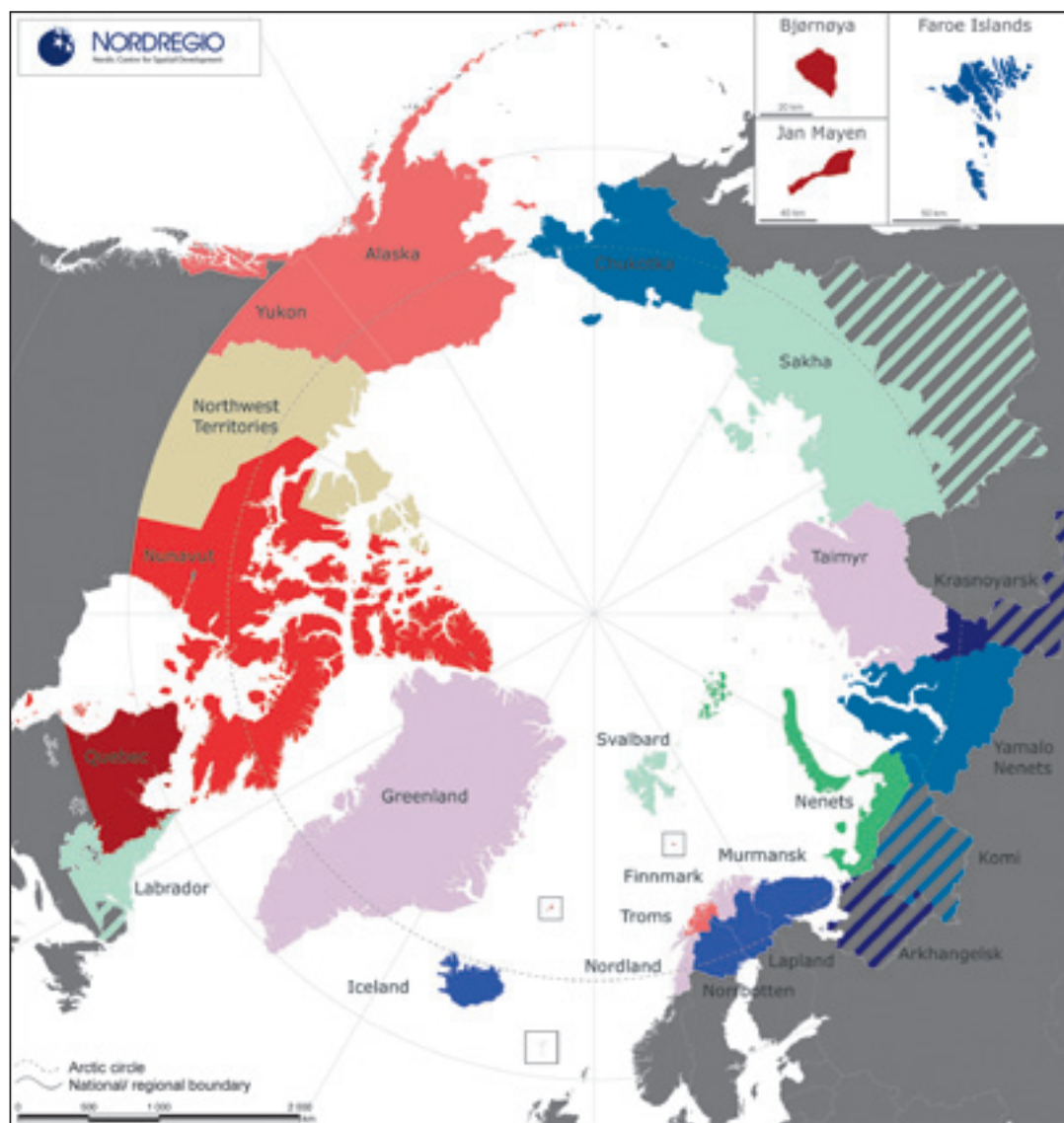
The region with the highest employment in services is Nunavik (88%) followed by Nunavut (93%) indicated through the red colours. The lowest shares are to be found in Krasnoyarsk and Archangelsk regions in Russia, both at levels around 58%.

The secondary sector is rather high in several of the Russian regions, indicated by the blue colours, but also well represented in the Swedish and Finnish part of Northern Fennoscandia, as well as in Iceland and the Faroe Islands. There is a marked difference in activities, however, as Iceland and the Faroe Islands are characterised by high employment in fish processing industries, while the Russian, Swedish, and Finnish industries are related to processing of minerals, heavy industries and the processing of products from the forestry sector.

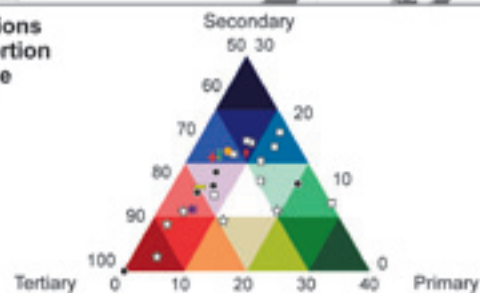
The primary sector is again high in several Russian regions shown with green colours, as it also is in Labrador. This relates to mining and energy production but forestry is also as an important component here.

What the map shows is that even though many perceive the Arctic to be primarily related to hunting and fishing the reality is that the economic activities carried out in this region are diverse and complex. Generally however, almost all regions have less than 10% of employment in primary sector activities; Most of the regions have between 10 and 20% of employment in relation to the secondary sector and all regions have more than 50% of their activities connected to the tertiary sector. More than half of the regions indeed have more than 75% of the activities connected to this sector.





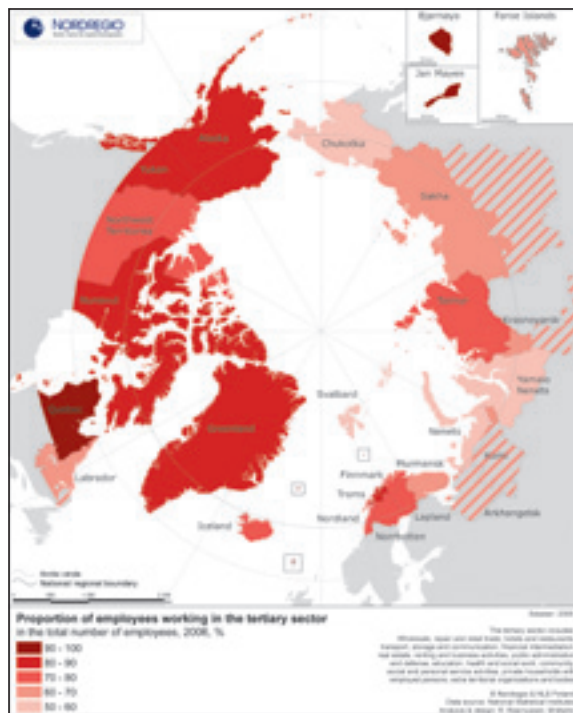
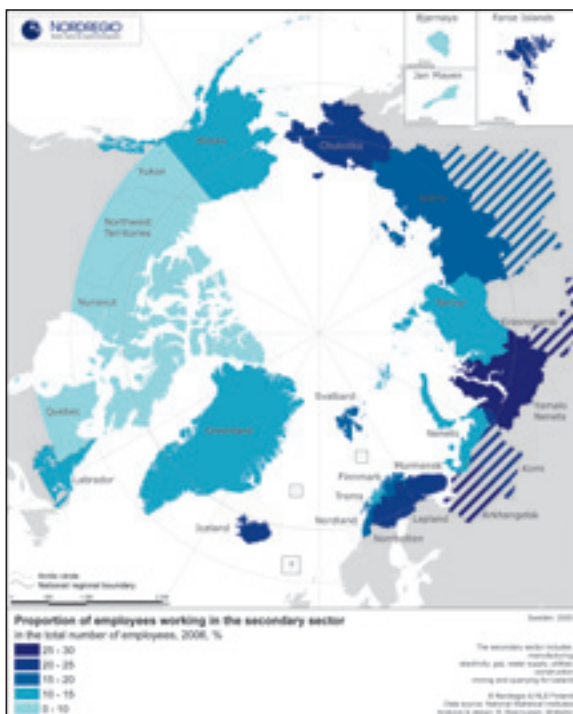
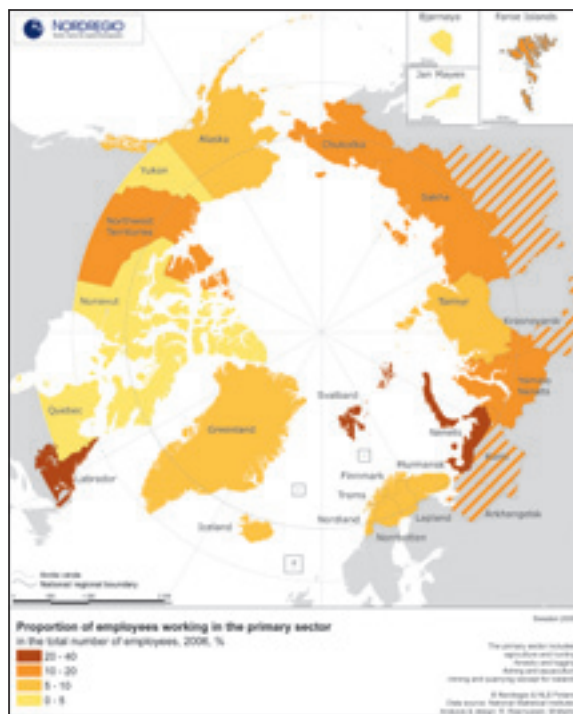
**Classification of the regions according to their proportion of employees in the three main sectors in 2006, %**



- ☆ Canada
- Norway
- Russia
- ★ Alaska
- Greenland
- Finland
- Sweden
- Faroe Islands
- Iceland

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Data source: National Statistical Institutes  
Analysis & design: R. Rasmussen, M. Martin





such as diamonds, gold, zinc, oil, natural gas, and fish. The traditional economy is also centred on resource production, but here the production, through fishing, hunting, herding and gathering, is for local consumption. Finally, the transfer economy brings funds into the region from other levels of government. The transfer economy supports services generate benefits and also contributes to incomes of many Arctic dwellers.

### Structure of the economy

The Arctic is a region of economic contrasts. The interna-

tional economy supports modern large scale, capital intensive production while the traditional economy occurs in small individual or family groups and mixes modern and traditional methods of production.

The economy of the circumpolar north is surprisingly large. GDP for the region was estimated to \$225 billion in 2003. This was comparable with that of Malaysia or Switzerland. While the Arctic accounted for a small share of the world's GDP at that time – less than one half of one percent – this was more than twice the region's share of the world's population.

## MAP 6: EMPLOYMENT AND LABOUR MARKET PARTICIPATION

The four maps included here provide further details in relation to economic activity in the Arctic.

The top left map shows the proportion of employees working in the primary sector. Very low percentages are apparent for Nunavut, Nunavik and Yukon, while recent developments in relation to energy and mineral resources have added to employment levels in this sector in NWT. In most of the other regions of the Arctic the primary sector is of some importance, with the highest number in Labrador (minerals) and the Nenets regions (oil and gas). There are important differences however which are not shown on the maps, namely differences between regions where the activities are connected to renewable resources such as fisheries, for instance in Iceland, the Faroe Islands, Norway, Greenland and Alaska, and then regions where the extraction of mineral resources and energy are the most important activities in this sector.

The upper right hand map shows activities connected to the secondary sector where both Russia and the Nordic Countries are characterised by high values. Once again however the map cannot portray the entire situation. Differences in resource-based activities exist, with Norway and Faroe Islands and to some extent also Greenland primarily engaged in the processing of renewable resources while Russia is primarily engaged in industrial activities connected to the processing of non-renewable resources. Iceland is positioned somewhere in between – a lot of activities connected to the processing of fish and fish products, but at the same time industrial production such as aluminium smelters and a few other production activities.

The map in the lower left corner shows the activities connected to the third sector, i.e. the production and consumption of services, including public services, schools, health care,

administration, trade etc., but also receivers of social benefits, pensions and the like. The North American part of the Arctic is characterised by a very high level of these activities, except for Labrador, where the level is comparable to that shown for most parts of Russia.

The last map in the lower right hand corner shows the labour market participation in the working age group (20-64 years) as of 2006. The level is generally high indicating that most of the Arctic's inhabitants depend on wage work, salaries, unemployment support and other types of payments whereby individuals are registered as being active on the labour market. The average level is between 80 and 90% of the working age group, with Yukon, NWT, Greenland, Iceland and the Nenets region having a level above 90%.

The value of the total northern economy output is in fact even greater, since such estimates do not include production in the important traditional or subsistence sector.

*The international resource economy* accounted for 31% of Arctic GDP in 2003. The sector produces both renewable and non-renewable resources primarily for export; see e.g. Box 11 showing where the major activities take place in relation to energy and minerals. In terms of value, petroleum is the North's most important resource; in 2002 over 16% of the world's petroleum and about one quarter of the world's natural gas were produced in the Arctic. More than 10% of the world's supply of nickel, cobalt, palladium, apatite and platinum came from the Arctic. Production in Canada and Russia accounted for 20% of the world's industrial and 25% of the world's gem-quality diamonds.

In 2002 the Arctic also produced over 10% of the world's catch of wild fish and over 5% of the crustacean catch. The region also has significant aquaculture production resources.

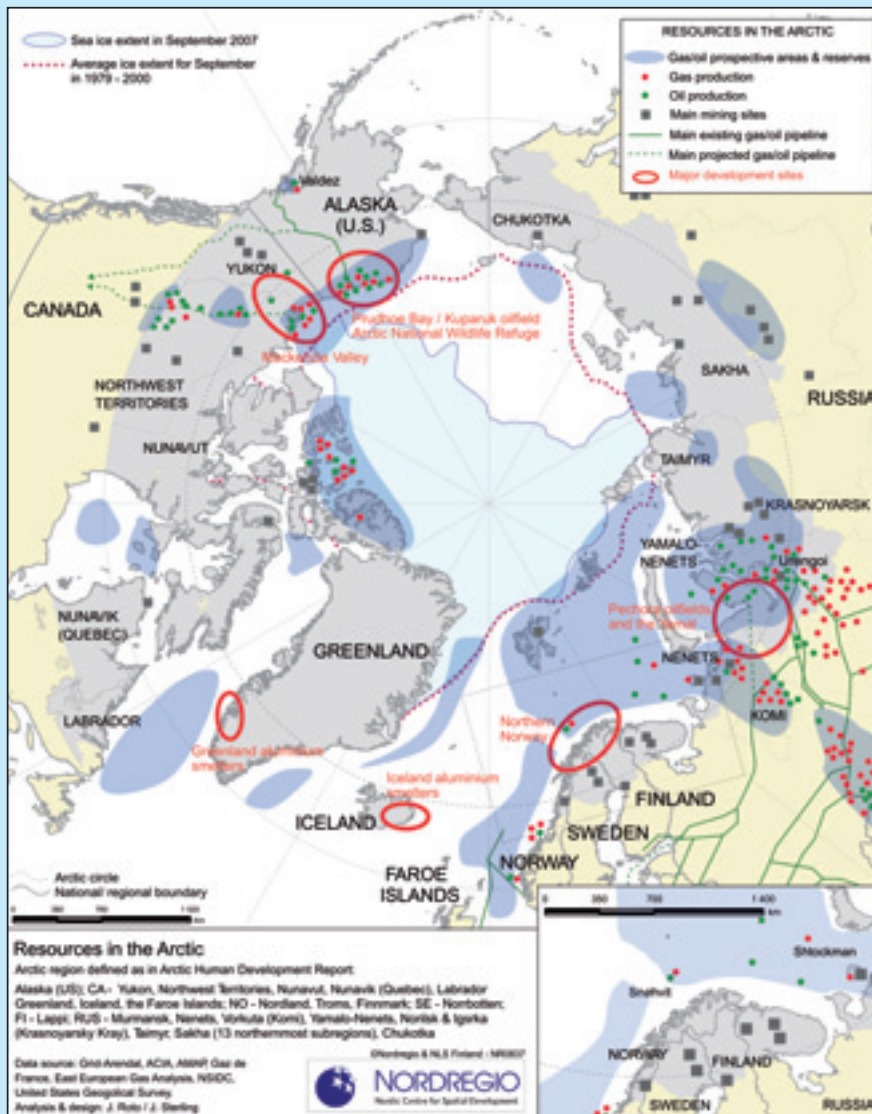
This northern resource economy is not evenly spread across the region. Alaska and Russia accounted for over three-quarters of the Arctic's GDP in 2003. The high value and significant production of oil and gas in these two areas explains this concentration. In 2003 Russia accounted for similar shares of the Arctic's GDP and population. All areas of Alaska and Arctic Russia did not share natural resource production evenly. Almost half of Russia's Arctic production took place in only one of its thirteen circumpolar regions. The distribution of natural resources, the value of these resources, past development and infrastructure all explain the distribution of natural resource production in the Arctic.

*The traditional economy* is local and spread out. The North's small, scattered communities are an efficient mode of production when local natural resources are harvested by small local groups for their own consumption.

#### BOX 11: THE ARCTIC IN THE INTERNATIONAL RESOURCE ECONOMY







The north provides a significant share of many of the natural resource products used in the global economy. In terms of value, petroleum is the North's most important resource, and already in 2002 more than 16% of the world's petroleum and one quarter of the world's natural gas came from the Arctic. More than 10% of the world's production of nickel, cobalt, palladium, apatite, and platinum is also from the Arctic. Production in Canada and Russia accounted for 20% of the world's industrial and 25% of the world's gem-quality diamonds. In 2002 the Arctic produced over 10% of the world's catch of wild fish and over 5% of the catch of crustaceans. The region also has significant aquaculture production resources.

Small communities are significant in the north. It has been estimated that more than 80% of Arctic communities outside Russia had fewer than 1,000 people.

Subsistence hunting, fishing, and herding provide real income to northern communities, see e.g. Box 12. As late as the mid-1980s the real income provided by harvesting and trapping was more important in the indigenous communities of northern Canada than wages through employment. Even though the situation has

changed considerably since the 1980s, the traditional economy is still important, in particular for the production of meat.

However, the overall tendency for most of these traditional small communities is growing relative poverty. This is why so many of these communities become “sending” regions. More people are moving out than moving in.

The “transfer” economy is important for most Arctic communities. These transfers are both national and re-

#### BOX 12: INFORMAL ECONOMY AND LOCAL FOOD



Many economic transactions take place outside the formalised economy. Local market sales of products and local rendering of services are important in the Arctic, often facilitated through public services. And last, but not least, subsistence still plays a crucial role in the Arctic,

particularly in small settlements, but not confined to such settlements.

The informal sector, or the informal economy, is that part of subsistence activity which is sold or exchanged for their money value, either on a local market or between people, but not registered

by the formal authorities such as the taxation-authorities. It is somewhere in between subsistence, i.e. hunting and fishing for own or family survival, and the formal economy where products from hunting and fishing are sold to registered and registering authorities.

The informal sector can be seen as creating a linkage between the two sectors and reflecting that the traditional distinctions between subsistence and cash-based economic sectors are more or less artificial and meaningless, because the two sectors are thoroughly inter-woven and in Greenland municipality authorities take care of the establishment and maintenance of a market place open for the sale of products from local hunters and fishermen.

The local markets – the *Kalaalimerniarfik* – in Greenland emerged in the 18th century to meet the needs of the employees of the church, the KGH (Royal Greenland Trade Company). The local markets were used as a kind of leveller, evening out differences in access to im-



gional and create jobs while also providing service incomes. Public sector spending accounted for 20 to 30% of all economic activity in most Arctic regions, but the real numbers may be much higher in many places. In areas with little access to natural resources this transfer-sector can account for probably up 45–50% of all economic activity.

One of the main elements of the transfer economy is welfare payments, unemployment compensation and

pensions. In addition, transfers may also help to create jobs in the community directly through government employment or indirectly by subsidising private development. Finally, transfers provide goods and services to people, schools etc., in the form of food assistance or housing. In addition to direct public support, Cooperatives, as discussed in box 13, have been another contributor to the continued maintenance of sparsely populated regions in the Arctic.



ported goods between Greenlandic hunters and their countrymen working for the colonial authorities. The market worked as a redistribution channel through which hunters were able to get the necessary funding to buy European goods, while Greenlandic and Danish salaried employ-

ees were able to get access to valued country foods and locally produced items of clothing and other goods.

Without the local market, a clearer separation might have developed between subsistence and the commercial activities. Through the local market the

two systems have been integrated. In addition, the market serves as a solution for many in the Arctic to soften the effects of economic crises by providing cash income needed in contemporary everyday life.

**Renewable resources and Ecological Change**

Fisheries, especially modern ones, generate systematic changes in the exploited marine ecosystems. Currently the percentage of fully exploited or over-exploited fish stocks is approaching ~80%, up from ~60% in 1970. The removal of fish can have cumulative effects on whole ecosystems, reducing their productivity and ultimately changing the lives of the people and communities that depend on fishing. Certain kinds of ecological changes appear widespread:

Reduction in the biomass of target species, and of other species taken as bycatch are affected by benthic habitat disruption, downward shifts in the size distributions of caught fish, due both to the progressive elimination of older age classes, and evolutionary reductions in size-at-age, and the reduction in numbers of large predator species, leaving room for expansion by smaller and lower-trophic-level species.

One consequence sometimes seen from these trends has been to shift the mean trophic level closer to primary production, a process called “fishing down food webs”.

Historical overfishing events, in retrospect, often show a characteristic outline called the “killer spike”: a time when the fishing industry became technologically capable of catching all the fish, and did so. The 20th century collapse of both Atlantic herring and cod fisheries resulted not simply from overfishing but from the interaction between overfishing and adverse environmental change. The herring collapse in North Iceland was precipitated by a killer spike that coincided with a pulse of cold, low-salinity Arctic water. Either one could have drastically reduced the resource. Together they ended it, with little in the way of recovery in sight one human generation later. The towns of Siglufjörður in North Iceland and Neskaupstaður in East Iceland experienced significant socio-economic effects from the collapse of herring stocks and the later cod decline.

A similar story of major fisheries collapse triggered by the combination of overfishing and adverse environmental conditions involves Newfoundland’s Northern Peninsula and its cod fishing industry in the Northern Gulf of St. Lawrence. These North Atlantic stories of long-term disaster emanating from the combination of over-aggressive fishing and climate variation should stand as a warning for future fisheries management in an era of accelerating environmental change.

Fisheries (or fisheries plus climate) induced changes tended to undercut fishing of demersal species based on large predators such as cod and haddock. To adapt, fishermen target alternative species, which may have increased in either relative or absolute abundance. Switching to alternative species however precipitates further changes. Some alternative species are comparatively scarce (e.g., lumpfish), or slow-growing (e.g., Greenland halibut), and hence less able to withstand sustained fishing pressure. Other shorter-lived species, including shrimp, herring and capelin, are periodically quite abundant but volatile and subject to great swings in population. In addition they themselves are food for the demersal species. Reductions in biomass, size distributions and bycatch species are thus the inevitable consequences of the change in target species.

Alternatives can replace the value lost by declining groundfish resources, but in so doing they often benefit different groups, with different capitalisation, licenses and location – providing a link here between ecosystem and social system change. The changes in the structure of the fishing industry in the Faroe Islands (box 14) show some of the current trends and characteristics of these processes, emphasising some of the challenges faced by these small economies. Moreover, the alternatives sometimes require new, distant markets, and thereby increase the vulnerability to changes in foreign economies.

### BOX 13: NEW BUSINESS INITIATIVES



Food flow contributes directly or indirectly to supplying the residents of the North. In Canada the cooperative system has, until now, played a fundamental role in social and economic development within Inuit communities. They were introduced in the Canadian Arctic by officers of the Department of Indian and Northern Affairs Canada, who saw in the cooperatives a culturally adapted way to introduce aboriginals to the market's economy. However according to Thibault Martin, they did not have the desired effect because they did not play the intermediary role between traditional and modern development models. Indeed, Inuit peoples used cooperatives as a tool for economic-political emancipation and as a means of transmitting reciprocal values, inherent to their way of life.

The success of Inuit cooperatives can be seen in various ways. First that individualism and the quest for gains were, until recently, notions which were not embraced; Second that there were, until recently, few economic opportunities and a lack of capital that could have made possible the development of private enterprises

During the last decade however cooperative organisations have been losing ground because municipalities and public institutions such as, for instance, the Nunavut Government, Kativik have become involved in the creation of jobs and in the development of community services such as childcare centres, leisure activities, technical and health services, etc., which, in the past, were acquired through informal networks.

At the same time the will of entrepreneurship and leadership which used to be essentially involved in cooperatives, this spirit now sees them starting their own commercial enterprises. Aboriginals today create more industries proportionally than the rest of the Canadian population. This is even more apparent in the Province of Quebec, where aboriginal groups' signatory of political treaties, such as the James Bay and Northern Quebec Agreement and others, have access to investment funds and are now at the head of prosperous businesses in various domains, notably in the sectors of air transport and tourism.

#### BOX 14: DILEMMAS IN SMALL ECONOMIES

In recent decades the Faroe Islands have experienced a profound socio-economic transformation. Growing global competition combined with over exploitation of

natural resources, mainly due to over capacity, created a structural economic crisis in the Faroe Islands similar to that experienced in many other Northern and

Arctic communities based on natural resource exploitation, e.g. fisheries.

Even though many communities have learned to diversify their economies





resource exploitation still remains at the core of their economic survival. In addition, international competition is hard, as the Faroe islands know only too well having experienced several crises. The economy has thus developed from small scale activities based on linkages between fisheries and on-shore processing, to large scale off-shore activities concentrated on very few companies, and with the main activities done off-shore.

The most promising potential for future development, however, is still to be found within fisheries/fish processing, aquaculture, alternative natural resource exploitation and finally in the oil industry. Thus far the two most important business sectors in terms of exports are fisheries/fish processing and aquaculture. But if resource exploitation is to remain a core economic activity in the future there is a need for fundamental change. To secure their long term survival these communities need to restructure their resource exploitation in such a way as to meet both the demand for profitability in a global economy and at the same time attach their economic activities to the local community. They will not employ as many people as before, but they will be able to “earn hard cash” for the import of necessities and they might facilitate other activities/production via forward and backward linkages to suppliers.

The options are outlined in the attached table, and the solutions are discussed below.

A different strategy for solving the Faroese import-export dilemma is to become less dependent on imports. Most imported necessities cannot be replaced by domestic products. But one of the most important import articles, oil, can potentially be reduced. By exploring natural energy forms like water, wind, geothermal heat, tidal power etc., combined with a general reduction in consumption, the Faroe Islands can reduce its consumption of oil by about 10–15% in the foreseeable future. In addition its citizens are well-educated and the workforce is highly skilled. The infrastructure is well developed; the standard of living is

relatively high with a welfare system very similar to the Nordic Welfare Model.

With a population of less than 50,000 inhabitants, the Faroese economy is a mini-economy with a limited workforce and a limited potential for specialisation. In a globalised world, with a growing international division of labour, specialisation becomes increasingly important and global competition becomes harsher. This means that the Faroese have to be careful about what kind of businesses they specialise in. They need to be something which other (larger) nations cannot do better, since they have the advantage of size/scale.

Business	Strengths	Weaknesses	Opportunities	Threats
Fisheries and fish processing	<ul style="list-style-type: none"> <li>• Knowledge or skill</li> <li>• Local capital</li> </ul>	<ul style="list-style-type: none"> <li>• Expensive energy</li> <li>• Distance from markets</li> </ul>	<ul style="list-style-type: none"> <li>• Foreign currency (Hard cash)</li> </ul>	<ul style="list-style-type: none"> <li>• Fears competition</li> <li>• Over-exploitation</li> </ul>
Aquaculture	<ul style="list-style-type: none"> <li>• Knowledge or skill</li> <li>• Capital extensive</li> <li>• Clean environment</li> <li>• Isolated location</li> <li>• Good infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Expensive energy</li> <li>• Distance from markets</li> </ul>	<ul style="list-style-type: none"> <li>• Foreign currency (Hard cash)</li> </ul>	<ul style="list-style-type: none"> <li>• Fears competition</li> <li>• Negative environmental impacts</li> </ul>
Oil	<ul style="list-style-type: none"> <li>• Skills (maritime)</li> <li>• Entrepreneurial spirit</li> <li>• Relatively good infrastructure (harbors)</li> </ul>	<ul style="list-style-type: none"> <li>• Size</li> <li>• Capital shortage</li> <li>• Low level of specific skills</li> </ul>	<ul style="list-style-type: none"> <li>• Foreign currency (Hard cash)</li> <li>• New business (supply &amp; service)</li> <li>• Global capital interest</li> </ul>	<ul style="list-style-type: none"> <li>• Negative environmental impacts</li> </ul>
Alternative resource exploitation	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• Little or no knowledge or skills</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>



In the context of future climate change we can expect northern Atlantic or Pacific fish species to move into the Arctic creating new alternative fisheries grounds. Where primary production can support new fisheries, these would likely be far from settlements with any tradition of fishing, accessible mostly to long-distance, capital-intensive vessels. Northern deepwater ports such as those of northwest Russia, northern Norway or Iceland would have the most direct access to new Arctic fisheries. Because the Arctic Ocean will be a cold and seasonally dark place even under reduced ice conditions, we could assume that predatory fish species would most likely be slow-growing and long-lived, as they are in deep water to the south. Such resources could quickly be overfished beyond their capacity to reproduce and the risk of overfishing would likely be exacerbated by jurisdictional questions and the industrial nature of fishing in Arctic waters.

Because the fishing industry operates in complex environments where many things change at once conflicting explanations can almost always be proposed for a target species' decline. Natural explanations, such as environmental factors or predation by marine mammals, have political appeal because neither regime management nor the fishing industry is blamed. Environmental variation and species interactions probably do play roles, although not necessarily dominant ones, in many fisheries crises. The direct ecological effects of the fishing activities listed above, can have indirect consequences by increasing the vulnerability of fish populations to environmental change.

This last point is important. For example, removing most of the large, older individuals (especially, the high-fertility older females) undercut cod populations' natural adaptation to their variable northern Atlantic environments. Similarly, removal of food species makes ecosystems less resilient. Ecological change might involve either

wild swings or regime shifts to a new stable state, in the worst case trending toward one in which the dominant animals are Cnidaria and other invertebrates without economic value.

Growing global competition combined with the over-exploitation of natural resources, mainly due to over-capacity, has created a structural (economic) crisis in many Arctic/northern communities based on natural resource exploitation, e.g. fisheries. Even though many communities, e.g. the Faroes, have learned to diversify their economies, resource exploitation still remains at the core of their economic survival.

If resource exploitation is to remain a core economic activity in the Arctic however fundamental change is required. To secure their long term survival these communities need to restructure their resource exploitation in such a way as to meet both the demand for profitability in a global economy and at the same time anchor economic activity in the local community.

### **Another shift in the attraction of the North**

Tourism development in the Arctic mirrors the general trend towards the increasing popularity of nature-based tourism worldwide. Vast wilderness and seemingly pristine areas, the feeling of solitude and sublime peacefulness has an ever larger attraction value to affluent travellers. Tourism is in itself an activity penetrating new frontiers. In the worldwide geography of tourism and travel there is a saying that the next frontiers are outer space (Virgin Space services), sub-sea excursions and the polar regions (particularly the North). Predictions of future growth in the Arctic tourist industry indicate that most categories will increase—such as large vessels and land-based tourism—whereas only the categories of smaller vessels (carrying fewer than fifty passengers) and yachts respectively will remain consistent or increase just slightly.

An important and enabling factor here besides more demographic and economic aspects is definitely the projected extension of the navigation season causing an awareness of the increased interest in growing marine transport (including passenger vessels) and access to resources. The projection first widely disseminated in the ACIA report published in 2004 where that the season for the Northern Sea Route was projected to increase from, at the time 20–30 days a year to around 150 days a year in 2080. The minimum ice extent in 2010 indicates that the acceleration rate of the ice melting has speeded up.

In recent decades tourism has become a major industry in some areas of the Arctic region. In relation to cruise tourism it is necessary to emphasise Arctic destinations in a global context, since Arctic and sub-Arctic destinations are merely routes in the itineraries of the cruise lines. In some cases the passengers decide not to disembark but stay in their cabins or enjoy amenities onboard while the ship stays in port. The cruise vessel is itself a destination and can be in direct competition with the land-based destination, however exotic these destinations may be.

As pointed out by several sources the supply of recreation and shopping onboard the vessels has increased significantly in the last decade, resulting in passengers staying and spending their money onboard rather than on land. Other studies have indicated that cruise passengers are to an ever-larger extent a more varied group than those of previous decades. In general, the opposition towards mass sailing with thousands of passengers on board has grown. The people who oppose this mass tourism are experienced cruise tourists. According to most studies on cruise and passenger vessel traffic in the North, and particularly in the Arctic, a larger proportion of passengers are travelling on what market analysts term “niche” cruises. These are a combination of expedition cruises based on the Lindblad model and include ice-breakers and specially tailored tours where lecturers and

libraries are more important than luxurious on-board amenities. The common belief that cruise liners are always looking for new destinations and new harbours is true in some respects. The cruise liner company’s interests lie in the possible profit at the destination, the possible cost, and the possible profit on board before and after arrival at the harbour.

Along with increased rate of tourism comes market segmentation, welcomed by most tourist authorities as it delivers increased diversity of tourist supply and demand in the regions. An illustration of the diversity of tourist activities in “wilderness areas” may be illustrated by the “World Ice Golf Championship” in Greenland, supposed to be “the only golf tournament in the World where golfers play between huge icebergs.” From that perspective tourism will reinforce conditions of living in many remote places where development of this sort is taking place and complementing other more traditional or industrial activities. By that same token, as long as it is focused on new ways of promoting tourism and supporting sustainability, it is a positive development in the Arctic economies.

Another important factor is the assessment of tourism’s contribution to social and economic development related to cultural continuity. Many studies have focused on the transformational power of tourism within regions and rural areas. This is relevant for the Arctic as it is the most sparsely populated and predominantly rural region of the world. These sparsely populated destinations, unlike the variable capacity of cruise vessels, can be quickly overwhelmed by mass tourism.

The small communities where rural cultures and lifestyles, including subsistence, may be disrupted by tourism are also the communities that most lack job opportunities. Research on small business development in Alaska found that small rural communities near scenic areas, especially national parks, had a greater quantity

and diversity of small business development and community income.

This tension within the notion of tourism, providing opportunities for community development while simultaneously disrupting cultural and community cohesion and environmental quality, is well documented. Communities prefer tourism scenarios which increase local employment without bringing large numbers of tourists into the community but in only a very few cases, due to its seasonal and conjuncture-sensitive nature, has it formed the basis for community development. Most of the people concerned visited areas by cruise passenger excursion over the short tourism period; the feeling of “invasion” among local inhabitants is however rising.

What can, however, be predicted with some certainty is that the regional effects of tourism will differ significantly between areas. Some regions will experience no additional tourist activity, others small scale/cultural tourism complementing activities in other sectors, while will experience the addition of year-round tourism due to significantly improved access by sea and road, whereas yet others will experience large scale tourism, coupled with the increased risk of the social and environmental stress of natural habitats, wildlife and communities.

Though ownership issues were beyond the scope of this study it is worth noting that several studies illustrate its importance. Well documented in a series of tourism research articles, the ownership of tourism resources influence residents’ perceptions and attitudes towards recreation and the impacts of tourism development as well as visitor satisfaction. This is critical knowledge for tourism developers and planners. Research on tourism development and neo-colonialism and enclave economies shows the social and cultural impacts of tourism asset ownership patterns. Many studies have recently argued that tourism is a “hyper-globaliser” which if not well managed can pose a threat to local resident’s sense of “fate control”.

One of the shortcomings of prediction is the limited knowledge of tourism’s effects on individual regions and communities. Better knowledge and monitoring of the rate of growth or decline in tourism activity is therefore needed. Furthermore it is necessary to gain an overview of how tourism activities affect the well-being of people living in the circumpolar north, if and how tourism activities are expanding with climate change, especially as this pertains to the opening of the northern sea route as a result of the loss of sea ice. In gaining that overview it is important also to study the particularities of places.

### **Determinants, Patterns and Trends**

Current optimism over the future of the Arctic economy is based on three observations. First, the north has always been a storehouse for the world’s natural resources. We have long known that vast reserves of natural resources lie under the lands and off the coasts of the earth’s northern regions. According to the USGS the Arctic holds about 30% of the world’s natural gas, 13% of the world’s natural gas liquids and approximately 22% of the world’s conventional oil.

The potential for opening this vast storehouse of resources has been increased by the rapid rise in commodity prices the world is currently experiencing. This rise stems from the huge growth in demand from emerging nations like China.

Proposed resource development projects in the Arctic include oil and mineral planning and include a number of exploration projects in Greenland. The potential for iron ore projects in Canada’s Nunavut territory has attracted the attention of numerous international mining companies. *British Petroleum’s* recent joint venture with one of Russia’s main energy firms was expressly to exploit potentially huge oil and gas deposits on the Russian Arctic shelf.

The final element of Arctic optimism reflects the prospective effects of global warming in the Arctic. Warming will free much of the Arctic of ice and snow cover for a greater period of time each year. It is suggested that this warming will allow ice free travel in Arctic seas and lower the cost of access and development to the Arctic's resources. Access by sea will allow lower cost delivery of supplies and less expensive shipment of the resources to markets.

This optimistic view fits neatly into a major determining relationship for future natural resource development in the Arctic. While in the past, some resource development occurred for strategic or national purposes, it is likely that most Arctic development in the future will have to meet the market test. The governments of Arctic nations are unlikely to have the financial resources to subsidise the high cost of development in the Arctic. Resources in the far north will be developed for the international resource markets only when market participants expect the development to be profitable. This relationship will determine the future pattern of Arctic resource development.

The optimistic view of the future of northern resource development sees the predicted changes in resource prices and costs as encouraging for development. Rising prices and falling costs will undoubtedly increase the profitability of northern development. Recent changes in the world economy and the long term forecast of global change provide the conditions which increase the probability that known and unknown resource deposits will be developed throughout the Arctic. Unfortunately for the optimists there are several reasons why it would perhaps be prudent to curb the enthusiasm a little in respect of future Arctic resource development.

The first is that the effects of global warming in the Arctic are not always beneficial to development. While warming may open the Arctic seas for transportation and the continental shelf for development, there is evidence that climate change may make it more costly to develop

resources on land. Changes in flooding, permafrost, and snow cover will increase the cost of production even in areas with significant current resource activity. Warming may shorten the period during which ice roads allow exploration and development activity on the tundra. Moreover, the thawing ground may destabilise existing systems of roads and pipelines and other industrial infrastructure installations in the north. This will impose costs on existing Arctic activity as well as increasing future costs. Even with warming, the sea ice will be unpredictable which adds an element of risk to the development of the capital-intensive investment required for Arctic resource production.

The second factor tempering the optimism for the future of the Arctic economy is that the recent dramatic increase in commodity prices is not likely to be a long run trend. The world has experienced high and rapidly increasing prices for periods in the past, but over the long run most resource prices have fallen in real terms. Some recent analyses have suggested that the current period is different from the past with some prices diverging from previous trends. Increased volatility in resource prices and increases in real oil prices are patterns that have been predicted. The suggested cause here is the recent industrialisation of the world's emerging economies.

Historically, high prices for any resource have provided the incentive for exploration to find more of the high price resource and innovation to find technological substitutes for the resource. The north has seen new technology replace existing northern production starting with petroleum replacing whales and continuing through the development of fish farming as a competing source of northern fish. For Arctic oil and gas this includes the development of techniques to produce oil and gas from unconventional sources. These new techniques in North America have resulted in what *the Economist* magazine called "An Unconventional Glut" describing the market

for natural gas. The new unconventional gas may be one reason for the postponement of the Shtokman field development in the Barents Sea. Similar technology is being introduced to open up previously out of reach oil in the continental USA.

In addition to the new technology high prices encourage consumers to substitute the high cost resource in consumption. This “consumption effect” will be reinforced by the policies of governments around the world as they attempt to reduce their consumption of fossil fuels. Taxes and restrictions on fossil fuel use and subsidies to encourage the use of alternative energy sources will strengthen the natural effects of the market.

Together these effects suggest that high and rising prices of Arctic resources may not be a long term phenomena. They are likely to face the long run pattern of resource prices which is declining real prices. Two further effects of price changes will limit Arctic development. The new volatility in resource prices increase the risk and therefore will decrease the potential for investment. Furthermore any long run increase in resource prices is likely to create inflation in the cost of producing resources. The production cost effect will work against any lowering of costs from global warming. In spite of these conditions, new activities are taking off, in some cases in compliance with the involved communities, and in others affected by the objections to new activities taking place, potentially damaging the environment and living conditions in the region. Box 15 highlights a case where a new activity is, on one hand, embraced by one community, while another clearly rejects it.

A third reason which suggests Arctic resource development will be more limited than the optimists believe is the fact that the north remains a high cost region of production. Costs are high because it is far away, it is empty and it is situated in a difficult environment. In most parts of the north development occurs on a frontier with limited in-

frastructure and few available workers; providing these imposes large costs on development. Historically, large bonanza scale resource deposits, like Alaska’s Prudhoe Bay, were required to open up a region to development.

There are several reasons for high cost development in the Arctic. They include harsh winters requiring special designs, poor soil condition requiring additional site preparations; potentially damaging ice pack in Arctic seas; long supply lines which require large inventories of parts; limited transport access; and higher wages and salaries required to induce personnel to work in the region. Of these only transport costs will be positively affected by warming. Bad weather and variable conditions may also result in the delay of Arctic projects. Extended and uncertain schedules increase the cost and uncertainty surrounding development. This potentially explains why 15 oil and gas fields have been discovered in the Arctic but none have been developed.

Previously a portion of the costs were assumed by various public or semi-public organisations. Public services and cooperatives remain important types of organisations in this context. But increasing limitations on public involvement (see box 16) add to the complexity of maintaining the same types of services. These changes may be beneficial in the sense that they are based on local initiatives and the building of local capital that might sustain some of the impacts of global change. But they also render some processes of change rather uncertain.

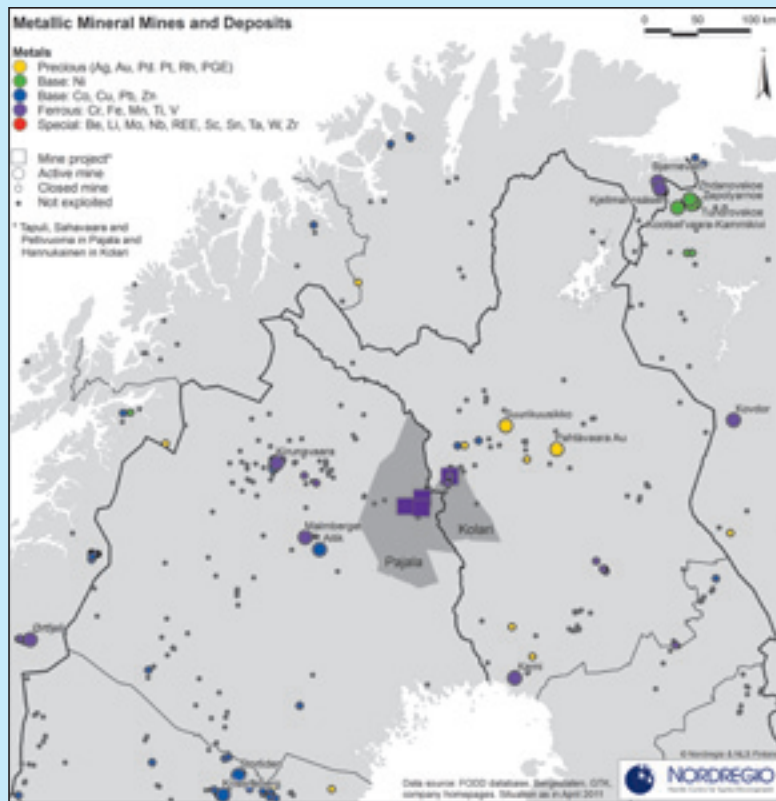
The fourth reason for, at best, limited optimism for the Arctic economy is the governments themselves. Government can affect the cost of development through taxes and regulation. This is not to suggest these are always bad but they do affect development prospects. A more important effect of government’s role in development might be limits to access. Access to the North’s resources may be impaired or denied by government policy. Environmental concerns and conflicts with other users of the land may



increase the cost of development through delay or remove the resources from consideration. *Shell's* current attempt to drill in the Arctic seas off Alaska has become costly be-

cause of regulation, court fights, and government delays which have increased the cost of development. Future concerns about fossil-fuel dependence and global warm-

### BOX 15: NEW MINING ACTIVITIES



The existence of iron-ore in Pajala has been known about since 1918. The rights to extract it were previously owned by *LKAB*, the Swedish state

company. Now they have been taken over by the private company, *Northland Resources*, which is registered in Canada. The largest shareholders are

however Norwegians. Right now the project is in its detailed planning phase to start production in Tapuli, Stora Sällavaara and Pellivuoma. The confirmed findings of iron-ore at the three sites are close to 200 million tons, but these are just what have already been confirmed. The total estimated amount in the field often called the Pajala-shield, can reach volumes equivalent to what has been produced in Kiruna, i.e. around 1 billion tons.

The Kolari–Pajala and Sokli mining areas combined would create a significant number of new job opportunities in Lapland. The construction phase has been estimated to 12,000 man-years. In the production phase, the mining projects could create over 3,600 permanent jobs. Community attitudes towards the projects, however, differ considerably. While the population in Pajala is very enthusiastic about the new possibilities, the communities across the border in Kolari in Finland display an altogether different attitude to the situation. In Pajala they have never experienced the effects of such large projects, while on the Finnish side of the border the population is more hesitant due to previous experiences with similar projects.

ing may result in further restrictions on Arctic development.

International economic sovereignty may also limit development if it increases the uncertainty facing developers. A number of countries have overlapping claims to areas of the Arctic Ocean. Boundary disputes in this new frontier may also delay, increase the cost, and possibly even eliminate development opportunities.

In addition the question of alternatives to resource exploitation may be rather bleak. Even if the expansion of the tertiary sector has been remarkable in some parts of the Arctic (discussed in Box 16) the content of the activities may very well be meagre. The third sector is depending on human capital which tends to leave the region. Consequently there may be troubles in finding the niches where activities in the Arctic may become in demand by the world market. Innovation and creativity are keywords in this context. An idea of what this may include is discussed in box 17, using Russia as an example.

A fifth reason centres on the questions of influence and of the ownership of the resources and/or rights to use them. Most Arctic communities/nations only have local or regional authority, they are primarily sub-national entities, and they are parts of states where the majority of the population are non-Arctic and whose interest therefore might not always correspond with the Arctic communities/nations themselves. Consequently the Arctic communities have little or no formal influence on an international scale. They are considered “non-powers”.

This lack of influence combined with the growing international interest in the Arctic from other nations, both Arctic and non-Arctic, from supranational entities, e.g. EU, and from transnational corporations makes the questions of influence, rights and ownership even more important. If the Arctic communities are to benefit from the exploitation of non-renewable resources they need to address at least two factors. First, they need to secure their own rights in connection with the exploitation of resources in their continental shelf. Second, they need to come to terms with and define their own involvement in their future exploitation (e.g. should it be royalties or should they be indirectly or directly involved in the exploitation?

These factors do not mean that resources will not be developed. An evolving understanding of the nature of potential reserves, changing resource prices, and Arctic warming may in fact positively affect development. Nevertheless, as today the North’s international economy will likely be dominated by resource production.

The resources that are produced are most likely to be concentrated in regions that offer low cost production. Existing production regions will see continued growth since existing infrastructure and technology are available to lower the cost of new projects. Resource production is also likely to occur in areas close to tidewater which reduces transport costs. Finally, areas in states with low tax rates and efficient regulation are also likely to be regions of potential development.

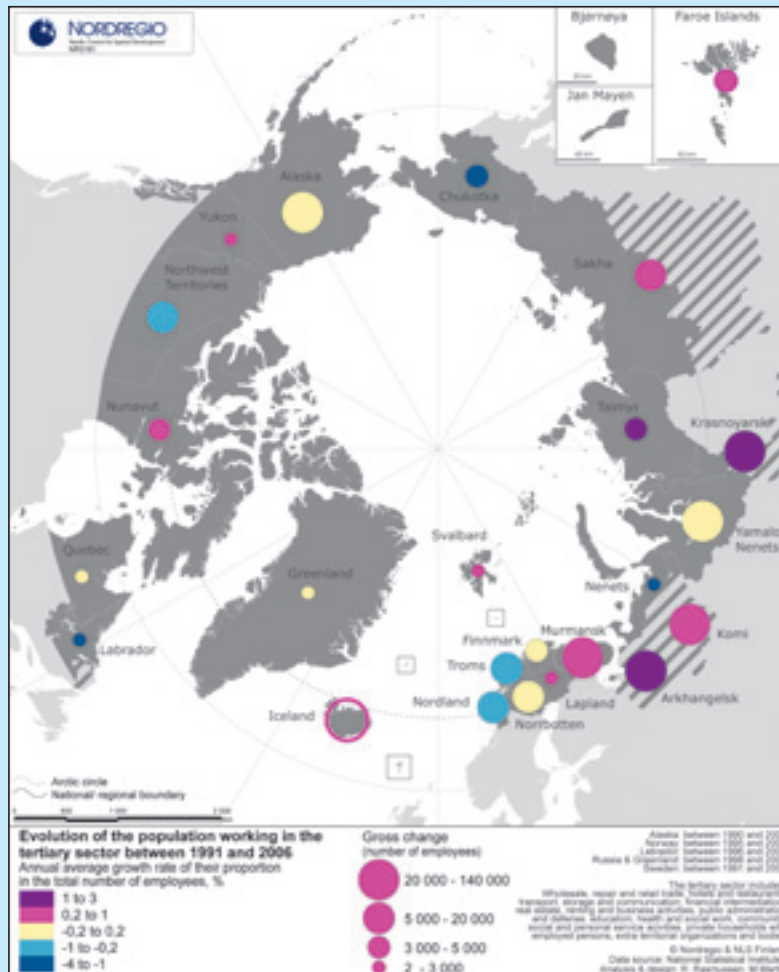
### BOX 16: THE SERVICE SECTOR AND THE FUTURE

In many parts of the Arctic government jobs are the main source of full-time wage employment, providing jobs in the

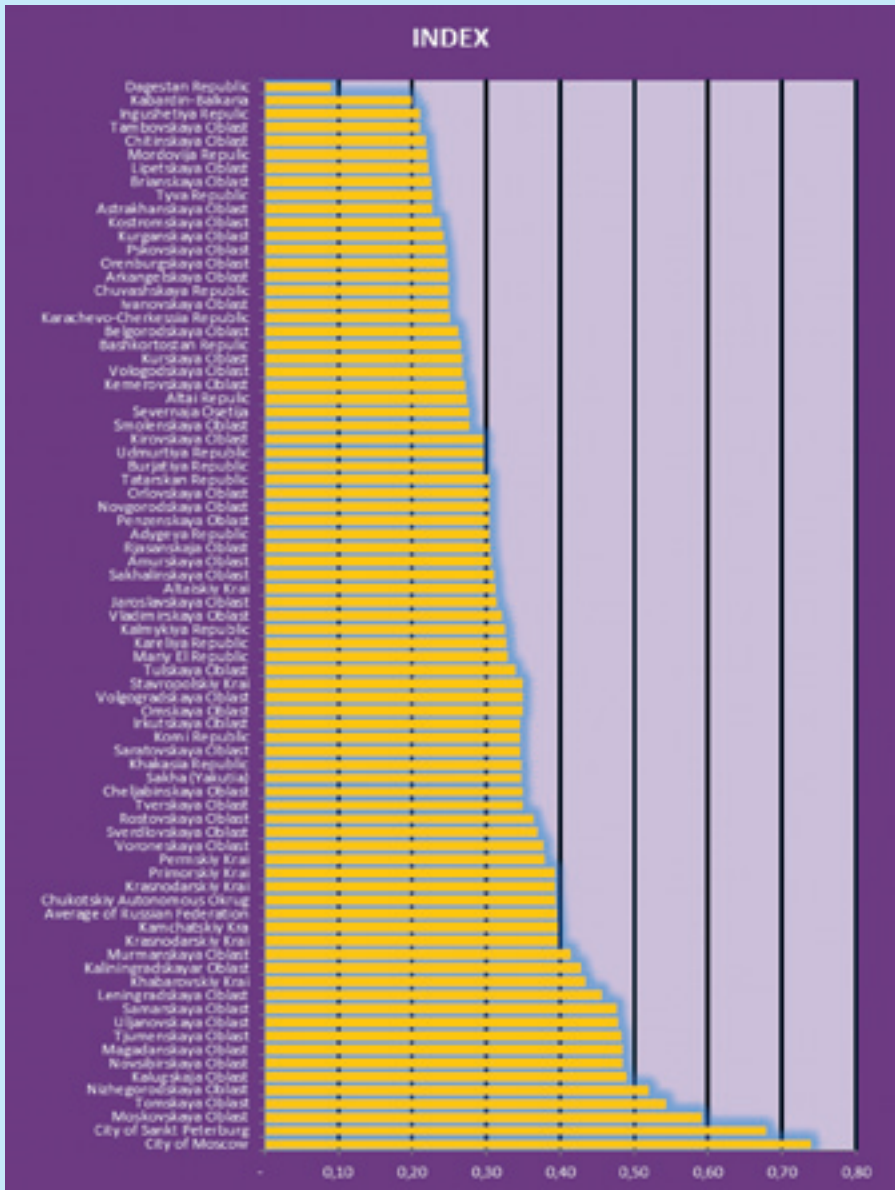
health, education, and social services sectors. In most cases also infrastructure, water supply, sewage and energy

supply are included on the municipal or government payroll. The advantage of full-time government positions is that they provide a substantial injection of cash into the community. The map shows the role of this tertiary sector in the Arctic, with the size of circles showing the absolute number of employees in this sector, while the colours illustrate the changes from 1991 to 2006, red colours showing regions with relative increases, blue colours indicating regions with a relatively balanced situation, with yellow colours also showing regions with a relatively reduced role for the service sector. Most regions have experienced increased (11) or balanced (5) situations, while a similar number (6) have experienced a decline.

The regions with relative decline are NWT and Labrador in North America, Chukotka, as well as The Nenets Autonomous *Okrug* in Russia, and Troms and Nordland in Norway. The decline is not because the absolute number of persons involved in the service sector has declined, but rather, because the increase in other activities has been of a larger magnitude.



BOX 17: THE ROLE OF THE CREATIVE CLASS



The researcher Alexander Pelyasov has emphasised the need for new creativity to be developed in the Arctic in order to cope with the economic challenges with an emphasis on human creativity. For many small communities across the Arctic the lack of job opportunities has led to population decline. There are also examples of communities, however, where a combination of local entrepreneurship, engaged political leaders, and government initiatives have created more hopeful situations, where thriving businesses as well as cultural revival gives people a meaningful way of life and thus gives the community viability. In order to do this, those creative persons who might choose to leave should be given the opportunity to develop their qualities locally, and in addition to this, new talents should be attracted.

In summary:

It is needed to fight more energetically to attract talent to every Arctic region, and that labour contracts should be adjusted to better correspond to the needs and values of those with talent from outside.

It is critical to strengthen the view of the Arctic as a land of discovery; adventure territory and as a magnet for researchers such that the cities of the Arctic can be concentrations of talents from across the world.

Balance of push and pull factors for talent is currently negative for the Arctic.

Key barriers to attracting talent to the Arctic are:

General decline in the Arctic population over the last couple of decades;  
Female flight due to the fact that education tends to prepare them for more urban types of jobs, increasing both the attraction of cities, and the likelihood that an individual can successfully adapt to life there;

Greater community involvement means a creative answer to the challenges of the climate change.

The key features of Arctic communities should be tolerance openness, both of which are essential strengths in the new knowledge economy.





Responding to changing  
environments and  
responsibilities

Non-scientists, experiencing the weather, sometimes mistake its fluctuations for climate change. If the average drifts up or down over decades and centuries, we have climate change. Climate is more predictable than weather. Both types of variations, however, whether it is short term on weather or long term on climate, require to be taken into account, resulting in a re-thinking of how to plan for the future.

### Natural and human-induced environmental change

It is generally accepted that climate change and its effects in the Arctic may be the most serious environmental issue threatening these northern environments. Discussions continue on the speed and exact direction of the changes, but it is clear that average annual temperatures in the Arctic have increased. Again there are different interpretations regarding the precise social, environmen-

#### MAP 7: PROTECTED AREAS IN THE ARCTIC.

The map shows protected areas classified according to the IUCN *Protected Area Management Categories*. Use of these categories reflect very different protection strategies in relation to types of protection as well as national discourses on how to perceive what should be protected, and how.

According to IUCN a protected area is: "A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values".

Major areas in Quebec/Nunavik are categorised as *Natural Monuments*, a category that is absent in other parts of the Arctic except a few spots in other parts of Canada and Alaska. This category includes protected areas managed mainly for the purposes of the conservation of specific natural features and would typically be "areas containing one, or more, specific natural or natural/cultural feature which is of outstanding or unique value because of its inherent

rarity, representative or aesthetic qualities or cultural significance".

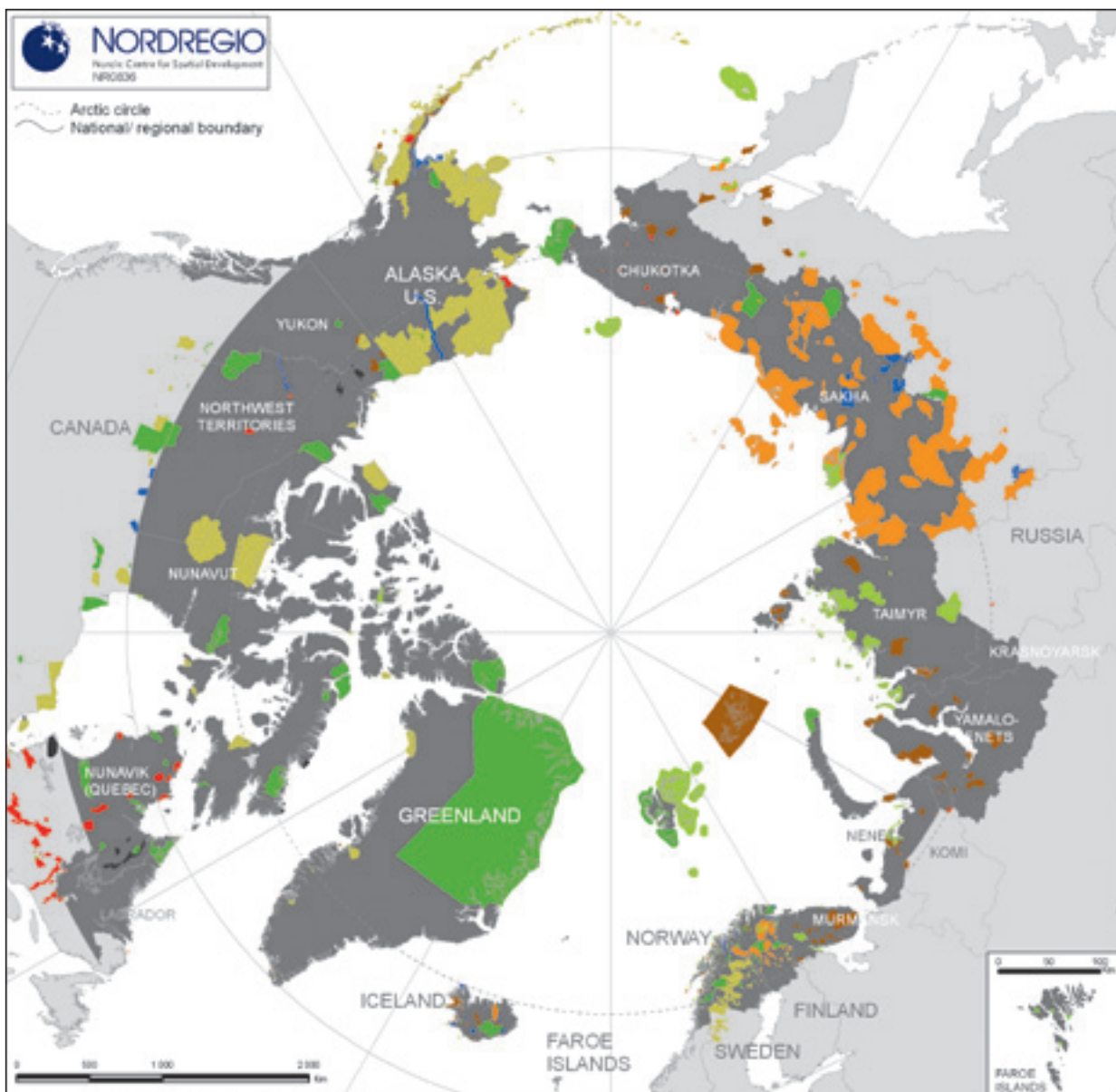
In Russia and Alaska the category *Wilderness Areas* is very common, but is rarely found in other parts of the Arctic. This category includes protected area managed mainly for wilderness protection and includes "large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition".

In Russia a very frequent form of this type is the *Protected Areas with Sustainable Use of Natural Resources*, a category also present in Fennoscandia and Iceland, but absent in other parts of the Arctic. This definition entails protected area managed mainly for the sustainable use of natural ecosystems containing "predominantly unmodified natural systems, managed to ensure long term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of

natural products and services to meet community needs."

The Categories *Strict Nature Reserve* and *National Parks* are among the most common forms existing in the whole circumpolar area. The Strict Nature Reserve includes protected area managed mainly for science and entails areas of land and/or sea "possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring." The National Park category covers protected areas managed mainly for ecosystem protection and recreation including "natural areas of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible."





## Protected areas in the Arctic

Classed after IUCN Protected Area Management Categories

- Ia - Strict Nature Reserve
- Ib - Wilderness Area
- II - National Park
- III - Natural Monument
- IV - Habitat/Species Management Area
- V - Protected Landscape/Seascape
- VI - Protected area with sustainable use of natural resources
- NA

Arctic region defined as in Arctic Human Development Report

Alaska (US); CA - Yukon, Northwest Territories, Nunavut, Nunavik (Quebec), Labrador  
Greenland, Iceland, the Faroe Islands; NO - Nordland, Troms, Finnmark; SE - Norrbotten;  
FI - Lappi; RUS - Murmansk, Nenets, Vorkuta (Komi), Yamalo-Nenets, Norilsk & Igarka  
(Krasnoyarsky Krai), Taimyr, Sakha (13 northernmost subregions), Chukotka

Source: Arctic Data Portal accessed March 2011  
IUCN Categories available at <http://www.iucn.org>

Analysis & design: J. Sterling

tal, economic and health impacts which may follow. For the Arctic's inhabitants, however, the future will probably include challenges such as higher temperatures, melting sea ice and glaciers, sea-level rise, and probably also increased precipitation in some areas and drought in others.

The current discussion about the impacts of climate change in the north, however, is often one-dimensional, identifying very simple cause-effect relations and pointing to a unique situation thus tending to ignore other mechanisms and potentially disruptive climate scenarios. It also ignores historical and pre-historical evidence demonstrating that the earth's climate has repeatedly shifted abruptly and dramatically in the past, that it is capable of doing so in the future, and in addition, that these climate shifts do not necessarily have universal, global effects.

While the question of establishing protected areas in the Arctic as shown on map 7 tends to be generally accepted as long as it does not have too serious implications for the access to much needed resources, the potential impact of the exploitation of these resources (map 8) may create consequences far beyond what has been experienced in the Arctic thus far.

Human-induced environmental changes include habitat fragmentation caused by roads, transmission- and pipelines, easy access to remote areas by boat, off-road vehicles and airplane. Overfishing and hunting, by-catch problems, disruptive techniques (the effect of trawling on the seabed) as well as the introduction of new species and diseases – a problem which seems to be accelerating due to climate change and increasing traffic – are all “human-induced”.

#### MAP 8: ZONES OF MARINE ACTIVITY IN THE ARCTIC

The map illustrates the complexity surrounding the future of the Arctic Ocean area particularly in respect of access to resources, primarily based on the Arctic Council *Arctic marine Shipping Assessment 2009 Report*. This report emphasises that the regions where there are currently high concentrations of Arctic marine activity include the North Atlantic ocean, the Barents sea and along the coasts of northwest Russia. The increase in cruise ship activity in ice-laden waters however sees an increased level of risk of accident as many of these ships are not built for Arctic waters. In addition it is argued that the conducting of more research activities in the central part of the Arctic Ocean may also consti-

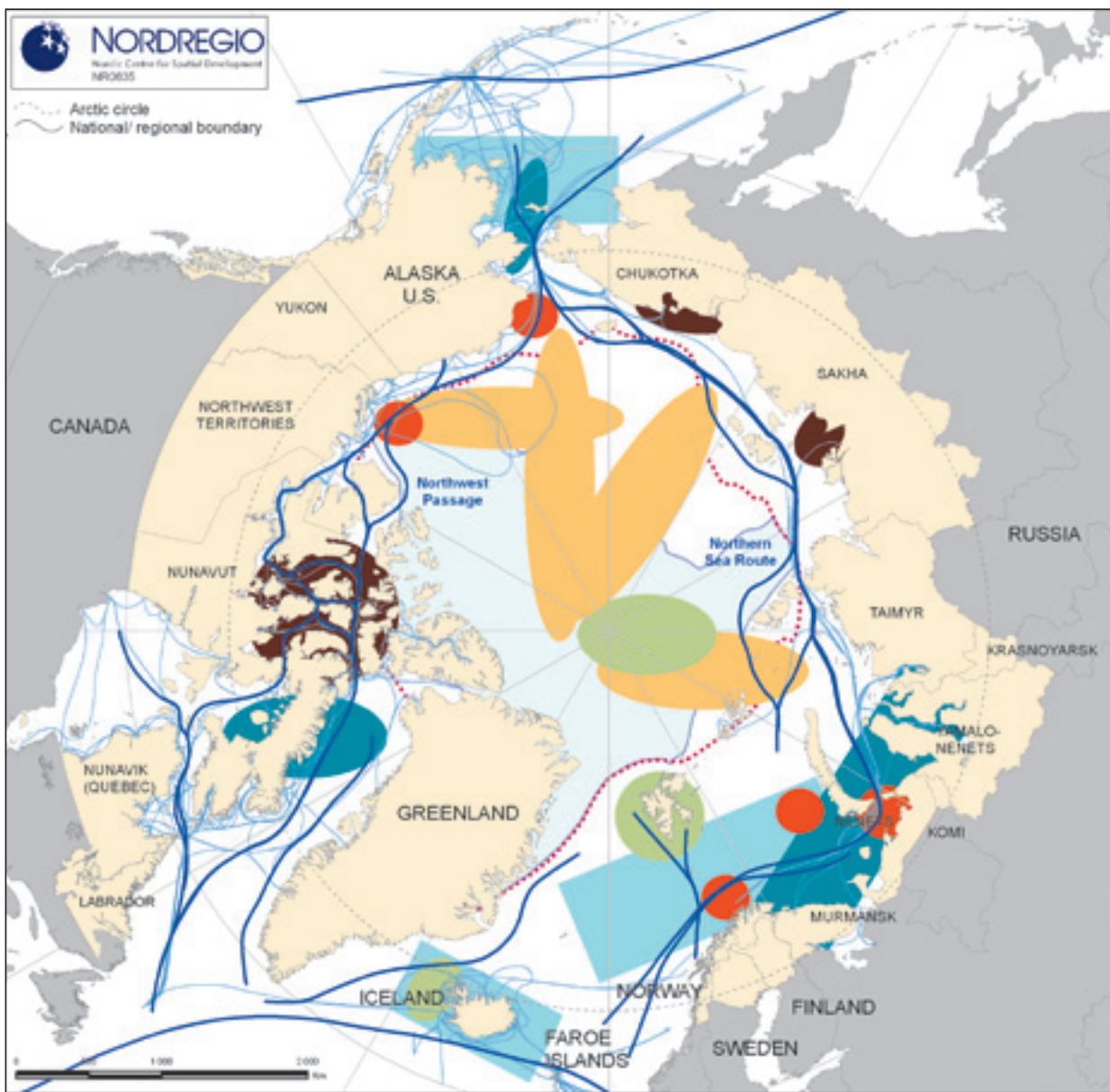
tute a risk. The major concern, however, concerns what is going to happen in the the coming decades as the sea ice retreats, opening the way for a significant potential increase in maritime activity. The map shows where these new activities are expected to take place and the sea routes that may become important in relation to these future activities in the region. While most of the activities so far have been conducted by the Arctic states themselves, primarily by Russia, based on long experience of dealing with the special conditions of working in ice covered waters, it is expected that in the future marine activity in the Arctic will include many non-Arctic stakeholders who may not necessarily however be

as aware of, or prepared for, these types of problems or situations.

The report emphasises that activities during the first decade will be characterised by destination-based more than trans-Arctic activities. This implies a lack of major ports, except for places where activities have been frequent for decades, such as northern Norway and northwest Russia. As has been emphasised in the main text on the question of accessibility, the establishment of a larger port structure in the Arctic Ocean requires significant backup support in terms terrestrial connections. Such an infrastructure is currently almost wholly absent (see map 15), and is extremely expensive to put in place.



Arctic circle  
National/ regional boundary



### Zones of marine activity in the Arctic

- Hard minerals
- Marine tourism
- Major fisheries
- Oil and gas
- Summer sealift
- Research
- Northwest Passage and Northern Sea Route
- Other shipping lines in the Arctic

Arctic region defined as in Arctic Human Development Report

- Sea ice extent in 2007
- Average ice extent for September in 1979-2000

Sources: Grid-Arendal, Arctic Council, 2009, Arctic Marine Shipping Assessment 2009 Report. Original by H. Ahlenius  
Shipping lines from ArcticData Portal  
Adapted by Nordregio 2011. Design by J. Sterling

In addition, many basic commodities, wrapping materials, chemicals and other consumer goods are imported from the south and eventually end up as garbage. Sewage is pumped directly into the sea and fossil fuels are necessary for all types of boats and vehicles, and in many places for heating too. Added to this picture of local pollution come the so-called trans-boundary contaminants.

Energy extraction, oil and gas pipelines, some occasionally rusting and leaking, all impact large tundra areas as has been the case with recent leaks from Russian oil pipelines raising questions about their reliability and safety. Moreover, as the *Exxon Valdez* incident in Alaska's Prince William Sound in 1989 illustrates the dangers of transporting oil by sea, while clear-cut logging is changing ecosystems, causing erosion, impacting the speed of permafrost melting.

The fact that populations throughout human existence have often managed to cope with change and through ingenuity and insight adjusted to the new situations is however often ignored in the debates on this issue. Several natural processes are working in parallel here, sometimes enhancing and sometimes counteracting each other. While one process may be predictable, the interaction between different processes will usually be unpredictable. The multitude of possible human actions only adds to the complexity. The possible adverse effects of human activities should however be clearly emphasised. Human activities influence the environment and reduce the value of forests, tundra and the sea in terms of original biodiversity and habitat.

### **The basic processes**

Most scientists who study climate, ice and oceans agree: the earth's climate is changing. In the past, significant but often gradual changes occurred due to natural forces such as solar and orbital variations, the movement of land masses, the intensity of volcanism and so forth. No

natural forces have been found to explain the uneven but relatively rapid rise in average global temperatures since the early 20th century. Instead, it appears most likely that this modern warming results from the increasing concentration of CO<sub>2</sub> and other greenhouse gases – so-called because they are transparent to visible light bringing heat from the sun to earth, but tend to absorb the infrared heat the earth radiates back towards space, thus trapping more heat on earth – in our atmosphere.

The pace and regional details of future climate change remain areas of uncertainty and active research. While critics point to scientific uncertainty as a reason to delay fossil fuel reductions, scientists note that uncertainty has two sides: change might come faster than expected. Arctic change in particular seems to be moving faster than the IPCC projected just a few years ago.

Taking a long view of central Greenland climate, showing 3,000 years of temperature estimated from ice cores, the Vikings reached Greenland around 985 CE during the Medieval Warm Period, which corresponds to an outstanding temperature peak. An earlier and even warmer time in Greenland can be seen to have peaked around 100 BCE. The ice core temperature reconstruction extends only up to 1,855 CE, however – a point overlooked by many non-scientists who have mistaken its most recent values for the “present,” and concluded that the ice cores show a Medieval Warm Period warmer than now. In fact, all that this ice-core shows by itself is that central Greenland was probably warmer during the Medieval Warm Period than it was in 1855, when that region was still gripped by the Little Ice Age.

For a better comparison with more recent values average temperature over the period 1987–1999 measured by automated weather stations at Summit Greenland, the same location as the ice core show that the 1987–1999 average is more than 1° C warmer than the medieval peak. In the decade since these measurements were taken Green-

land's temperature has warmed further. Large areas of the ice sheet even in North Greenland are now losing mass.

Large ice sheets melt in timescales measured in decades or centuries. Their contribution to rising sea levels is small at present, although that may change. Arctic Ocean sea ice, on the other hand, melts on seasonal to yearly scales and has emerged as the most prominent sign of global change. Because this sea ice is floating, its fate has little effect on sea levels, but it is highly visible from space and has broad implications for transportation, ecosystems and weather – and for the thermal properties of the planet.

Since 1979, the era of satellite observation, the September minimum extent has declined by about 810,000 km<sup>2</sup> per decade. Less complete observational data from submarines and satellites confirms a decline going back to the 1950s. Although the Arctic was, in the distant past, ice-free indirect measurements suggest that the recent decline is unmatched for at least several thousand years.

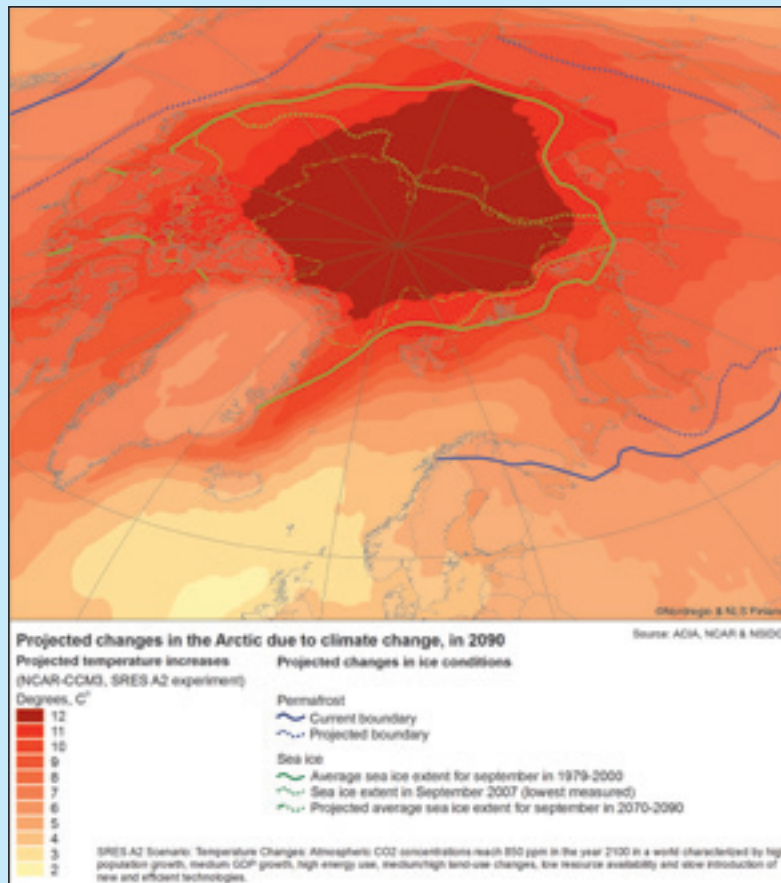
Decreasing sea ice affects the earth system in complex ways including decreased albedo or greater heat absorption in summer, loss of thermal protection for permafrost and glacial ice onshore, changing atmospheric and ocean circulation, and ecosystem effects that harm ice-adapted species. Some of the potentially important effects (such as thawing permafrost to release CO<sub>2</sub> and methane) involve positive feedback whereby Arctic warming could further accelerate the pace of global warming. Impacts on ocean and atmosphere circulation, including recent snowy mid-latitude winters, are currently also under study.

The past four Septembers have seen the lowest ice extent of the satellite period. Although declines in the September minimum have been most dramatic, the ice extent has also significantly declined in every other month of the year. Rising air temperatures account for some of this decline, especially in spring and summer melting. Arctic penetration of warmer Atlantic or Pacific water also

plays a role and can limit ice from below even in the dark winter months. Although the 2007 IPCC report projected a seasonally ice-free Arctic Ocean for the second half of the 21st century, many Arctic specialists now believe we will see this before 2020. By “seasonally ice free” they generally mean a September minimum extent reaching below about 1 million square kilometres (about 15% of its 1980s average). The projected changes in the Arctic due to climate change in 2090 are shown in Box 18, indicating what may be expected. In those conditions weather, marine ecosystems, transportation and the flow of surface waters would be among the many things changed. Arctic glaciers and the Greenland ice sheet melting would likely accelerate, contributing to rising sea levels. Permafrost thawing would challenge infrastructure and shorelines in northern Alaska, Canada and Russia, while terrestrial ecosystems could change character significantly.

So climate change appears to be well underway. Greenhouse gas concentrations continue to increase, already passing levels not seen in 15 million years and apparently heading much higher. The consequences of our global-scale experiment will emerge over the course of the 21st century, and are likely to be surprising, with rates of change increasing instead of hitting a new plateau. Regarding the marine food webs that support fisheries, impacts already observed include decreased productivity, altered dynamics, reduced abundance of habitat-forming species, shifting species distributions and a greater incidence of disease. Although there is much uncertainty about the spatial and temporal details, climate change is fundamentally altering ocean ecosystems. The level of uncertainty involved here nevertheless argues for a strongly precautionary approach to be taken to fisheries management.

## BOX 18: TEMPERATURE VARIATIONS / CHANGE IN TEMPERATURE



If the changes which have occurred in recent decades continue the projected climate situation in 2100 might look similar to presented on this map. The data shown is based on calculations by the NCAR-CCM3 model due to averages 1–5

for the SRES A2 experiment, while the ice and permafrost are from the ACIA.

Sea ice has already declined considerably over the past half century. Additional declines of roughly 10–50% in annual average sea-ice extent are

projected by 2100. Loss of sea ice during summer is projected to be considerably greater than the annual average decrease, projected to be more than a 50% decline by the end of this century. Other models are showing the near-complete disappearance of summer sea ice. The projected reductions in sea ice will increase regional and global warming by reducing the reflectivity of the ocean surface.

Snow cover extent over arctic land areas has decreased by about 10% over the past 30 years, with the most visible change being an earlier disappearance of snow in spring, in some places the snow cover end date has shifted to about one month earlier over the past 50 years.

And for vegetation a situation where forests will overtake tundra while present tundra is projected to move into polar deserts might be a consequence. These changes will result in a darker land surface, amplifying warming by absorbing more of the sun's energy and creating a self-reinforcing feedback loop.

### Other Large-Scale Marine Changes

Although atmospheric changes could eclipse other environmental shifts before the end of the century, human activities are also affecting oceans on shorter time scales.

These anthropogenic forces include:

- Ocean acidification, another by-product of our fossil fuel consumption, is viewed by some experts as potentially more damaging than climate change. As CO<sub>2</sub> from the atmosphere dissolves in sea water, it forms bicarbonate (HCO<sub>3</sub><sup>-</sup>) and hydrogen (H<sup>+</sup>) ions, lowering the pH of the water to almost acidic levels (pH below 7.0). With atmospheric CO<sub>2</sub> steadily rising, ocean pH has already dropped lower than it has been for 20 million years. Moreover, it is changing at an unprecedented pace. Coral and other shell-forming marine organisms may find it increasingly difficult to survive.
- Excess nutrient inputs and pollution likewise are rapidly altering the biogeochemistry of oceans and coastal areas. Fertilizer runoff and nitrogen deposition from fuel use contribute to hundreds of low-oxygen (hypoxic) areas in coastal waters, in extreme cases becoming “dead zones” fatal to fish and invertebrates. Industrial pollutants such as methyl mercury and persistent organic pollutants have spread globally, and bio-accumulate in the tissues of marine organisms. They tend to concentrate up the food chain, so that mammals, seabirds and the predatory fish favoured by fisheries take on burdens hundreds of times above ambient levels. At the top of northern food chains, people too can accumulate metal and organic pollutants.
- Excess nutrients also support harmful algal blooms such as red tide. Invasive species including bacteria

can be spread in the ballast water of ships, as discussed below in relation to tourism.

- Garbage, not only in large chunks but increasingly as dispersed microplastics, spread widely in the sea. Seawater samples have been reported in which the plastic content outweighed zooplankton by as much as 6:1. Larger pieces of garbage pose well publicised physical risks to marine vertebrates. Ecological effects and even the destinations of vast quantities of toxin-containing microplastics remain largely unknown.
- Oceans have also grown much noisier, a change that impacts heavily on whales and dolphins. Naval exercises using sonar have been linked to whale deaths and beaching etc. Oil exploration ships using air guns for soundings also produce noise heard by equipment thousands of miles away, with unknown effects on marine life nearby (Malakoff 2001). Individually less loud, but collectively far more so, shipping traffic creates pervasive mechanical noise underwater.

Whether or not they are fatal themselves, these anthropogenic forces stress marine organisms and food webs. Their combined effects could be cumulative with a causality that is hard to understand even in retrospect. And they may require innovative approaches by the population in order to respond to the consequences. Box 19 provides an example of how a fisheries dependent region may respond to these challenges.

### Terrestrial impacts

It is generally agreed that further climate change may be inevitable and will therefore require adaptation. Similarly most scientists also think that the pace of climate change can be slowed by substantially reducing greenhouse gas emissions. If this is the case, it might give governments,



BOX 19: MIGRATION AS A RESPONSE TO ENVIRONMENTAL CHANGES

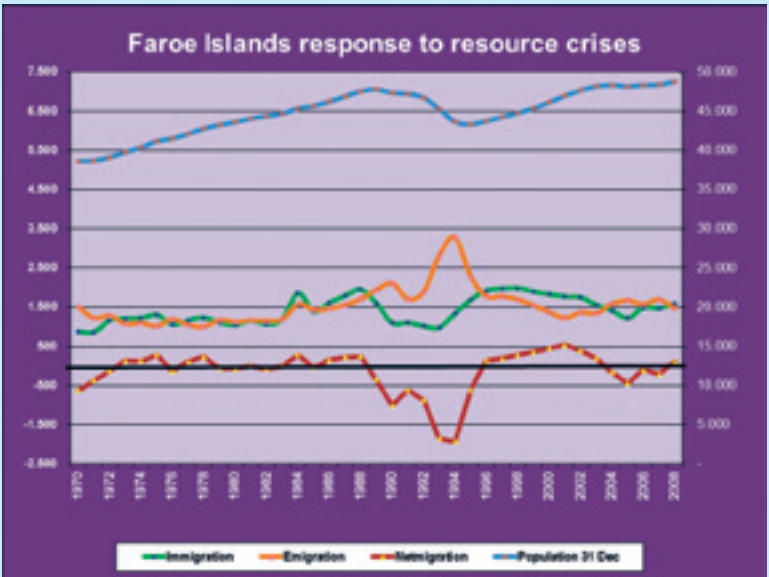


When fisheries decline, out-migration becomes one of the first options identified by individuals and families. This may solve the problem for the smaller group, but at the same time reduce options for the communities they leave behind.

This happened in the Faroe Islands in the late 1980s and the beginning of the 1990s. During the 1970s successful skippers managed to accumulated capital and invested in new trawlers, filleting plants etc. Soon, however, the success turned to failure and decline, due to combination of overfishing and environmental variations. From here major Faroese banks went bust and foreign debt mounted, fish processing plants were closed and the Faroese economy was put under administration.

Massive emigration followed and the population of the Faroe Islands declined from 48,000 to 42,000 (approx.) due to net out-migration during the 1980s and 1990s.

Most of the people leaving the Faroe Islands went to Denmark. Partly because they had relatives there who could provide them with a much needed network, when looking for jobs. Some who had connections to fisheries and the fishing industries could find similar jobs in Denmark. The fisheries town of Esbjerg in Southwest Jutland became their preferred destination.



businesses, and ecosystems more time to respond and adapt to climate change as well as reducing the overall severity of climate change-related impacts.

Across a wide range of climate scenarios analysed in both national and international assessments, it appears that modest warming could result in increased carbon storage and forest productivity in most forest ecosystems. Plants and animals that live in the forest will undoubtedly be affected, both by changing habitat and in direct response to temperature increases and changes in precipitation, fire regimes, and storm events.

Yet, under some warmer scenarios, forests could experience the reverse effect, namely drought-induced losses of carbon. Added to this may be further loss due to increased fire disturbance as fires may become more frequent. The amount of forest area burned might increase by 25 to 50%, especially as projected increases in productivity produce large amounts of brush and other fuels and subsequent droughts combine to increase fire occurrence.

In some areas increased forest productivity may decrease the water that flows from forests into rivers, streams and reservoirs because forests play a major role in the water cycle. In areas where forest ecosystems suffer from increased disturbances, one consequence may be that water quality could be affected by increased soil erosion and contamination. And as a consequence both municipal and regional water systems which are dependent upon healthy forest ecosystems to catch and filter rain and snow, may be severely affected.

As plant growth is dependent on the intake of CO<sub>2</sub>, an increase in the atmosphere may even act as a fertilizer for plants, enabling them not only to produce more, but also to use water more efficiently. As a consequence forest productivity seems to increase with increased atmospheric CO<sub>2</sub>, while at the same time local conditions such as moisture stress and nutrient availability strongly temper these results.

A key nutrient for plant growth is Nitrogen oxide, a substance which is generated through fossil fuel combustion and therefore increases in this nutrient will eventually add to forest growth. There is however a downside to this as adding Nitrogen oxides to the soil and streams has the effect of acidification (acid rain) which will increase the risks to lake fish and even decrease forest health when soil and leaves are affected. The air-pollutant therefore tends to cause a decline in forest health and productivity.

It is unknown as yet whether biological diversity would be reduced if climate change occurred at a fast rate, but the new composition of species is likely to be one of heat-tolerant fast adapters, resulting in patterns where these “invasive species” tend to re-structure the ecosystems, an issue that is discussed in box 20.

Wildlife has been able to adapt to changing climates for millions of years. But unlike previous climate change periods, roads, development and other changes to the natural environment now block their migration routes or otherwise impede their adaptations. Parks and nature reserves established to protect certain species may no longer be hospitable to those species. In other words, appropriate climates for currently protected forest ecosystems may only exist outside protected areas. In many cases, these areas will already be developed and wholly unsuitable for new forests.

Another consequence of climate change is the effect that the changes may have on the recreational and tourism industries. While summer recreational opportunities may increase in some northern and mountainous areas, the question of accessibility may hamper these opportunities, while downhill skiing is very likely to decrease with fewer cold days and reduced snowpack.

Management to help forests, and those dependent upon them, adapt to climate change must be integrated with other human activities like agricultural and urban

**BOX 20: THE CHALLENGE OF INVASIVE SPECIES**

Invasive species are alien species whose introduction will or is likely to cause economic or environmental harm or harm to the natural and human environment. It will most commonly be non-native plant, animal or other organism that influences – eventually dominates – the encountered ecosystem whereby it influences its function and structure by posing serious threats to local biodiversity and causing adverse environmental, economic or public health effects. It is often the lack of a natural competitor in this new ecosystem that allows invasive species to be successful and resistant enough to survive in a foreign environment.

Humans have been responsible for most changes, as natural ecosystems

usually adjust to environmental changes over thousands of years, while spreading alien species for instance through tourism may have a much more immediate effect. Consequently there are a lot of worldwide examples showing the role of human activities. It is expected, however, that climate change could trigger the expansion of invasive species into wider ranges. A warmer climate with rising average world temperatures could mean more foreign species could find their way into the Arctic and result in environmental impacts which could have a profound influence on species' geographical ranges.

While most immigrant species do no harm to their new environment, a small number do disproportionate damage.

Consequently invasive species may disrupt ecosystems, primarily by preying on local species and competing with native species over limited resources. The effect on native biodiversity can be severe.

Already now the rate of marine invasion has been increasing, primarily by crustaceans and molluscs. These observations may have significant relevance for future marine invasive risks to Arctic waters. Studies of polar shipping operations have demonstrated that the external hull and ballast tanks of vessels operating in ice-covered waters can support a wide variety of non-native marine organisms.

encroachment on forest lands, the impacts of multiple use on forests, and air pollution. Commercial forestry adaptations could include salvaging dead and dying timber and replanting species appropriate to a new climate.

### Environmental effects of tourism

Ocean pollution is a threat to the biosphere and in the long run it is estimated to threaten inhabitants across the northern hemisphere. The state of systematic monitoring between areas in the Arctic and North Atlantic varies considerably. In Iceland generally very little is known about the situation of the ocean biosphere or that of fjords and the coastal zones. The interplay between physical and environmental factors is, according to a status report made by the State environmental institute in Iceland, however addressed. This is further confirmed in a number of reports on sub-sea mining.

This report states that knowledge on the biosphere and the effects of various interventions are not well known. Sand and mining activities affect benthic communities, fisheries, the ecology of the sea, archaeology etc. Given the limited knowledge of the ecology and biotopes of the benthic *milieu* in the shallow sea surrounding Iceland, all licenses given to mine sub-sea areas should be carefully reviewed.

Information on the biosphere in the ocean has been collected for over a century, but when placed into a scale perspective – a total area of the exclusive zone, an area covering 738,000 km<sup>2</sup>, or seven-fold the territory of dry land mostly concealed by sea at great depths – it becomes clear that the project is both expensive and difficult. The main emphasis in research has been aimed at collecting data on the most important fish stocks as well as the factors most crucial for the economic aspects of fisheries and the state of commercialised stocks.

Numerous reports on the importance of pollution monitoring particularly of cruise ships, however, have not

agreed. Despite this Alaska is the only Arctic territory to systematically monitor the changing chemical composition of the sea in the light of cruise ship traffic its science advisory panel assesses the importance of environmental harm caused by the cruise traffic. They focus in particular on the chemical effects on the molluscs/blue mussels etc., in relation to stunted growth. However one of the prospects put forward in the ACIA report is the rising threat posed by oil transport by sea as an effect of increased access due to the ice sea melting in the north. Possible oil pollution will pose greater risks and become much more complicated to deal with in icy waters than for example the effects of the *Exxon Valdes* accident in Prince William Sound, Alaska.

Larger and larger cruise vessels are being constructed and sailed in northern waters but the accumulated knowledge in respect of the threat from oil spills, the scale and scope of dumping, and where it is practiced by the cruise liners, nevertheless remains limited. Not much is really known about the cruise ships' contribution to oceanic pollution or of the pollution impacts of ports. The main sources of pollution from ships are based on oil, solid waste, sewage, grey and black water, emissions and the dumping of bilge water. The key problem according to the OSPAR commission report is the lack of general knowledge about the Arctic region's waters. Furthermore the monitoring sites for different environmental problems and their prospects are very limited shedding light on only a few places.

Geographers monitoring the extent of the sea ice between Greenland and Iceland do occasionally observe tracks of something on the ocean surface after cruise ships pass by on satellite pictures taken in relation to the sea ice monitoring. However no systematic monitoring is currently being undertaken on the extent or scale of pollution sources and development due to increased shipping traffic, both passenger vessels and commercial

vessels. With increased shipping traffic and regular bilge water dumping, the threat of aquatic invasive species (AIS) increases.

AIS are defined as aquatic animals or plants that have either accidentally or intentionally been released outside their traditional range and with the ability to survive and establish a lasting population, resulting in undesirable or unwanted consequences. In most of the areas around the North Atlantic only sporadic examples of this have been acknowledged by the authorities. Atlantic Canada has been most blunt about the serious consequences of nine known AIS introduced, harming ecosystems, aquaculture and reducing populations of native species around i.e. the maritime provinces as well as affecting the economy of those communities reliant on aquatic industries.

As a consequence some carrying capacity problems have for almost a decade now been obvious in some of the most visited attractions, scenic spots that are most visited in the short peak season in addition show clear visible decay. One of the only areas posing a limit to a number of tourists annually is Svalbard. About 40,000 tourists visit Svalbard each year, and a comprehensive set of regulations was recently developed to protect the wilderness there from the adverse impacts of tourism.

### **Management of resources at the proper geographical level**

A new generation of approaches to monitoring trends and changes in natural resources include locally-based, participatory monitoring methods. These methods appear effective in incorporating evidence-based assessments into decision-making at the local level and provide a means to encourage local involvement while opening up local control of the resources.

Often, however, there are two conflicts which have to be considered. First, many Arctic species of mammals and birds are migrating species, and as such they visit several local human communities each year. Second, conflicts

exist between local communities and public authorities – between state interests and community interests. One reason for these conflicts is that the management of renewable resources is a complex and highly advanced scientific exercise, with several different layers and players.

The challenge here is to provide management systems such as co-management approaches where the different levels of interests meet in order to provide a means of regulatory control and follow up schemes while at the same time remaining open to outside involvement. Especially in the Arctic, where cross-boundary interests between nations, regions, and communities are often involved, it seems obvious that resource management could benefit from such experiences.

This would be a natural development, as the Arctic States are already involved in joined monitoring projects, and to a large extent have the same objectives in terms of sustainable use and are members of the same international agreements on biodiversity, sustainable use and environmental protection.

The redistribution of influence occurs not only between companies and the state but also between national/federal and regional powers. Very often it is done by defining formal ecological and social restrictions for corporate structures. One such example could be that of the Khanty-Mansi Autonomous *Okrug* in Russia. Here the regional authorities, after a period of experiencing a weakening of their powers in the area of sub-surface management due to the transfer of the main control functions to the federal level, approved (in 2004) new maximum permissible aquatic pollution quotas for oil and gas companies. Although it had been necessary to toughen ecological standards earlier, the region introduced them only when it had lost real rights of control over and direct influence on the companies' behaviour.

The main tool of state policy in the Russian part of the Arctic is becoming the separating of strategic industries



(fuel and energy complex, transportation, communication) into the area of first-priority state control and regulation. This also occurs through the formation and consolidation of large business structures, centralising the rights of control over most valuable assets of the territory. For example, in Republic Sakha-Yakutia, JSC “ALROSA” has become such a “super organisation”.

Another important – and positive – change for the future of Arctic resource development is the trend toward local ownership of the North’s natural resources. Land claims movements in Alaska and Canada as well as the evolving political situations in Greenland, Finnmark, and northern Canada have increased the role of local residents in decisions over resource development.

Most importantly these changes increase the share and certainty of rewards from resource development in the Arctic. While local residents may suffer environmental loss or damage to existing economic activity, ownership gives them compensation. This should reduce conflict over development and result in increased access to northern resources. This shift in ownership increases the share of the resource rents that stay in the north. This provides a base for activity in the local Arctic economy. The additional income encourages the growth of the local population and supports service activities.

Over the last twenty years or so the rise of the indigenous movement and the concomitant policies of decolonisation have had clear effects on resource management policies in Norway. Steps in this process are outlined in Box 21. A devolution trend in management power is also currently ongoing, though the public discourse is still focused on top-down management. Similarly a change in the development of cross-border co-management arrangements has clearly occurred since 1997. The encroachment pressure creating land-use changes and disturbance is serious and increasing. An overall Eurasian evaluation asserts: “Potential threats facing reindeer

populations of Eurasia, and reindeer herding as a livelihood, include rapid land use change, excessive predation, climate change, and ongoing institutional conflicts” (Forbes 2010:86).

From a long-term perspective the combined effects of land-use change and climate change appear to be quite serious. The question remains, to what extent can devolution and local resistance put the brakes on and modify the effects. Diverse forms of land-use changes in combination with climate change effects continue then to be the main threats both for reindeer herding and other traditional forms of resource utilisation important for the sustenance of Sámi culture.

If the Sámi of Finland and Sweden manage to create momentum and engage in real dialogue with their governments to achieve significant progress for Sámi rights this will add to the progress achieved by the Sámi in Norway and will become a powerful tool with which to slow land-use change processes.

### **Devolution of management power**

In Norway the devolution process begun three decades ago, initiated by ethno-political mobilisation and actions taken against the hydropower regulation of the Alta-Kautokeino River in its northernmost county of Finnmark. To put an end to the actions the government agreed to the granting of core Sámi claims by initiating a process leading both to political and land rights’ reforms through the setting up of a Sámi Rights Commission (SRC). The SRC was established in 1980 and presented its first report in 1984 providing the basis for the passing of Constitution Amendments and a Sámi Act in 1987 and the establishment of the Sámi Parliament (SP) in 1989. The SP executes a cultural autonomy and is also the formal representative of the Sámi people in Norway.

A recent additional outcome of the reforms is the Finnmark Act (2005), which has become the basis for the

## BOX 21: CASE FROM SAMI AREA



From the Middle Ages Sápmi was an area of competitive expansion for the Nordic states (Riseth, 2005, Sandberg, 2008). By the final colonisation and border establishment in 1751 an addendum to the border convention between Denmark-Norway and Sweden-Finland, later named “The Lap Codicil” was set up to guarantee

the future of the Sámi people. Sámi individuals were required to become citizens of one of the states, but had guaranteed rights of cross-border land-use such as for reindeer herding, hunting and fishing.

Changes in the governments’ ideas of Sámi rights led to the undermining of cross-border co-management arrange-

ments by border closures between Norway/Finland (1852) and Sweden/Finland (1889), followed by a series of border conventions between Norway and Sweden which gradually reduced cross-border reindeer herding throughout the 20th century (Pedersen, 2006, Norberg 2007).



Today a specific Sámi area has been defined in Finland and Norway. The Sami native region of Finland (Sámiid ruovttu-guovllu in Northern Sámi) consists of the municipalities of Enontekiö, Utsjoki and Inari as well as a part of the municipality of Sodankylä. The area is defined in and protected by the Finnish constitution (17

§ and 121 §) to be autonomous on issues relating to the Sámi culture and language. In Norway the Sámi area has been defined as the application area of the Sámi Parliament subsidy schemes for business development that accounts for around 50 per cent of the area in Norway north of Saltfjellet, or 26 municipalities where

10 of those is only partly included. The Sámi area can also be defined through language. Altogether there are 30 municipalities in Finland, Norway and Sweden where Sámi languages have an official status guaranteed by law (Seurujärvi-Kari 2011).

transfer of state property (of a size similar to Denmark's land area) to the local people, as a first step through a collective private body called the Finnmark Estate. The passing of the ILO Convention on Indigenous and Tribal Peoples (C169) in 1989, adopted by Norway 1990, also required that the regime of the Finnmark Act had to be recognised by the Sámi Parliament before final adoption. Moreover, this act led to a consultation agreement which provide the Sámi at different levels with a right of consultation with the government and its branches. Further land reforms are proposed for the remaining parts of Northern and Middle Norway. A proposed reform securing local fishermen's fishing rights on the coast (NOU 2008:5) is not however expected to be adopted as it threatens powerful fisheries interests.

Norwegian reindeer husbandry legislation in the 1980s and 1990s was based on a top-down command and control approach, but with an outcome differing due to regional geographic and cultural differences. New legislation however recognises that resource management power in the first instance now resides with the local collective.

In Sweden and Finland the Sámi have not managed to challenge the government and the political establishment to take an active stand on basic questions as regards relations between the Sámi and the majority society and thus achieve a real dialogue. In Sweden the discourse, moreover, show signs of conflict while in Finland critics assert that the government practices double standards maintaining an image of being a defender of indigenous rights abroad while doing nothing to improve Sámi rights at home. One factor working against success for Sámi rights in Sweden and Finland is that the forestry industries have prominent economic positions in both countries. However, in Finland a serious dispute about logging in winter pasture areas has recently been settled.

Both countries have Sámi Parliaments but have not adopted the C169 thus far. The expert proposal for a Nordic Sami Convention in 2005 are still under governmental consideration, and can – if adopted – further add to the pressure on these governments. In Finland its implementation would require that the position of reindeer herding as a Sámi source of livelihood and a basis of Sámi identity and culture be strengthened. And finally, the UN Declaration on the Rights of Indigenous Peoples, 2007 could reinforce Sámi rights further in all Nordic countries.

Ongoing climate change requires increased flexibility as opposed to a development based on unchangeable regulations and land-use conflicts. In the wake of a possible Nordic Sámi Convention the question of re-establishing cross-border reindeer herding between Norway and Finland may actually become a real possibility.

In the case of reindeer management in the Sapmi area this is very formal and centrally controlled by the two governments through a convention, i.e. a bilateral intergovernmental agreement. The current status of the relationship is that the Grazing Convention was signed by the two countries' governments over a year ago. In autumn 2010 the agreement was circulated for comment before ratification takes place. A novelty of the Convention is that it creates an intergovernmental "*reinbeitenemd*" with the decision-making authority and an "*overprøvningsnemd*" as the appealing body. With Finland arrangements thus far only include a deal on a border fence.

Informal cultural cooperation across the border has had an impact especially because Sami dialect and culture follow major river valleys. Further details are available in Box 20. As an illustration from Sweden one has both groups of Lule and Pitesameralso in Norway and the people are related to each other, sometimes quite closely, as documented through recent Interreg projects such as "Inside the Sami room" in the South Sami area.



A citation from the Department of Agriculture and Food's homepage illustrates the current situation and considerations: "The new Norwegian-Swedish reindeer Convention is circulated with a deadline of October 15, 2010. The theme of the hearing is whether the Convention, as it exists, could be altered through the ratification of subsequent implementation in the two countries. The Reindeer Convention between Norway and Sweden from 1972 ceased to apply in 2005. Negotiations this time have been carried out between the two countries on a new Convention on Trans-boundary Reindeer. These negotiations were concluded on 24 February 2009. The Convention was signed by the Minister of Agriculture and Food and the Swedish Minister of Agriculture on 7 October 2009. With this, the two countries mutually agreed to a follow-up to ratification and entry into force. After ratification the Convention is finally now binding. The Convention's mission is to promote and develop cooperation between countries, grazing districts and cities, as well as between the individual reindeer herders, so that the reindeer pasture can be utilised in a way that provides a long-term basis for an ecologically, economically and culturally sustainable pastoralism in both countries. The Convention contains provisions to regulate trans-boundary reindeer husbandry providing bodies that can take the necessary decisions in respect of implementation. The protocol also specifies the areas that can be used respectively by Norwegian and Swedish reindeer."

Experiences with cross-border management are also drawn from other parts of the Arctic, for instance with the management of the porcupine caribou herd. An important driver for the initiatives was the interest in the oil potential of the De Cho (Mackenzie) Delta and the Yukon North Slope during the late 1960s and early 1970s due to the potential impacts from development. The user communities were insistent that they become fundamentally

involved in the conservation and management of the caribou herd which had always been the basis of their culture and economy. Negotiations on the co-management of the porcupine caribou herd however soon reached something of an impasse which was not concluded until 1985. Different levels of delegation of responsibility are presented in Box 22.

A more recent co-management agreement comprising members from Canadian federal, Yukon and Northwest Territories governments, as well as aboriginal government officials was expected to be concluded in 2010. The harvest management plan calls for hunting restrictions based on the number of caribou in the herd. The Porcupine Caribou Management Board remains a useful avenue for outreach and communication about issues related to the porcupine caribou herd, which has long been an important food source for aboriginal peoples in northern Yukon, the Northwest Territories and Alaska.

Once a new management plan is in place it is difficult to determine what the board's role will be. And even though expectations are high in connection with the co-management arrangements, an analysis of two caribou management systems in Alaska and Canada, focusing on the relationship between user involvement in management and management effectiveness, has shown mixed results. While expectations were that the involvement of users in a joint management board would produce greater cooperation and agreement in the Canadian setting than the Alaskan hierarchical system, the results showed that government managers are more sensitive and responsive to user concerns while direct user involvement in a joint management board does not increase the likelihood that users at the village level will cooperate with management actions.

User-manager boards do not appear to be a substitute for a frequent and continued presence of biologists in tra-



ditional user communities when it comes to establishing trust in management information and supporting traditional community-based decision making.

The historical relationships between people and a changing environment in Sápmi, and other parts of the Arctic alike, can be seen as social-ecological systems.

These systems for hunting/gathering, pastoralism, peasantry and local fisheries were based on “timescapes” following natural divisions of landscape and its resources as well as nature’s rhythms in their exploitation, organised through culturally based institutions such as Siida. The enclosure regulations in connection with border estab-

**BOX 22: DELEGATING RESPONSIBILITY**

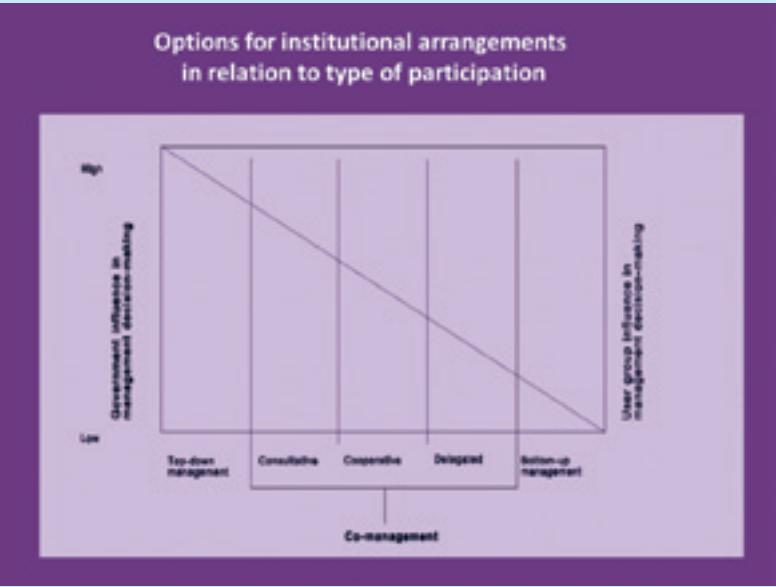
Rapid changes in both societies and the environment require closer relations between communities and governments within the natural resource management arena. Co-management arrangements are usually considered. This is the in-

volvement of a variety of stakeholders to devolve some decision-making to other levels of government and stakeholder groups.  
The role of each stakeholder can be defined differently, as indicated by the

graph and the table below, depending on the political and cultural situation, but in all cases based on the idea that full access to information on relevant issues and options should be available.

The system needs to be able to compensate for traditional approaches in relatively closed systems where resources were managed through complex interplays of reciprocities and solidarities. Co-management therefore describes a range of collaborative arrangements from stakeholders simply having a consultative role to a partnership arrangement between stakeholders and government.

The benefits of co-management include the more equitable, appropriate, and efficient management of natural resources recognising that stakeholder groups have varying interests in the resources (see box 30 on community quotas and box 21 on reindeer management), while alternatives to co-management involve either government being in charge, or private ownership (see box 29 for ITQ).



ishments provide a major example of how the administrative division of land and resources make sustainability difficult in many regions. One of the outcomes is recognition of the lack of winter pastures for reindeer in Norway and a lack of summer pastures in Sweden and Finland. The latter is the more serious as Finland also uses natural winter pastures for summer grazing making reindeer herding increasingly dependent on supplementary feeding in winter.

Since the 1980s the Norwegian government has tried to regulate Finnmark's reindeer herd size. Current legislation recognises that governance systems need to be based on basic trust to be effective. Accordingly, possibilities for better regulation and to react to rapid environmental change due to climate change, primarily warming, are increased. There is also a tendency here for knowledge to be more valued in resource management.

Land-use competition and changes have increasingly promoted pasture land fragmentation and irreversible changes due to encroachments from infrastructural and industrial development in particular. This includes railways, roads, mines, power plants, modern forestry, secondary homes, tourism, but also general urbanisation. In Finland and Sweden forestry is particularly important.

Such encroachments have many implications, including that the more grazing lands are cut up into an uneven patchwork the more difficult it becomes to stabilise the reindeer's movement. Further, in addition to the direct loss of pasture land, disturbance by human activity leads to disturbance effects in large areas. This has relevance not only for encroachments but also for areas of nature conservation due to the so-called "attraction effect".

One side-effect of conservation efforts such as those associated with the Bern Convention is that reindeer herders are no longer allowed to manage predators as

was previously the case. Currently, predators raise serious problems for reindeer herding in Finland as well as in Sweden and Norway, in some regions herders are close to giving up. These questions are highly contested and can be understood as part of a centre-periphery conflict where herders and peasants have to "pay the bill" for urban dwellers' often ill-informed concern for nature. In Norway there is now the beginning of a recognition of the seriousness of the predator issue among national and local politicians, and Sámi and other rural people have banded together organising a recent demonstration in Oslo mustering some 1,500 to 2,000 participants.

New trends also exist in respect of encroachments that are both serious and important. Due to an increasing level of demand for mineral resources there is currently a new wave of mining efforts being undertaken over large parts of Sápmi. The expected decline of the petroleum industry also has two different effects. One is the expansion northwards into the Arctic as more areas become ice free as an outcome of rising temperatures. In Sápmi this increases the pressures for new encroachments on the coasts. The second issue here is the expansion of windmill farms which also create large encroachments.

### **Dealing with complexity**

The cautionary tales of the 20th-century North Atlantic cod and herring fisheries highlight the risks facing 21st-century fisheries in a time of global change. Our technology remains capable of catching too many fish, while at the same time fish and their ecosystems face unprecedented threats and stresses from other anthropogenic sources. Climate is shifting toward a generally warmer world, but with details of timing, circulation and regional effects that resemble weather- more than climate-change in being difficult to predict. Species could adapt to new environments over tens of thousands to millions of years, but the rapidity of current change far exceeds the normal

pace of evolution. Species migration and hybridisation might offer faster routes to adaptation. Interdependence among species (such as fish reproduction depending on the timing of phytoplankton blooms) could reduce their adaptive flexibility. Moreover, fisheries pressure itself, through the direct removal of target species and their prey, habitat disruption and the truncation of older age classes, may constrain the ability of fish stocks to adapt.

At the same time various forms of pollution, algae blooms or hypoxia due to excess nutrients, and invasive species raise other ecological challenges. Classic single-species management practices, or calculations of maximum sustainable yield, will more likely than not yield new disasters when applied to rapidly changing environments. Future fisheries declines will come at a time when humanity can ill afford the loss of protein, let alone fisheries income. In this complex setting attempts to delegate responsibilities to different stakeholders, for instance to the private sector by means of ITQ's and community quotas, is a question which will be dealt with further in the boxes 29 and 30. There may be both advantages and disadvantages in such mechanisms, but the main requirement would be to ensure that the systems are open to change when important background issues – for instance climate, demographic, biology and economics – are changing.

Many of the trends described in this chapter are part of the broader “megatrends” outlined previously in the sense that their patterns occurred repeatedly in 20th century, for instance in terms of fisheries, showing the force of human ecology behind contingent variations in local history. But whereas 20th-century fishing had the technical capability to transform biological marine systems,

in the 21st century we see the steady transformation of physical marine systems as well. The fish and the fisheries now struggle to coexist not just with each other, but with rapid physical changes in ocean climate and chemistry.

Meanwhile on land, the concentration of amenities, necessities and choices in regional or larger centres draws mobile elements of the population there too, at the expense of more dispersed and historically resource-dependent places. Voluntary migration has generally been selective for younger age and higher ambition, to the detriment of source communities left behind. Around the circumpolar North in recent decades, we have also seen migration selective for gender – women, more often than men, voting with their feet about the relative attractions of rural vs. urban life. It is not possible for any government to provide an urban range of services in each small community, along coastlines with many such places. In times of windfall income (like an oil boom) they might try, but the same services must then be cut back as income ebbs.

Consequently, the concentration of population, not necessarily just to the largest places but to those offering a balance of opportunities and amenities (such as universities, the new growth engine; but of course also housing and more attractive jobs), appears to comprise another megatrend. In this complex setting the younger generations are trying to find their own ways of coping with the challenges, recognising the fact that climate change may be an important part of the framework, but at the same time not necessarily the factor that would be decisive for their choice for the future, something which is illustrated in box 23.

**BOX 23: GREENLAND'S YOUTH EXPERIENCE CLIMATE CHANGE IN SOUTH GREENLAND**



The warmer climate has had a positive impact on Greenland's economic possibilities and development. The ice conditions in South Greenland have improved, and as a consequence access to the towns and villages is becoming easier. Moreover, the return of the cod to Greenland has stimulated local economies, enabling communities that were hit severely by the disappearance of the fish during the 1980s to regain some hopeful economic opportunities.

First and foremost, the farmers in the southwest of Greenland are looking forward to longer summers and less severe winters, providing new opportunities to grow a variety of crops and to further expand their farming activities, first established back in 1905.

These farming initiatives have made an important contribution to the local economy in South Greenland. Today new opportunities are appearing all the time. The introduction of better equip-

ment, tractors, cutting machines, and equipment for fodder production can provide for further activities including the growing of vegetables. Today, most vegetables are very expensive, as they are imported. The film "Green Land" provides insight into the perspectives of young people in southern Greenland:

[www.nordregio.se/films/green\\_land](http://www.nordregio.se/films/green_land)







# The need for human capital

The Arctic has always been dependent on human resources. While skills in terms of hunting and fishing were once absolutely decisive for survival in the Arctic environment the question of education has now become paramount.

It is often emphasised how many Arctic residents have a well developed and highly sophisticated grasp of matters important to their well-being. On the other hand it is also stressed that their knowledge does not necessarily translate into high scores in, for instance, adult literacy and school enrolments. Looking into the goals and methods of educational systems it becomes clear that the state, the regional authorities and Arctic residents now share a common understanding of what should be relevant in terms of education policy.

The current characteristics of the formal educational systems in the North reflect a broader range of identified societal as well as cultural goals. At the same time the divergence between society's expectance level and the individual youth's response tends to increase. The differences clearly appear when highlighting the share of population with a post-secondary education as in Map 9 or with a tertiary level education as in Map 10. What the maps do not show is that differences are more pronounced than actually indicated due to differences in the

definitions of content and in the objectives of the various educational systems.

### **Knowledge economies and the demand for human resources**

The economic prosperity and functioning of a nation depends on its physical and human capital stock. While the focus used to be on physical resources, the advent of what we now characterise as the "knowledge economy" has drawn attention to factors affecting the enhancement of human skills and talent as key issues in the development process.

This is also the reality for the Arctic, as indicated through the role of the 3rd sector in the various Arctic economies. And this is parallel to the situation where, according to the OECD, more than 50% of Gross Domestic Product (GDP) in the major OECD economies is now based on the production and distribution of knowledge.

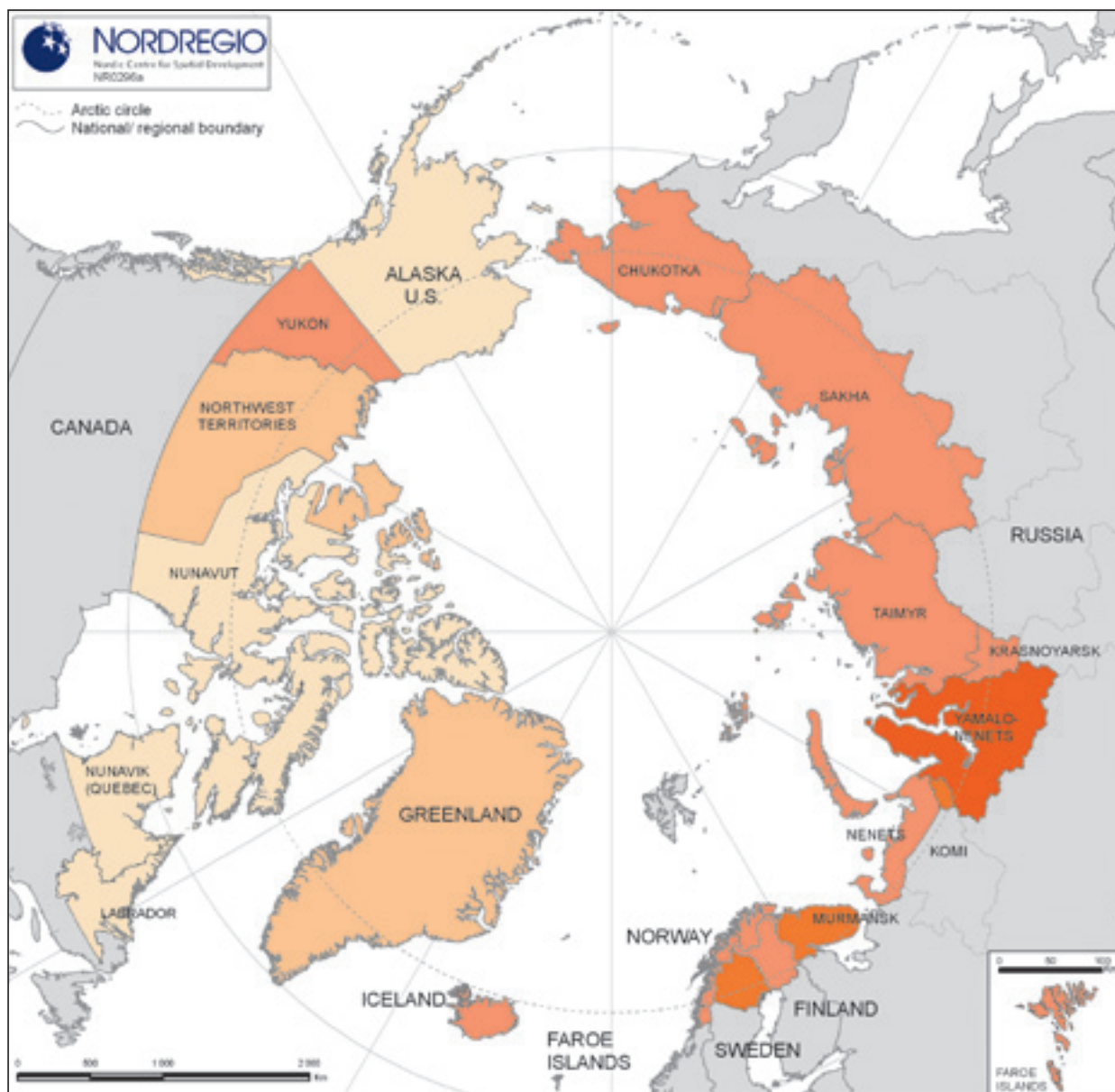
While technology used to be an undisputed key factor of production, intimately connected to general economic development, the de-coupling of economic performance and simple measures such as energy consumption, however, is no longer an indicator of economic success. Instead access to knowledge has become the key factor.

#### **MAP 9: SHARE OF POPULATION WITH A POST-SECONDARY EDUCATION**

Regional differences in response to the educational challenges faced by the region as a whole are illustrated in map 9 showing the distribution of the share of population with a post-secondary education. The differences in level are in many cases due to very different historical legacies of post-secondary education, leading to a situation where the Russian North and the Nordic Coun-

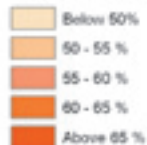
tries have a relatively high proportion of the population with post-secondary education, while parts of Northern Canada and Alaska show a relatively low level. As emphasised in the report on Arctic Social Indicators, post-secondary education has been emphasised as an important tool in connection with both regional and minority development in Russia and in the Nordic Countries. A

similar trend, however, has been historically absent, and has emerged only quite recently in substantial parts of the North American continent. An important issue in this context is the availability (or otherwise) of educational opportunities that allow young people to stay in their own communities.



## Share of population with post secondary education

Share in % of total population



Arctic region defined as in Arctic Human Development Report

Data sources: 2006 for: Norway (Nordland, Troms, Finnmark), Sweden (Norrbotten), Finland (Lapland), Faroe Islands (National average), Iceland (National average), US-Alaska (estimates); Canada (Northwest Territories, Nunavut, Yukon Territory). 2002 for: Russia (Komi, Nenets, Murmansk, Yamalo-Nenets, Sakha (census), (Krasnoyarskiy Krai, Taymyr, Chukotka (census, rural population). 2001 for: Canada (Labrador and Nunavik-Quebec (census, health districts).

Analysis & design: R. Rasmussen & J. Sterling

Moreover, with the increasing mobility of the global workforce and of the flow of information, knowledge and expertise can instantaneously be transported around the world, leading to a situation where advantages gained by one company can be eliminated by competitive improvements from one day to the next. Consequently, among the only comparative advantages a company may enjoy in the not too far future will be its innovative capacity.

It has often been emphasised how what can be termed “the death of distance” has developed in tandem with globalisation. As will be discussed further in chapter 8, the growth of the Internet and other related new technologies has undoubtedly become an important catalyst in the creation of “knowledge economies”. The new information and communication technologies have contributed to the development of global markets for these types of goods and services and thus it is often stated that we becoming an information society in a knowledge economy where the effective management and distribution of knowledge is essential.

Human capital represents the investments that people and their communities make in themselves which

enhance their economic productivity. Education adds to the productivity and efficiency of human beings by increasing the level of cognitive stock and qualities of economically productive human capabilities. Consequently, formal education can be seen as a productive investment in human capital eventually becoming resources which affect the rate of adaptation to change. It is quite clear how developed countries have been able to take advantage of the new global markets turning knowledge and information into GDP growth.

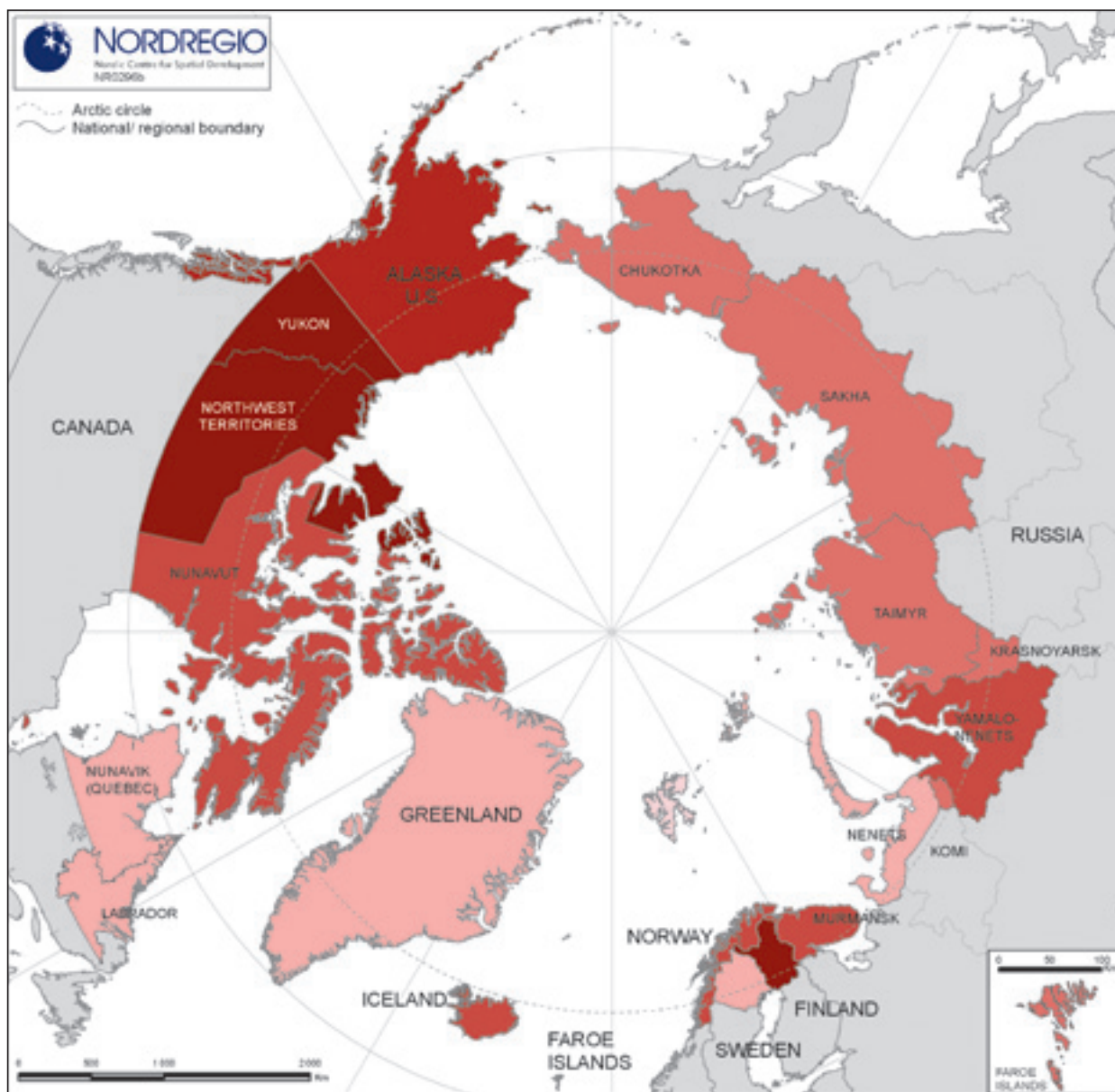
A key issue is empowerment. There are two factors of importance here. On the one hand we have the empowerment of the individual where a proportion of students are able to continue past primary through secondary school graduation, and, in an increasing number of cases, further on to post-secondary institutions and technical colleges. Individuals may be empowered to fulfil important functions in the community and their education may provide them with a reason for staying. But such qualities may also empower them to start looking for other opportunities, and eventually to leave the community. As is often said: “Education can bring the outside into the

#### MAP 10: SHARE OF POPULATION WITH A TERTIARY LEVEL EDUCATION

Based on the interpretation of the map on the share of population with a tertiary level education a rather contrasted picture is revealed compared to that of post-secondary education. The North American part turns out to be at the very high end in this context compared in particular to Russia, but also to Eastern Canada and parts of the Nordic Countries. Here, however, a number of issues add to the complexity of the picture. First of all the differences between the

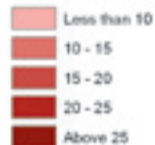
traditions in the educational systems in the Nordic Countries and Russia, compared to the prevailing North American approaches are important. While most of the students in North America leave universities after graduating with a bachelor's degree after 2-3 years of study – the ratio between bachelors and master's degree is around 4:1 – the traditions in the Nordic Countries and Russia have been based on graduation after a full master's degree, i.e. studies of 5

years or more. Typically, ratios of 1:3 exist between the number of persons who have obtained bachelors and masters degrees respectively. Consequently the participation rate in what is classified as tertiary level education from a bachelor's degree and above would show these differences. Over the last decade an attempt has been made to harmonise the systems but it will take time for people to adjust to these changes.



## Share of population with tertiary-level education

Share in % of total population



Arctic region defined as in Arctic Human Development Report

Data sources: 2006 for: Norway (Nordland, Troms, Finnmark), Sweden (Norrbotten), Finland (Lappli), Faroe Islands (National average), Iceland (National average), US-Alaska (estimates); Canada (Northwest Territories, Nunavut, Yukon Territory). 2002 for: Russia (Komi, Nenets, Murmansk, Yamalo-Nenets, Sakha (census), Krasnoyarskiy Kray, Taymyr, Chukotka (census, rural population). 2001 for: Canada (Labrador and Nunavik-Quebec (census, health districts)).

Analysis & design: R. Rasmussen & J. Sterling



community”, but if the social system is not able to accommodate this, it may simply lead to the “bringing the educated out of the community to the outside.”

In this context it is clear that empowerment is a multi-dimensional concept with often divergent consequences. Empowerment may strengthen communities, making them able to resist the pressure from the outside, at least for a while. It may, however, be less responsive to the marked differences in both gender and generational *foci* in relation to the development process, which may eventually result in unexpected and unwanted out-migration patterns, and thus the loss of the new human capital gained, for example, through the expansion of educational opportunities.

As such, the strategies that are applied need to respond to national and global policies in both the public and the private sectors while also responding to the specific characteristics of the involved communities and taking notice of the specific social and political institutions, civic culture, and traditions characterising the individual places concerned.

These ideas suggest some propositions about the adaptive paths open to individuals, enterprises, and communities:

- Those with greater human capital have a larger field of possibilities and greater ability to create alternative economic enterprises. Social capital can enhance the acquisition of human capital.
- Norms of trust and inclusive social institutions (social capital) improve the prospects for economic development.
- Communities with long-standing habits of cooperation and participation will be better prepared to develop effective resource management, in part because they are more likely to have sufficient legitimacy and sanctioning authority to control individual

behaviour and avert free-riding or the selfish depletion of common-property resources.

- People in communities where outside forces – such as creditors or distant government bureaucracies – control access to resources and “the rules of the game” will be less trusting of one another and of outsiders. They may lack the institutional resources and habits of decision making necessary to carry out alternative strategies.
- The widely-accepted dichotomy between “traditional” and “modern”, for instance in relation to the fisheries sector breaks down as growing differences in education, capital, technology, and fishing capacity emerge within the formerly traditional small-boat sector. Increasingly sophisticated fishing technology creates more business-oriented fishermen.
- Cohort replacement, by younger generations with more education and higher expectations, forms a primary mechanism of social change.

The propositions above address the social and political conditions that affect the success of adaptation to environmental change. Understanding such conditions should contribute to future policy discussions. A related issue, not formalised above, involves how individuals adapt. Sometimes apparently rational individual decisions turn out differently than policy makers expect, and even work at cross-purposes; and rationalities change over time, as illustrated by the example in Box 24.

### **The need for education**

It is generally accepted that education has a leading role to play in economic and social development. Moreover it is also now suggested that an effective anti-poverty strategy should incorporate the enhancement of education and skills among households as well as individuals. By creating new and better jobs education may contribute

to the reduction of poverty even adding to the social surplus highly needed for these communities to take charge of their own development process. This has been repeatedly emphasised in theories of human capital where the focus on education as a capital good emphasises that the development of skills is an important factor in different levels of production activities. When applied at a macro level, there seems to be a clear correlation between the levels of enrolment and GNP. Contrary to this, however, at the micro level poor children and particularly girls have traditionally been less likely to enrol, leading to a situation which sees increased segregation produced. In this context it has often been stressed that poverty acts in a dual manner; on one hand as a barrier to education, but at the same time also as an outcome of the lack of education.

Very often poverty alleviation and gender equality strategies are not something emanating from private ini-

tiatives. Investment in education is usually dependent on government action, both in relation to financing, and in defining what minimum standards should be imposed on the communities. So as a tool for development education can be used in developing the human resources that would be needed to generate the foundations for economic and social transformation.

This is in many ways confirmed by the Arctic Human Development Report (2004), which emphasises that the most critical concerns are for control, relevance, and access to education. These concerns are directly impacted by the acknowledgement of distributed knowledge and in that context the need to adapt education services so that they fit better with local needs and conditions. "This requires a shift from viewing knowledge as a standardised commodity to seeing it as a distributed resource with decentralisation of control and decision making, local adaptations of curriculum, and increased use of technol-

#### BOX 24: STAYING OR LEAVING

Around 62 % of all Faroese leave home to study. This is a high figure compared to the other Nordic countries. In Denmark, Norway and Finland 2–5% leave the country in order to pursue an education, while between 10% and 25 % of Norwegian and Icelandic young people leave home for the same reason. The major reason for the relatively high Faroese figure is the limited supply of educational services in the Faroe Islands.

By choosing opportunities outside the Islands, the majority of young people continue in the footsteps of previous generations who headed towards

Denmark. But a growing number of young people are now choosing to travel even farther away to countries such as England and Scotland which are ranking highest on the list of preferred colleges while the U.S., Australia and Poland are also popular.

The students have a strong global identity, and experience abroad creates people who challenge themselves and develop throughout life. But the question is whether this global identity is compatible with a life in the Faroe Islands. Recent studies suggest that it is not. Just a decade ago nearly 100% of all students moved back home after com-

pleting their education. But today the reality is different. Recent studies have shown that only 25–30% of Faroese students abroad are confident that they will settle down in the Faroes after they have finished their education. Phrases such as brain drain have been used to describe this situation.

ogy to access knowledge from any place at any time (i.e. University of the Arctic)”.

### **Different approach to what is needed**

The two maps presented at the beginning of the chapter (maps 9 and 10) illustrate two very different aspects in relation to education in the North. While map 9 showed the general level of education in the North, where the regional and national governments generally decide on content and structure, this reveals that The Circumpolar North has been characterised by very different historical legacies in terms of post-secondary education. This has led to a situation where the Russian North and the Nordic Countries have evolved into a situation with the population with post-secondary education being a relatively high proportion, while parts of Northern Canada and Alaska have a relatively low level.

While post-secondary education has been emphasised as an important tool in connection with both regional and minority development in Russia and in the Nordic Countries as well, a similar trend has either been entirely absent or has emerged only quite recently in substantial parts of the North American continent.

What is shown on the next map (10) is a marked difference in relation to tertiary level education. In Finland the level is very high due to a specific focus on tertiary level education as a regional development tool, and as a consequence the establishment of a regional university in Rovaniemi. In Russia as well as in the other Nordic Countries the emphasis has been similar to that in Finland, but due to the existence of a rather large population connected with large scale mining, forestry, and industry development, the share of the population with a tertiary level education is significantly reduced.

An important difference here in terms of educational traditions is that in both the Nordic Countries and Russia a minimum of five year's study (typically a master thesis)

is viewed as being the proper accomplishment of a tertiary level education. This is very different to the North American situation where the major part of the tertiary-level education process relates to the gaining of a bachelor's degree accomplished after 2–3 years. The differences in approach show up clearly on the map. Significant differences in terms of accomplishments between the western and the eastern part of the hemisphere are not mapped here. The map simply reflects the differences in traditions.

What is common, however, is the trend that the pursuit of educational opportunities shows that the existence of a substantially higher proportion of women with post-secondary education has become a general pattern in the Arctic.

The differences in gender response to the question of “better opportunities” discussed in box 8 have very much to do with the marked changes in patterns of education which have taken place during the last 10–15 years. The pattern shows how women dominate the realm of education in most of the Arctic. Already in the 1990s women had become the majority group in relation to higher education in several countries, and by the late 1990s basically all regions in the Arctic had moved into this situation. Only parts of Canada show a dominance of males in relation to post-secondary education. But this divergence reflects only to a certain degree real differences in the aspirations of the populations concerned.

Another contributory factor here relates to the fact that young women pursuing education in many communities tend to leave the region before they start to pursue their educational goals. This is similar to the situation pertaining in the Faroe Islands where many of the women, on completing their education tend to emigrate, predominantly to Denmark. There they pursue a career where they are able to take advantage of their acquired skills. This has also been the pattern in Greenland, due to the

limited level of social acceptance traditionally afforded to women with higher qualifications. In recent years an increasing number of positions requiring higher education have however been taken up by women.

In communities with a generally high level of persons with high and higher education – first of all the urban areas with one or more higher education institution – female dominance is limited to a few percentage points. The high level of dominance, i.e. a women's share of 56% and more, appears in municipalities representing small town and urban settings. This is the case in spite of the fact that it is in these same communities where the highest deficit of women appears.

The issues discussed above can be seen as being a number of gender-related differences in aspirations and approaches to change and primarily to the question of work and work-related activities. The perception of customary male activities related to renewable resource exploitation seems to be “sticky”, in the sense that the male discourse – or perhaps rather, the discourse regarding males – has difficulty in moving on from what once were key activities, but now constitutes only a small percentage of the available jobs.

In the upbringing, pedagogy and training of boys the focus is on individualism, with silently accepted behaviour patterns for the boys such as disobedience and non-acceptance of orders and correction. This promotes individualistic, selfish, self-centred, self-promoting, and status seeking behaviour, as these qualifications are considered to be the true characteristics of “real” boys.

Contrary to this, the females in their upbringing are socialised into collective activities, are more attentive to other's needs, and consequently much more open to change. As a result, they become less limited by specific job characteristics, determined by what may be considered as being “traditional” and “acceptable” activities. To use an analogy, males seems to be socialised into

path-dependency, which causes them great difficulty in accepting other paths and changes, while females in contrast tend to be socialised into situations where adjustment and change are constantly needed, leaving them prepared to move between job categories and job options. Only jobs related to (new) technology appear to constitute status giving alternatives for males.

Consequently, the adaptation to changes through the educational system fits much better with the socialisation of girls, despite the fact that girls are constantly under-rated and underrepresented when it comes to filling high ranking positions, both in academia and in administrative affairs.

The current situation where women now predominate in the pursuit of academic careers is, however, a rather novel situation. In Greenland boys still dominated the educational system up until around 1990 with 5–10% more boys than girls finishing an educational diploma or degree. From 1991, however, a marked change began to appear. During the 1990s and the first half of the 2000s, between 10 and 20% more girls than boys finished an education, and since 2003 more than 60% of the persons finishing an education have been girls. Differences also clearly emerge in the types of education chosen. Among the boys registered as active students, almost 70% are registered in vocational training and 30% in short and long term academic programmes. Among the girls, however, there is an almost equal division between vocational and academic training (53% and 47% respectively).

### **Do these gender aspects matter?**

Even if resource exploitation is still perceived to be the main economic basis for communities in the North the reality is that the third sector – the service sector with wage work in administration, education, social services etc., – has become the main income source for most families. These incomes have become necessary for the mainte-

nance of many of the traditional renewable resource activities, with hunters and fishermen also having supplementary wage work, and especially with wives' income becoming the main income source for many families.

In Greenland 24% of hunters and fishermen have incomes from other activities, and in more than 70% of households the wives contribute to the income, typically from work in schools, kindergartens, public and private administration, cleaning etc., while in more than 50% of families the major income source is now generated by the wives (Rasmussen, 2005).

In Greenland – as in most of the Circumpolar North – households with professional hunters and fishermen are highly dependent on incomes from other sources. These incomes are very often generated by the fishermen's spouses. This leaves young unmarried males in a special risk group, worsened by the fact that household structures are changing.

More than 40% of households in villages are single persons as there are simply not enough young women in the villages who consider living the life of a wife of a village hunter and fisherman to be attractive. Single versus multiple person households is a good indicator of the viability of small communities. The large number of single persons limits the possibility of reproducing the households, in the long run limiting the reproduction of the settlement, and eventually limiting the reproduction of hunting and fishing in general.

The cultural adaptation process is viewed as a response to a change in the physical environment. However, biological anthropologists and archaeologists concerned with changes in cultures as well as cultural resistance suggest that adaptation is a consequence of selection acting on variation through cultural practices (adaptations) which have historically allowed a culture to survive.

Cultural practices are thus equated with genetic characteristics in the natural sciences; limited by a Darwinian

view, a group which does not have adequate methods of coping with environmental stress will not be able to compete for scarce resources and will fail to continue. From this approach to the term, a cultural practice is an adaptation only if it developed to overcome stress, thereby distinguishing adaptations from adaptive capacities where societies function within their dynamic environments regardless of whether or not they evolved as a result of selection.

### **And what are the regional implications?**

A critical issue here is the availability of the educational opportunities that enable young people to stay in the community, or at least in the region. This has been of concern for decades and the Arctic can show several examples of deliberate policies aiming to improve such situations. Box 24 highlights examples from the Nordic countries showing the density and accessibility of universities and higher education units.

Local access to educational opportunities has much to do with “sensitive ages” in the life cycle. One of the more important is the age when young people make decisions in respect of forming families. Establishing themselves as families often defines where they will be staying for at least a certain period of time thereafter. So if they have to leave the region in search of education, this more or less automatically results in a situation where they may decide to stay, not in the community, but at the place where education is offered. And as a consequence strategies for providing development opportunities in northern regions include, as Box 25 clearly shows, some examples of this behaviour.

In more recent social science work it is recognised that societies adapt to a range of stimuli including, but not limited to, environmental stress. Adaptive capacities rest i.e. also on socio-institutional relationships of exchange. Cultures (or societies) which are able to respond to or cope



with change quickly and easily are considered to have high adaptability or a high capacity to adapt.

Even without climate change the complexity of producing a viable plan for sustainable development in the Arctic would be daunting; but the added uncertainty of climate change makes this task simply enormous. The impacts on infrastructure inevitably affected by climate change, together with the probable lengthening of growing seasons and increasing agricultural effort, opening of new sea routes, changing fish stocks and ecosystem changes will provide many new opportunities for the development of Arctic economies. However this will also place limits on how much development is actually sustainable (IPCC, 2007).

Sustainable economic development will be even more unlikely if the gender and age balance of communities continues to widen. There now appears to be an increasing level of understanding among governments and residents that environmental protection and sustainable development are two sides of the same coin. For that purpose a forum for circum-Arctic co-operation has been established in the Arctic Council involving eight nations and six indigenous peoples' organisations and embracing the concept of sustainable development in its mandate.

### **Newcomers**

While the Arctic communities are challenged by changes in the economic focus towards knowledge, but still rely on some activity connected to resource extraction, the influx of a skilled labour force related to traditional activities has become an important trend. Two cases from the West Norden region (Greenland, Faroe Islands, Iceland and Western Norway) illustrate the situation. The focus here is on two groups of people from Poland and Thailand respectively. Further details are provided in boxes 26 and 27.

### **The Poles**

It is estimated that about 70,000 Polish workers were working abroad in Europe before the economic crisis had its impact on the economic situation. Most of them work in the British building sector and in large scale industries. They have also become frequent travellers to the North Atlantic region. In Iceland as well as in Norway the Poles are number one on the list of foreign citizens with residential status. They are also represented on the top-10 list in other parts of West Norden – number 3 in the Faroe Islands, and number 6 in Greenland.

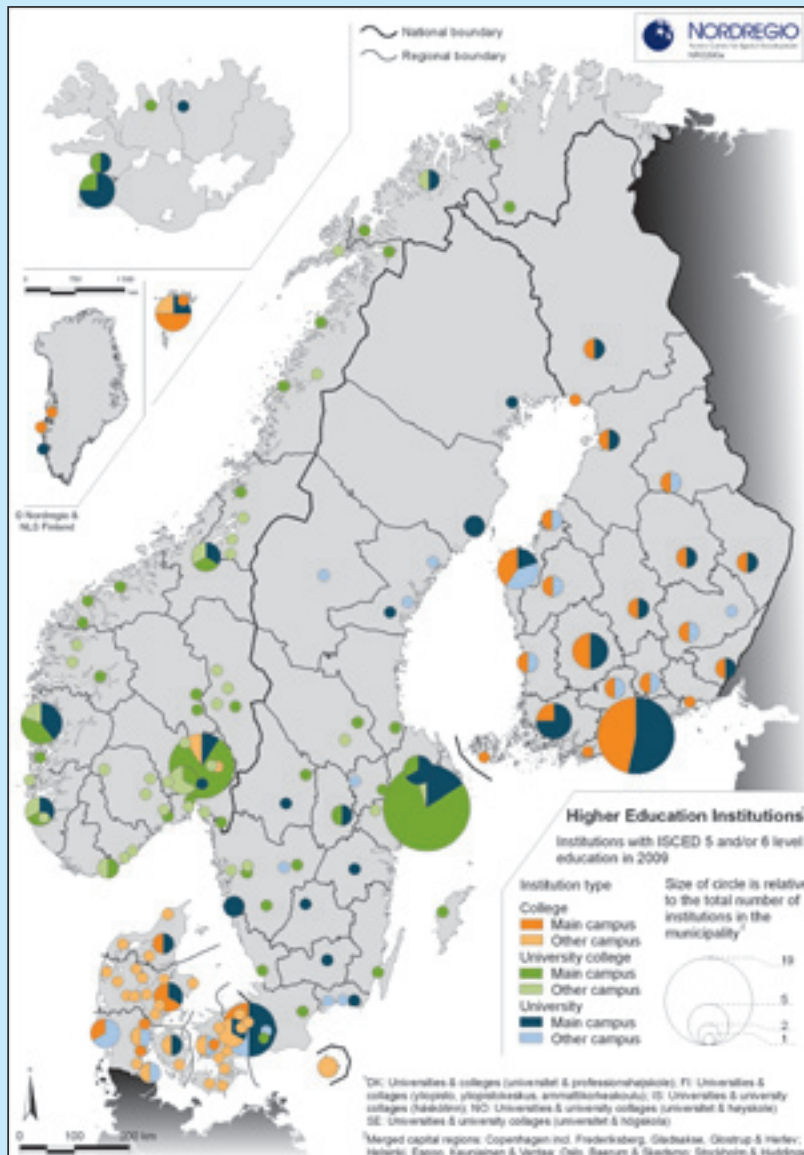
Their traditional experiences of mining, large scale industries and large scale construction has added to their mobility with a surplus of skilled workers available due to the severe and prolonged crisis for many of these activities in Poland. From a Polish perspective they have the skills and qualifications while from the receiving countries perspective, this is exactly what they need.

Large scale mining and industrial projects require significantly more workers during the construction phase than they require during the production phase – often 3–5 times as many. Therefore in the construction phase experience shows that the effect on domestic employment is limited. Foreigners working on temporary contracts typically account for three quarters of the workforce in the construction of the projects, while a local or at least partly local workforce might be hired for the operational phase.

The construction of the *Alcoa* Fjarðaál smelter in East Iceland which started in July 2004 and finished in June 2007, hired more or less continuously 2,200 workers. Of this 20–25% were from Iceland while 75–80% came from various countries and most notably from Poland.

During the construction phase the town of Reyðarfjörður had the highest concentration of foreign residents of any community in Iceland, and to house employees, the company erected a large team village near the existing village of Reyðarfjörður, about three miles from the

## BOX 25: REGIONAL UNIVERSITIES IN THE NORDIC COUNTRIES



Between the 1950s and 1970s economic growth and the emergence of welfare states were witnessed across the Nordic countries, and the expansion of tertiary education to new parts of the population – and to new locations – became an essential foundation of these new welfare societies. The volume of students in tertiary education increased significantly. This meant not only that established universities had to set up branches in new regions; but also that entirely new higher education institutions had to be established at new locations. In addition, a range of municipal and private higher education institutions were nationalised, so that tertiary education increasingly came under state control. Since the 1960s, higher education institution development has been presented as a regional policy tool which may boost regional development in non-metropolitan areas.

In Norway the policy in relation to remote areas – “*Distriktpolitikk*” – has been oriented to support for what is often characterised as “weak” regions thus retaining a more traditional stance in relation to equalisation issues. This approach sees a marked difference from the other Nordic countries where the need for a growth policy for the whole country is expressed.

The main goals of Norwegian Regional Policy have been to sustain the geographic pattern of settlement and the creation of value in the whole country with Regional Policy being designed to secure employment and welfare where people live. People should be able to live where they want. To promote this, new



universities were established in Trondheim and Tromsø towards the end of the 1960s. During the 1970s and 1980s, a new set of higher education institutions – specialised in regional public colleges – were established in selected regional centres that did not currently host universities to boost regional education capacities. The state university colleges were institutionalised as a new higher education institution category following the 1994 reform of tertiary education. In this way, 98 specialised public colleges and independent higher education institutions were merged into 26 new larger units – mostly with regional uptake areas. In Iceland, the University of Iceland was founded in 1911, and by 1960 a few other

colleges provided educational opportunities also outside Reykjavik. The legal framework covering higher education in Iceland is the Higher Education Institution Act from 2006. This act applies to educational institutions providing higher education leading to a degree and which have been accredited by the Ministry of Education, Science and Culture. The ministry has also issued the National Qualification Framework for Iceland which is a systematic description of the structure of education and higher education degrees that is specifically based on learning outcomes. All accredited higher education institutes in Iceland must follow this framework.

Icelandic regional policy has long had

a major focus on decentralised activities. This is clearly reflected in more recent regional policies which have developed from three basic ideas: maintaining economic vitality across the country, looking at growth areas as a driver, and connecting to globalisation by strengthening the local level.

There are currently seven higher education institutions in Iceland that fall under the auspices of the Ministry of Education, Science and Culture. The University of Iceland and the University of Akureyri are public universities while the Agricultural University of Iceland and Holar University College are public universities that were formerly under the auspices of the Ministry of Agriculture. Reykjavik University, Bifröst University and the Iceland Academy of the Arts are private institutions that receive state funding and operate under structural charters approved by the Ministry of Education, Science and Culture. The ministry concludes performance-related contracts with all higher education institutions under its administration.

Establishing educational opportunities in the Faroe Islands has been an important issue since the islands gained their independent educational system in 1979. There are 6 different types of upper secondary education, and the exams taken at these schools correspond to corresponding exams in Denmark. In the general higher Secondary Education a three year education at upper secondary school provides the student with the necessary basic knowledge to access further or higher studies at all higher educational

institutions, e.g. universities. An alternative to this is a Higher Preparatory Course, a two year education, intended for adults wishing to pursue a delayed education. In relation to vocational training the Business College, the Technical College, the Fishery College, the College of Health Education and the Marine School all provide students with educational opportunities in relation to different choices of vocations.

The University of the Faroe Islands is an educational and research institution, and one of the smallest universities in the Western world. The University offers education of particular relevance to the Faroese community that cannot be found elsewhere. Recent regional developments in the Faroe Islands have led to local functional specialisation, as the settlements surrounding Tórshavn, Runavík and Klaksvík have taken on the characteristics of commuting areas with emphasis also on providing educational opportunities. The lack of choice in the educational system, however, still leaves most of the students with the only other option of leaving the islands in order to pursue the careers of their choice. Around 500 students are enrolled in the higher educational

institutions on the islands, while more than 1,000 students study in Denmark.

The first attempt to establish educational opportunities in Greenland was through the establishment of a teacher training school in 1848 in Nuuk. The first formal vocational education was enabled in Greenland in 1946, when a polytechnic school was established in Holsteinsborg (Sisimiut) including a home for apprentices. Responsibility for the education system was taken over from the Danish government when Home Rule was established in 1979. The first political action was the enactment of a new school statute, in which it was stipulated that the language of instruction should be Greenlandic. A need for the introduction of a broader spectrum of educational opportunities resulted in the establishing of high schools and vocational training colleges in several of the larger towns, just as a university was established in Nuuk.

During the 1980s vocational education was decentralised with the establishment of local vocational schools in individual towns. The intention was to ensure a more local orientation in vocational education and to establish better cooperation among school

administrators and more training sites, thereby ensuring continuity in the career development of the country's youth. The system was however abandoned after a number of years due to the limitations imposed on the quality of the training provided in the smaller towns.

The University of Greenland is the major institute of education in Greenland. It is located in Nuuk and offers bachelor and masters' degrees, as well as post-doctorate programmes. Most of the courses are taught in Danish due to limitations in qualified Greenlandic speaking teachers. Some courses are however taught in Greenlandic. The spectrum of courses includes economics, law, commerce, management, public administration, literature, and theology, cultural and social history etc. The university offers both bachelor's and master's degrees.

By far the larger proportion of university students graduate from universities outside Greenland, mostly from Denmark where choice in the educational system provides most of the students with a larger variety of options even if it means that they have to leave in order to pursue their careers of choice.

smelter. The village has its own recreation area, dining area, gym and internet café. By 2008 the majority of the construction workers had left the region, looking for new construction sites, some in Iceland, others for instance in Greenland, while still others have returned to Poland.

In Norway the construction of the Snøhvit gas platform in the Barents Sea as many as 1,000 Poles were involved

as welders, mechanics, insulators and painters in the construction phase. Similarly the welding of pipelines in connection with the Ormen Lange gas project in north-west Norway also involved Polish workers.

A number of companies in Poland specialise in linking industrial contractors with Polish workers. *Everet*, for instance, situated in Łębork, is run as a family business

focused on developing a commonly respected brand for recruitment services and since 2005 has cooperated with a Norwegian business Partner in the recruitment of well-trained welders and fitters. One of these was for the Norwegian company *Fosdalen* who had a contract to build racks as part of the Ormen Lange Project.

Mining and large scale industrial developments are expected to contribute significantly to changing Greenland over the next decade. From a country primarily based on fishing and hunting, minerals and energy may very well become the main contributors to the economy. The first in line may be an aluminium smelter in Maniitsoq similar to the *Alcoa* Fjarðaál smelter in East Iceland, the question of the influx of foreign workers and especially that of the future mobility of the Greenlandic labour force will thus become of vital interest to the authorities, not least with regard to spatial planning.

The establishment of the new industrial complexes will probably not be “doable” based on Greenlanders alone. In a country with around 56,000 inhabitants it will be impossible to find the 4–8,000 skilled workers that are needed. So in the construction phase workers from outside, probably a large number of welders and construction workers from Poland will be invited. In the production phase however the group of workers needed will be more limited –in the range of about 600 persons – the majority will probably be Greenlanders.

The ongoing process of building a new Hydropower plant close to Sisimiut in West Greenland is being undertaken by the Icelandic company *Ístak*. A substantial number of workers here also come from Poland.

### The Thais

From 1998 to 2009 the total number of Thai citizens settling in the far north, i.e. Greenland, Iceland, the Faroe Island and Svalbard increased from 356 to 824 persons – a total increase of 131% over 11 years!

824 persons may not sound that large, but in Greenland as on Svalbard the Thais are the largest group of persons with foreign citizenship. They are number 4 in the Faroe Islands and number 8 in Iceland. In Norway Thais are number 10 on the list, an increase of 297%, from 1,987 persons in 1998 to 7,884 persons in 2009. In both Iceland and Norway the Poles are by far the largest group of immigrants.

In gender terms of the situation is more or less the reverse of that of the Poles. Among Thais women constitute almost 60% in Greenland and up to 85% in Norway. In Norway the role of marriages with Norwegian men is a key factor in the high female ratio. This is a pattern that resembles the other Nordic countries, where the in-migration of women from Thailand has helped to some extent to compensate for the general pattern of out-migration of women from the rural areas.

Similarly, marriages have been an important element in other parts of the North Atlantic, at least initially. However, the possibilities of getting good jobs in the service sector – hotels, restaurants and hospitals – are also important for the continued influx of women. Longyearbyen on Svalbard provides another example of this. The influx of women is at a later stage is supplemented by males often leading to new business activities, still connected to the service sector. Thai restaurants can now be found in most of the larger places in the North Atlantic region. In Nuuk, the capital of Greenland, with a population of around 15,000 inhabitants, the Thai restaurant *Charoen Porn* employs 16 persons and is among the most popular in the area. The Thai kitchen cooks with Greenlandic produce and is considered to resemble “the best of both worlds”.

The town has two shops with a great variety of Thai products – from furniture to clothes and food, primarily servicing the 100 Thais in town, but increasingly providing a service for all. Thais are recognised as being



**BOX 26: THE POLES**

Workers from Poland have been involved in many large scale projects in the North Atlantic region over the last decade. Usually they are there on contracts that are clearly temporary and they often live in camps that are established as temporary or semi-temporary units. In the case of the construction of the aluminium smelter at Fjarðal in East Iceland 2,200 workers from Iceland (20-25%), Poland and other countries (approximately 75%, hired directly from various countries, most notably from Poland). At one point the town of Reyðarfjörður had the highest concentration of foreign residents of any community in the country. To house employees, the company erected a large team village near the existing village of Reyðarfjörður, about three miles from the smelter. The village had its own recreation area, dining area, gym and internet café. After construction ended most of the workers left and it is not clear what the buildings will be used for. In connection with the possible establishment of a similar smelter close to the town of Maniitsoq in Greenland a similar accommodation model will probably be considered.

Net migratory trends tend, to some extent, to portray the regions as losing population, which may be interpreted as a sign of economic and social decline. But the reality is more nuanced, both in terms of the actual flows that occur and in their geographic patterns, as illustrated by the attraction of the region as seen from other parts of the world. Negative net migration figures



in these areas should be related to the much larger and constant circulation of people in all regions and municipalities. While domestic net migration figures may be systematically negative the international net migration figures need to be taken into consideration. While the latter figures regarding the influx from other countries do not compensate for the national loss, they may be suggestive of future trends. Among the ways of compensating for demographic losses resulting from domestic migrations from north to south and from the periphery to the core, international immigration has been considered a possible solution. It is however a major challenge to attract people with the appropriate competencies and profile, to integrate them in

small local communities and to encourage them to settle on a perennial basis. The two examples – attracting workers from Poland and Thailand – clearly show very different approaches. But they may nevertheless indicate potentials for the regions possessing a workforce with competencies within relevant sectors of activity, here e.g. mining, fishing, services, etc. The difficulties associated with predicting both short- and long term migration trends is however remain a major challenge, and this will undoubtedly be a major political issue for the future.

not only good workers but also a very stable workforce. The restaurant the chef works for has been in Nuuk for 14 years, while two other cooks have been there for more than 10 years.

The question of integration in the community is often a major factor when it comes to newcomers' decisions about staying or leaving. Within the Thai community networking is a major factor in stabilising the community. Interviews with Thais in Longyearbyen, Svalbard, indicate that integration in the local community is not necessarily an issue. None of the interviewed persons had any expectations in this regard. Those married to Norwegians were however expected to become more involved, especially in the case of raising children.

Questions of integration and of long-term community involvement did not, however, appear to be decisive in

relation to the decision to stay or leave. But the little enclave served as a cultural setting for them, and turned out to be decisive regarding whether or not to stay. They had no specific strategy in respect of leaving as long as they had good income opportunities and felt accepted by the community.

Similar examples to those already mentioned are available from other parts of the Arctic. In Alaska, the fishing industry is highly dependent on a temporary workforce from Asia. The men and women doing this type of work are mostly seasonal workers from the Philippines. They work 12 to 16 hour days, 6 or 7 days a week. Fish is a seasonal and fresh product which has to be processed as soon as possible. Temporary workers provide both a cheap and efficient workforce in this respect.

## BOX 27: THE THAIS



“I came to Greenland in 2002 on a two year contract to work in a grill bar in Ilulissat in North Greenland. I was employed by Master Meng, who came to Greenland in 1977. He owns different fast food restaurants around in Greenland. I met Konrad in 2004, and it turned out that we became interested in each other, so we got married in the summer of 2005. Konrad was born in Paamiut and has worked in the fishing industry for several years, lately in connection with the processing of snow crabs. We have

our own house, and we like living here in Paamiut with many of Konrad’s relatives and friends living nearby. By the way, we are both going to visit Thailand again next year. We love the country, have a lot of relatives and a good network there, and I am happy to be able to maintain my relations with my country of origin.”

This is in short the story of Rutchana, one of the 100 citizens from Thailand presently living in Greenland. Her story is quite similar to that of many others in the North Atlantic region.

Quite often the influx of women at a later stage is supplemented by males. And this very often leads to new business activities, still connected to the service sector. Thai restaurants are becoming increasingly common in most of the larger places in the North Atlantic region. In Nuuk, the capital of Greenland, with a population around 15,000 inhabitants the Thai restaurant employs 16 persons and is one of the most popular restaurants in town. The Thai kitchen with Greenlandic produce is considered to resemble “the



best of both worlds". In addition the town has two shops with all kinds of Thai products – from furniture to clothes and food, first of all servicing the group of 100 Thais in town, but increasingly becoming an important supplement to the shopping opportunities for all in the town. The Thais are recognised as being not only good workers but also a very stable workforce. In the case of the restaurant the chef has been there for 14 years while two other cooks have been there for more than 10 years.



While the question of integration in the community is often a major factor when it comes to newcomers decisions about staying or leaving, the question of networking within the Thai community is a major factor in stabilising the community. Interviews with Thais in Longyearbyen, Svalbard, indicate that integration in the local community is not necessarily an issue. None of the interviewed persons had any expectations in respect of becoming integrated into the community. Those married to Norwegians of course were

expected to become involved in community activities, especially in the case of children. The question of integration and the question of long term community involvement, however, did not appear to be decisive in relation to staying or leaving. But the little "enclave" served as a cultural setting for them, and turned out to be decisive in determining whether or not they would stay. They had no specific strategy regarding leaving as long as they had good income opportunities and felt accepted by the community.







# Private – Public relations

In most parts of the Arctic the public sector still tends to dominate the economy. The reasons for this often differ – geopolitical considerations, colonial characteristics, regional policies etc – but the consequences have nevertheless been quite similar: a large public sector with the state and regional authorities involved in most regulation and planning measures. Map 11 provides a good illustration of this situation, showing the distribution of jobs between the public and the private sectors.

Parallel to this, a private sector has recently emerged and has to some extent replaced the public authorities as the main provider of services. In addition it is clear that the locus of political power formerly held by the centralised public authority has now moved towards the regional and municipal level.

In Russia these changes have been quite explicit but to some extent they are taking place all over the Arctic. How privatisation is reflected in the everyday life of the population is illustrated in map 12 showing the level of ownership of dwellings in the Arctic. It is an overview of the sta-

tus as of 2010, and as will be explained below, reflects the marked changes which have taken place in Russia over the last decade. In other areas the process has been much slower, and for a large part of the population the share of dwellings owned by the dwellers still plays a minor role.

In between these public and private sectors cooperatives have also become important players in the development process, and are now important players in many parts of the Arctic. A discussion on the role of cooperatives is conducted below (see box 28).

As some of the major changes over the last ten years have occurred in Russia, followed by similar trends, across other parts of the Arctic, the Russian process will be the starting point for discussion in this chapter.

### **The process of privatisation in Russia**

The mandate to privatise in Russia was taken by the federal government following the collapse of the Soviet Union. Until 1991 practically everything was state-owned. The exception was cooperative enterprises (collective

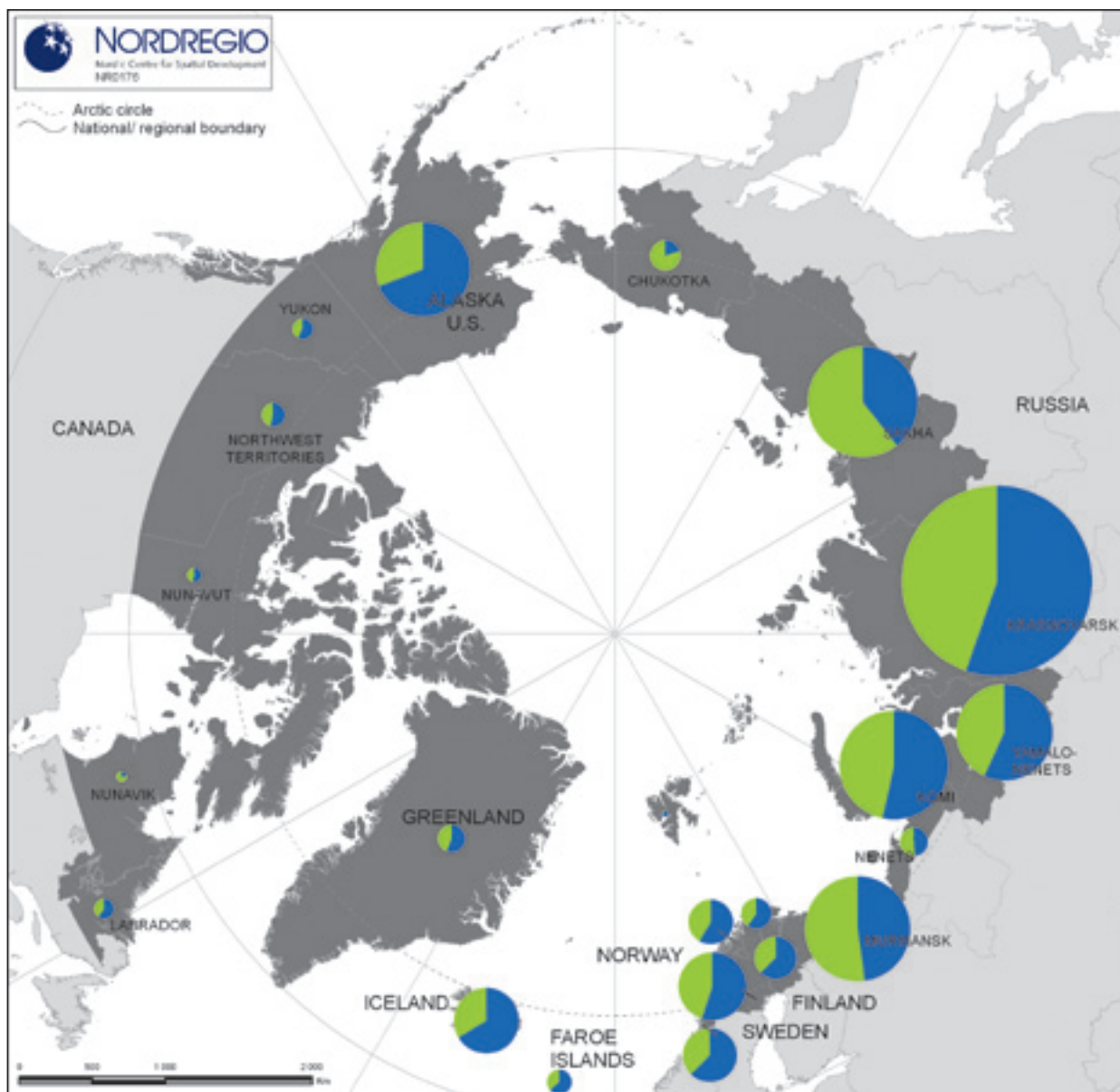
#### **MAP 11: PUBLIC-PRIVATE EMPLOYMENT IN THE ARCTIC**

The map shows the distribution between employment in public versus private activities in the Arctic, and reflects the role of these two types of activities in the economics of the region. According to the OECD the public sector today represents between 5% and 28% of the workforce in most OECD countries, with the numbers remaining rather stable over the last decade.

Looking at the Arctic there is around a 50/50 division between the two sectors on average. The public sector has a huge influence on livelihoods in the

Arctic simply by providing around half of all employment in the region. But as shown on the map marked differences exist. In NW Russia the public sector is slightly below 50%. This is similar to the situation in Fennoscandia and the Faroe Islands. An exception here is Murmansk where the private sector is below the 50% mark. Greenland is close to the 50/50 mark, while Nunavik, Nunavut, Chukotka and Sakha are regions where the public sector contributes more than 50% of the employed workforce, in the case of Chukotka this is substantially

more. From NWT towards Alaska the public sector involvement declines, with Alaska being the part of the Arctic where the Public sector contributes least. What is not shown on the map however is the fact that public employment could be subdivided into government-related activities versus public (quasi-)corporations. While the first type dominates for instance in Fennoscandia, with only a small percentage of jobs in public corporations, the percentage is substantially higher in Canada and in Greenland.



### Public-private employment in the Arctic \*



Arctic region defined as in Arctic Human Development Report

\* RU: public includes: governmental, municipal, property owned by societal and religious organizations, mixed and foreign & joint Russian-foreign. FO & IS: Education, health & social work included as public.

Sources: NSIs for GL, IS, NO, RU, SE, Canada: NSI for Provinces, Bureaus of Statistics & Community profile, Canada 2006. FO: NORA & NSI, Alaska: ArcticStat, State of Alaska, Dept. of Labour & Workforce Development. Data for 2009 (except Nunavik 2005 and Labrador & Nunavut, 2006)

farms and consumers cooperative societies), constituting 5% of the economy at most.

In 1991–1992 a number of regulatory acts were issued, governing the process of the privatisation of state enterprises. The first stage involved dividing state property into three levels: federal, regional and municipal.

The federal level included mainly military enterprises and entities ensuring the security of the country as well as the transport and energy infrastructure. Federal property also came to include large enterprises, higher educational establishments, large providers of utilities, agricultural enterprises, etc. However, these could also be transferred to the regional ownership.

Regional ownership was formed on the leftover principle and its amount depended on the decisions of the federal government.

The municipal level included housing enterprises, utilities, shops; healthcare, culture and sports facilities; consumer services enterprises, etc. Thus, the majority of

former state property was distributed between the federal and municipal levels.

Through this type of division of former state property, municipalities obtained both properties like shops, providers of consumer services, and large scale utilities including hospitals, swimming-halls, gyms etc. Usually these required large investments and were more-or-less unprofitable. Only auxiliary enterprises were as a rule transferred into regional control.

For example, in the Magadan region by 1993 the inventory of regional property included only 45% of the total number of enterprises that might have been transferred to the regional level. The 40 mining enterprises of the region, which were the bedrock of the region's economy, became federal property. Not a single enterprise playing a significant part in the region's economy became regional property. Such a distribution of property effectively maintained the region's dependency on the federal authorities.

## MAP 12: HOUSING IN THE ARCTIC

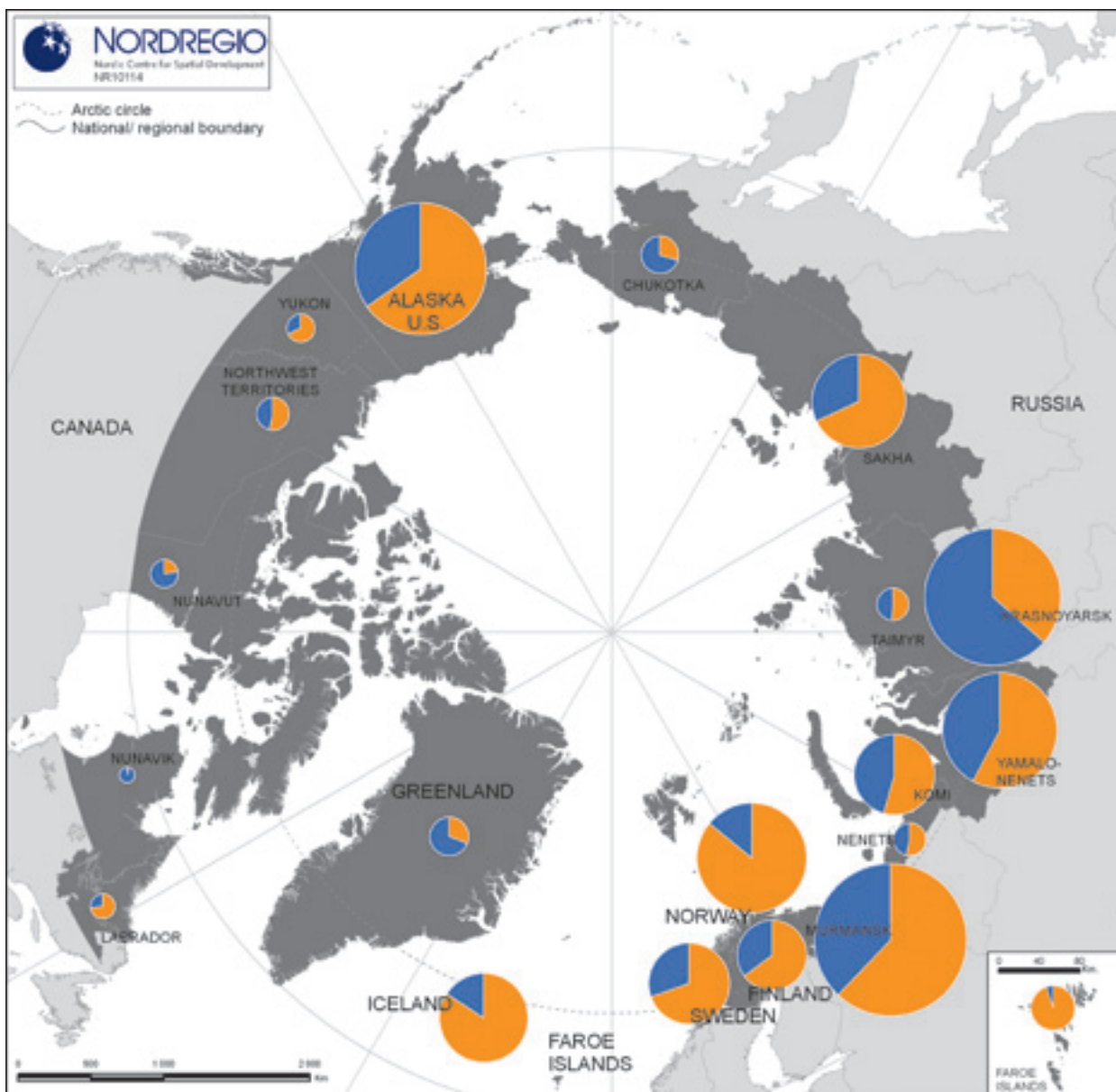
Just as public employment has been a trademark for the Arctic, also public housing has made an important contribution to the improvement of housing conditions in the Arctic. Rented dwellings – apartments, terraced or semidetached houses as well as individual houses – often in connection with employment and with favourable rental conditions as part of the employment contract, is still important in many regions. The current situation is shown on the map, and illustrates a divide between the regions – Greenland, Nunavik, Nunavut, NWT, Chukotka, Taimyr and Nenets – where most of the dwellings

are rented, and the other regions where there is a dominance of owner-occupied dwellings. In the Faroe Islands almost all dwellings are privately owned. Only a few apartments are rented out and these are typically basement apartments rented by students or single persons. Nunavik, Nunavut and Greenland are among the regions where the majority of dwellings are owned by public organisations, for instance in Greenland by the Greenland Government or the municipalities, or in a few cases by large companies.

Looking back just 15 years the picture would have been very different. In

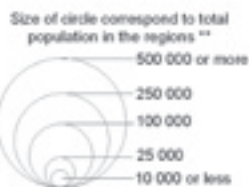
Russia where the majority of dwellings today are privately owned, fifteen years ago most would have been either state owned or owned by cooperatives. And fewer dwellings in Greenland were also privately owned at that time. The processes toward privatisation in Russia and Greenland have been very different, in Russia the process occurred over a very short period of time, while in Greenland the process has been much more evolutionary in nature. A similar process is only now taking off in the Eastern Arctic in Canada.

Arctic circle  
National/ regional boundary



## Housing in the Arctic\*

- Share of owned dwellings
- Share of rented dwellings



Arctic region defined as in Arctic Human Development Report

\* Distribution of owned/rented dwellings correspond to national figures for SE, FI, NO, IS, FO, GL

\*\* Size of circle in Norway correspond to sum of population of Nordland, Troms and Finnmark, Finland: Lappland, Sweden: Norrbotten

Sources: Inst. For Economic Problems, Apatity, Eurostat, Statistics Finland, Statistics Greenland, Statistics Canada Community profiles, Alaska Statistical Agency. Analysis & design: R. Rasmussen & J. Sterling



Later, after 1996, the process of property distribution continued, although less actively. This mostly dealt with the division of enterprises into smaller units and the redistribution of their property.

The second stage was the process of “small” privatisation and the transformation of large and medium-sized enterprises into joint stock companies. This was the process of privatising municipal enterprises like shops, cafes, hairdressers’ and repair shops, etc. This process peaked in 1992–1993. By 1996 the majority of these facilities had

been privatised. The main method of “small” privatisation was sale of enterprises at special auctions. Some part of the municipal property was however transformed into joint stock companies.

The process of “small” privatisation was completed very quickly. Thus, in the Magadan region, 35 formerly municipal entities (mainly shops and consumer services enterprises) were privatised in 1992, 250 in 1993, 75 in 1994, 69 in 1995 and 7 in 1996. In the following years there were very few further instances of privatisation.

#### BOX 28: THE ROLE OF COOPERATIVES IN THE ARCTIC



It has been estimated that the livelihood of half of the world’s population has been made secure by co-operative enterprise, and they provide more than 100 million jobs around the world which is 20% more than multinational enterprises.

Cooperatives are economic institutions, for instance consumers coop-

eratives are formed to obtain improved products and services at better prices, retail businesses use them to gain benefits in terms of group purchasing or other shared activities while employees utilise the cooperative form of business to improve their income and equity positions in a company. Among the advan-

tages of cooperatives are that they build community assets, they usually stay in business longer, and they merge business and community participation. At the same time cooperatives are usually locally owned and controlled, contributing to the strengthening of the local economy through employment and the ability to exercise some form of control over the economy.

Cooperatives function within a broad spectrum of activities, including production, consumer affairs, housing, insurance and worker cooperatives plus credit unions. Most visible are the shops which are part of the core distribution system for consumer goods.

It is generally recognised that cooperatives have had a huge impact on development in the Arctic even though there are substantial differences in approach between them. According to the Canadian Cooperative Association (CCA) there are over 10,000 cooperatives operating in Canada, with nearly 12 million members and assets totalling over \$169 billion.

In Murmansk region this process unfolded at a somewhat different pace. The aim of the privatisation programme was to privatise 524 such enterprises in 1992. However, only 126 municipal enterprises were privatised with a further 109 in 1993. The municipalities and the employees in these enterprises tried to avoid privatisation. This was precipitated by the desire to retain their income basis, as in the course of privatisation they lost not only enterprises, but virtually the entire stock of real estate occupied by these enterprises at the time of privatisation.

For the employees, entering a free market required marketing efforts to retain their client base. At the same time, being a municipal enterprise guaranteed minimum wages, irrespective of performance, and the possibility to operate at a loss. Everything earned by such enterprises above the minimum income determined by the municipality was appropriated either by the employees or their managers, which was possible in the context of the generally underdeveloped state tax service. As a result, by mid-



Northern regions compared to those in the South are much more involved in cooperative activities. The average northern cooperative was larger (\$4.3 million volume of business) than the southern cooperatives (\$1.0 million volume of business) and the average northern cooperative employed 162. Within Arctic

Canada there are also marked differences. According to the Government of Yukon Registrar there are six registered cooperatives in the territory while there are 21 in Nunavut and 8 in NWT.

In the Nordic Countries 19% of the distribution of consumer goods in Sweden is from cooperatives. The numbers for

the other Nordic countries are: Norway – 25%, Denmark 39%, and Finland – 43%. In Greenland around 30,000 persons are registered as members of “Brugsen”, the Greenlandic consumer cooperative. The first shop was established in 1963, and today 13 shops in all major towns are servicing the retail market. Besides retail sale the organisation also produces local products.

In Alaska different activities are organised through cooperatives, including telephone, electricity, and law related cooperatives, cooperative banks, sea-food producers, and credit unions, and in 24 towns across the state there are Consumer Organisations and cooperatives. In Russian major changes in the ownership structure have taken place during the last 15 years. Cooperatives used to be one of the most important forms of ownership besides state ownership. Some have been converted into private enterprises or acquired by the state.

1997, in Murmansk region only 406 municipal enterprises had been privatised.

Thus, the privatisation of municipal enterprises went rather fast, although it was not complete. Practically the entire wholesale and retail trade, consumer services and public catering were privatised.

From this process of “small” privatisation emerged the small business sector. In 1994 the number of small businesses in Arctic regions exceeded thirty thousand, many of them highly unprofitable. By 1998 the number had been reduced to around twenty thousand, primarily through liquidation. It was only by 2006 that the number of small businesses in the Arctic regions once again reached the level of 1994.

State owned enterprises (regional and federal) were transformed into joint stock companies before privatisation began. In 1993–1999 in the Arctic regions of Russia, about 1,500 state enterprises were changed to joint stock companies, in 2000–2009 another 300 followed suit.

This transformation into joint stock companies was an uneven process. In 1993–1994 in the Magadan region, 111 federal and regional enterprises were turned into joint stock companies, constituting 15% of all enterprises at most. The peak was in 1996 while 1998–2001 saw a slump. By the end of the 2000s all large and medium-sized federal and regional enterprises liable for privatisation had become joint stock companies.

Through 1992–1996, in the Murmansk region, 152 joint stock companies were established. During this period all large enterprises, forming the basis of the regional economy, were transformed into joint stock companies. After that the process was frozen until the mid-2000s. From the mid-2000s on the process of transformation continued by means of the transformation of state unitary enterprises.

The third stage of privatisation was the floating of the shares of privatised enterprises on the open market. Over the period 1992–1996 a portion of the shares were given to

the employees of these enterprises for free, the remainder were sold at auction by the state property fund or turned into a fixed governmental shareholding.

During the period of transformation into joint stock companies, a “golden share” was introduced, giving a casting vote at a shareholders’ meeting to the state authority for a certain period of time. In 1995 the state retained control over 28% of enterprises privatised in that year in the Arctic regions, in the form of a controlling interest and/or a “golden share”.

On average, the process of transformation into a joint stock company and of moving from state ownership to mixed ownership and then into completely private ownership took 3–4 years. In Murmansk region most joint stock companies remained in mixed ownership until the mid-1990s, i.e. the state retained a certain shareholding. By the late 1990s, the state retained its presence in only 25% joint stock companies across the region.

Regional authorities have however continued to retain major influence. In the Murmansk region *Severonickel* and *Pechenganickel* are enterprises formed by nearby towns and villages. In 1998 the owners of these enterprises intended to close them down because of the prevailing situation on the world nickel market. This would have led to the closing of the settlements themselves and to unemployment for about thirty thousand people.

The regional authority interfered actively in this situation. Under its influence the new company *JSC (Kola Metallurgical and Mining Company)* was created, which has continued operating up to the present time. The regional authority used indirect leverage over the company owners as the state was not a shareholder of either enterprises or the newly created company.

The difficult situation faced by numerous enterprises after privatisation has often provided the basis for interference from the state. In 1996 the state returned to itself 25% of the shares of one of the largest enterprises, the *JSC*

*Kovdorsky Mining Processing Plant*, in the Murmansk region by means of a judicial procedure (breach of investment conditions of privatisation). The enterprise was on the verge of bankruptcy.

At the beginning of the following year, 1997, 21% of the shares in the *Kovdorsky Mining Processing Plant* were returned to municipal ownership to the city of Murmansk (within the framework of a pre-trial settlement). Thus, 46% of shares were now under the virtual control of the regional government, which ensured full control over the enterprise, as the other significant shareholding of about 30% at that time was scattered among the enterprise's employees.

The regional government was able to stabilise the operation of the company, organise product sales and achieve the annual profit of 30 million roubles by 1999. In 2001 the decision was made to sell the state and municipal shareholding. The private mineral and chemical company *EuroChem* thus became the owner of the *JSC Kovdorsky Mining Processing Plant*.

At the same time, the regional authorities tried to retain influence over the enterprises located in their territory. The reason for this was that in most northern regions enterprise assets are “stationary”, i.e. closely tied to a certain space, which is true for oil and gas, metallurgical enterprises, the mining industry etc. It thus became important who controls these enterprises – trusted business structures, closely cooperating with regional and municipal authorities, or “outsiders”, who are hard to influence. Therefore, regional authorities interfered actively both with the process of the initial division of state property and with the following periods of reorganisation, seeking to establish either, their own direct control, or the control of trusted owners over the territory's assets.

In the 1990s in Komi Republic a group of senior regional managers, on behalf of the citizens, obtained control over the main large enterprises of the region and subsoil

plots with attractive mineral reserves. The struggle by outside private capital to buy up regional property ended in 2001 when the regional authority changed and the main regional enterprises were transferred into private ownership.

At the same time the interaction between regional authorities and large enterprises is retained due to the “migration” of regional officials into the managing bodies of the enterprises and *vice versa*. To a greater or lesser extent this happens in all regions.

The state restored control over large enterprises, in particular, over the power giants, by placing high-ranking officials at the head of their boards of directors. Not only does the Russian government promote the interests of leading companies, but it integrates them into the decision making process – sometimes for the benefit of firms and their leaders and against national interests.

In the mid-2000s, the federal power promoted further privatisation of the remaining enterprises. In accordance with the law, by 2009 the local governments must either privatise or transfer into the state ownership the property that does not serve to ensure the performance of the local authorities' functions. To date, only social sphere enterprises may remain as municipal property, such as schools, kindergartens, outpatient clinics and hospitals.

A similar decision on the privatisation of state property was made with respect to enterprises that were not used for the performance of state functions. Since 2005 the state has sought to systematically decrease the number of unitary enterprises. Most of them went through the transformation into joint stock companies with the state retaining 100% of the shares in its ownership. Then they were offered for privatisation.

In addition, the following were offered for privatisation: shareholdings in enterprises owned by the state, not exceeding 50% of the statutory capital; any shareholdings of enterprises in the fuel and energy complex, construc-

tion complexes, civil aviation, transport, etc., including those that had been previously categorised as strategic enterprises and had not been liable to privatisation.

During the economic transition period (1992–1999) over 6,000 enterprises were privatised in the Arctic regions. During the period 2000–2009, within the framework of the programme of selling off non-core state and municipal property, almost 800 enterprises were privatised. Notwithstanding the fact that these seem like large numbers, only about 50% of the enterprises existing in 1990 have as yet been privatised. A considerable number of enterprises still remain in state ownership, although their organisational structure has changed, the others were liquidated or reorganised into other types of structures.

As for the entire Russian Arctic, by 2007 the federal government retained direct control over 600 enterprises registered or operating in the Arctic regions. Among them 34 enterprises with 100% state shareholding, 3 enterprises with 50% state shareholding, 9 – with a state shareholding of 25–50% and 8 with a state shareholding of less than 25% were intended to be further privatised from federal property.

In part these were the enterprises for which no buyer had been found (for example, the failed attempt, in 2003, to sell the shares of *JSC Sea Port Edvekinot* located in Chukotka AO), and partly also the unattractiveness of enterprises relating to the nuclear industry and the old military-industrial complex.

The remaining non-privatised enterprises often remain in state ownership as there are no private entrepreneurs willing to acquire them. By 2007 there were 80 enterprises prepared for privatisation however only 29 were subsequently privatised. In the following year the state attempted to privatise an even larger number of enterprises – about 120, but only 39 were privatised. These failures occurred, in addition to the low economic

attractiveness of the assets, because of their overrated auction price and sale in a single lot. It is now planned to transfer into regional property this group of non-privatised enterprises. Thus, it is planned to transfer into regional ownership the air-transport companies of *Khanty-Mansi* and *Yamalo-Nenetsk*, servicing remote areas and field camps.

On the whole, across Russia, the share of joint stock companies fully owned by the state has been increasing. One can assume that the same tendency is true for the Arctic regions. According to albeit incomplete data, by 2010 the federal government had retained control over more than 200 enterprises situated in the Arctic regions due to being in ownership of the major share of the statutory capital owning about 400 unitary enterprises.

In addition, the list of strategic companies in the Russian Federation (i.e. not liable to privatisation) still includes about 12 enterprises registered or operating in the Arctic regions. About 40 enterprises formerly included on the strategic list have however now been excluded from it. Exclusion from this list does not mean that all of them are sure to be privatised. Most will be transformed into joint stock companies with 100% state shareholding or included in state corporations.

On the whole, one may speak about strengthening state management and control over key natural resources. It is typical for Russia that the state's portion of the economic gain from the recovery of oil and gas resources and diamonds in the Russian Arctic is appropriated *exclusively* by the federal power. Priority state control and regulation are exercised with respect to such strategic industries as fuel and energy, transport and communications.

At the same time there are examples of a considerable reduction in the level of state control, when corporations exert such considerable influence (financial, political, etc.,) over region development, that the area is virtually privatised together with its institutional infrastructure,



with the entire territory turning into a “quasi-corporation”.

One can thus see an intensification of the transition from direct interference where the state acts as both a regulator and an entrepreneur in respect of the principles of indirect management. The influence is redistributed both between companies and the state and between different levels of power. One of the tools of such indirect influence is establishing formal ecological and social restrictions for corporations.

### **Privatising resources**

Individual Transferable Quotas (ITQ) are quotas or quota shares allocated to fishermen or fishing vessels in such a way that the rights can be utilised, sold or rented out by the holder of the right. What may once have been a public resource is thus turned into a form of private ownership.

The introduction of the system was a reaction to the experiences of over-fishing and over-investment under former management systems. Inventors claim that the system should be an efficient fisheries conservation enabling fishermen to plan fisheries activities over the longer term. It has been argued that ownership of a certain share of a fish stock could therefore be considered to favour a more sustainable utilisation of the stock. Others, however, argue that this perception of the disadvantages of the former systems and advantages of the ITQ system has to be taken with some reservation.

A major issue here is the extent to which the expected adapting of fisheries capacity to the fishing opportunity in the ITQs system will be real. “Upgrading” – discarding undervalued fish in order to get a higher market price for the landed catch – would be a negative side effect of the system. Only being allowed to land a certain catch under conditions where market prices are low might bring the quota holders to undertake such unsustainable actions.

The consequences of the ITQ system in Iceland are discussed in box 29.

Another potential effect of the ITQs could be capital concentration as wealthier fishermen look for opportunities to purchase others’ quotas while the desire to reduce transport costs through improved market access may lead to physical concentration in the larger towns. In addition, a side effect here might be the closure of coastal fisheries unless other means of regulation are introduced. In most market economies such consequences are regulated by public policy measures, and the case of Iceland is a good example of the complexities involved here (see box 30).

ITQ management has been emphasised as a system that focuses more on the regulation of economic efficiency than on resource efficiency. It might provide the highest yield per capital input, but this does not necessarily mean the highest yield for society. One advantage of small scale fisheries here is that not only the most valuable resources are involved but also that less valuable fishing opportunities would be utilised, because spending a day on fishing and returning with low value fish would be better than returning home without any fish. In the context of large scale fisheries what counts is the outcome of a 2–3 week trip, and here it is not the daily catch, but what has been caught during the whole trip, that matters.

Economic efficiency is important in fisheries where a rational handling of catches is fundamental to the economic result. And what is emphasised by critics of the ITQ system is that the concentration of quotas in individual hands limits the availability of fishing resources to many smaller places, and eventually leads to the disappearance of this livelihood from these communities. Several alternatives to the ITQ system exist, for instance the Community Quota systems where privatisation is not based on individuals but delegated to communities/municipalities (see box 30).

**BOX 29: ITQ**

ITQ – Individual Transferable Quotas – in reality means the privatisation of the expected outcome of renewable resources, primarily fish. An Individual Transferable Quota (ITQ) system implies that Total Allowable Catch (TAC) is allocated between a predefined and fixed number of quota holders. Quota holders can buy or sell, lease or rent quotas at the market place. There are no geographical requirements connected to ITQ, which

means that the owner can fish out of any port.

In the beginning quotas for different species were introduced to provide an overall measure of sustainable fisheries, further it was to ensure a more optimal use of the resource and more convenient behaviour by the fishermen compared to other types of allotments of rights. The opening and closing of fisheries during specific time periods or until the quota

has been fished by the total group of fishermen could result in over-investments in equipment in order to be the first to catch as much as possible, while it was allowed. By owning a defined part of the total quota it is possible to catch it when convenient, and with lesser technical resources.

The introduction of such a system in Iceland was related to the country's ability in 1976 to claim ownership of its



coastal oceans after the Third United Nations Conference on the Law of the Sea, when it was decided that countries had consented to allow a 200 mile Exclusive Economic Zone (EEZ). The ITQ system was established in 1984, altered several times until it assumed its final form in

1990. Pros as well as cons have been stressed in relation to the system, and very often there is a clear political divide between the two groups of persons.

In addition to increasing efficiency in effort and capital expenditures, an ITQ system provides an estimate for

measuring the value of the fish stock and thus the option of arranging loans based on expected outcomes and funding for improvements and fleet renewal. In cases of overcapacity the market process will induce less efficient vessels to be withdrawn while the most efficient will remain. Thus fishing will be conducted in a cost-effective manner. The “cons” include the following issues: As the quota system limits quantity, quality is left as the primary means of increasing profits by means of discarding lower value fish. With the option of selling the quotas there has been a tendency towards the concentration of the quotas in fewer hands; Due to the high costs involved in obtaining a quota, newcomers face major problems in entering the market. As most profit is gained by delivering the fish directly to the larger markets, the concentration of quotas in the larger harbours has been the result. If quota rights are given to vessel owners’ groups, those who will not receive compensation include crew members and the various suppliers and receivers. In a worst case scenario fishery-dependent communities can collapse with the loss of a quota right to fish.

**Delegation of authority**

During the last ten years important changes in the power and responsibility of the administrative structures of the various Nordic countries have been introduced. The reasons for this are many and include, an ageing population, extensive service needs, more effective service production and delivery and maintaining strong local autonomy and democratic accountability.

The starting point for governance reform in the Nordic countries is both functional and democracy-related, relating in particular to service provision needs, but also to efficiency concerns in public sector governance. The pressures in respect to service provision needs have resulted in a variety of reform processes and pilots being implemented where on the national level the organisational form selected is a Committee on Public Sector Responsibilities, or some other similar body, which seeks to clarify the division of responsibilities between different levels of the administrative system (where multilevel governance occurs) and by so doing, enhance the capacity of the public sector to renew itself.

Another expression of the need to restructure is the aim to improve the innovation capacity at the various different levels of governance while seeking to clarify functional specialisation in such a way as to build on a clear division of responsibilities between the local and central government levels in particular.

On the central government level, the issue is most often articulated in terms of the cross-sectoral development of central government services and national level governance. In most cases such territorial reform processes are generally separated from these more intra-governmental processes. These cross-sectoral perspectives should however be discussed together with the multi-level territorial considerations as issues of scale, function and political organisation as all are equally relevant for territorial governance.

The largest reduction has been in Greenland where the number of municipalities was reduced from the 18 that have existed since WWII to four. The structural reform agenda of the early 21st century in Iceland and the Faroe Islands has also largely been dominated by municipal mergers.

Iceland has a two-tier territorial system, with no regional level. In terms of governance and policy innovation it is in many ways one of the most interesting Nordic countries and it has been a keen policy innovator, strongly influenced by many New Public Management ideas.

Public debate in Iceland has been dominated by the issue of municipal mergers. The realities of the settlement structure and population size to landmass ratio however generally render regional policy and territorial governance questions, nationally-speaking at least, irrelevant. The degree of centralisation and concentration in the capital Reykjavik is also a major factor here.

The number of municipalities has however fallen in recent years, reflecting the extensive process of municipal mergers that have taken place. The role of the local authorities has also changed, becoming more complex and now embracing primary schools and social services. The major share of the municipalities' work entails the management of primary education, a local authority area of responsibility since 1996.

The main objective of the reform process in recent years has been to strengthen the municipalities in such a way that they would be better able to provide public services. In Iceland the debate has focused on bringing about the reform of local authorities such that they could become strong enough to adopt new tasks and responsibilities, which in the Icelandic case would be moved from the state to the local level.

The aims of the local authority reform are similar to those of the other Nordic countries on the one hand, but

also in some ways rather different, on the other. This is particularly so in the context of the increased decentralisation sought in the provision of public services in order to render clearer the division of tasks between the

central government and state authorities and local government.

At the same time however an increase in the local level share of public consumption remains a significant end

### BOX 30: COMMUNITY QUOTAS



Community Quotas (CQ) or Community Development Quotas (CDQ) is a system where the rights to renewable resources – primarily fish – are allotted to communities. Consequently the Total Allowable Catch (TAC) is allocated between a predefined and fixed number of communities. In some situations Quota holders can buy or sell while in most situations they are only allowed to lease or rent quotas on the market place. The Quota is therefore geographically located.

Community Development Quotas have for some years been an important regional policy tool in Alaska. The programme was introduced in 1992. All Bering Sea and Aleutian Islands quotas are allocated to eligible communities.

According to the National Marine Fisheries Service this programme provides eligible western Alaska villages with the opportunity to participate and invest in fisheries, to alleviate poverty and provide economic and social benefits for residents and to achieve sustainable

and diversified local economies in the area.

Community Quotas can be held by municipalities, regional organisations or other groups representing the community. The quotas allocated to the communities ensure they have access to an important economic resource. Capital generated by such programmes can enable them to modernise and to help diversify regional fisheries, build and maintain the necessary infrastructure and also to help address additional issues such as the promotion of education.

A number of problems have however arisen here. While it is possible for the community to lease out the quota to for instance large scale organisations in Seattle, and thereby gain revenue, the original intention of the system was to maintain fisheries as a viable activity in the community and this then tends to disappear. Similarly, when the quotas are caught and processed on-board this limits the jobs available on land. As the quotas allotted to the communities are of limited size, in most cases they do not provide enough resources to maintain a continuous level of production. Consequently many communities choose to use a labour force from, for instance, South East Asia during the weeks or months allotted to the fishing.



goal. Thus the services that have been considered as suitable for decentralisation have included areas that in many cases come under the ambit of “local level responsibilities” in the other Nordic countries, e.g. basic health services or care for the elderly.

In Norway a consistent trend towards increasing the degree of public sector functional specialisation can be found. On the territorial level this has perhaps been most visible in the establishment of specialised state regions, each having distinct responsibility for only one limited function. This is also an area where pressure for reform has emerged, as the call for regional and structural reform in the Norwegian case originated at the local level in response to the desire to simplify the decision-making process and improve service provision while bringing these issues closer to the citizen.

As is the case in Sweden, discussion has focused on the number of regions to be reduced (leaving somewhere between five and seven regions). There have however, been equally strong arguments made within the current government for a structure with 10–12 regions, but with an increasing degree of power and responsibility. Those who, on the other hand, call for fewer regions often seek to decouple the debate on regionalisation from that on the decentralisation of administrative tasks. The number of regions is however to be drastically reduced.

The State level in Norway is directly represented at the regional level through the County Governors’ offices, while the municipalities represent the autonomous local government administration. Both levels of administration receive part of their revenues through local taxation, fees and local business management, and part from allocations from the central authorities and other public institutions. The county municipalities (*fylkeskommunene*) represent a traditional administrative division dating back almost ten centuries. During the Viking age local *fylkesting* (county councils) commanded great power

with this system of local self-government and they continued to evolve throughout the Middle Ages.

Local governance in the Faroe Islands has traditionally been intimately associated with rural development (*bygdamening*). As a consequence of the economic crisis of the 1990s, the structural commission set up in response itemised regional development (*økismening*) as a strategy to provide more economic dynamism for the islands.

In Greenland the Home Rule Authority set up a Structural Reform Commission in 2003 with a mandate to assess the division of tasks and responsibilities between the Home Rule Authority and the municipalities, where the keyword was the “delegation” of responsibility from centralised to the municipal authorities. In order to increase efficiency in the public sector, the commission proposed a major overhaul of the municipal structure, reducing the number of municipalities from 18 to 4. Municipal mergers in Greenland have produced some of the world’s largest municipalities in terms of territorial coverage.

The reform processes have raised interest in “best practice”, and the exchange of experiences etc. It is generally understood that the Nordic countries provide a relevant and appropriate context for such comparisons, as their policy contexts, geography, functional division of tasks etc., are sufficiently similar to warrant such comparison. Activities in relation to regional and sub-national experiments are moreover ongoing in Sweden, Norway and Finland and here comparisons and the identification of best practices remain a fruitful basis for further governance reform.

### **Privatisation of the housing sector**

An enduring characteristic of the Arctic has surely been the high level of public involvement in the housing sector. Recent decades however have witnessed increasing levels of private ownership promoted by a number of ra-

tionales. First of all the question of the delegation of responsibility away from the public sector, represented by the state, the region or the municipal authority to the individual through their individual ownership of dwellings. Secondly the desire to build up of local wealth which was expected to encourage and promote local independence from public decisions often taken outside the community. In addition to these rationales issues such as the attachment of the labour force to the settlements, providing a financial background for individuals in pursuing future goals by means of their own finances etc., have been among the most frequently discussed questions.

### Case Russia

One of the major recent developments in the Russian economy has been the reform of the housing sector. This is important, given that changes in the housing sphere have a marked influence on the macroeconomic situation as a whole – since expenditures in connection with housing are responsible for considerable proportions of both the federal and the regional budgets. At the same time the construction of new houses is considered to be one of the main ways of stimulating economic growth, on the one hand through the generation of local capital, and on the other due to the perception that local ownership also adds to local responsibility (see box 31).

The Russian housing reform process began in the middle of 1990s as did many of the other recent reforms in Russia. The main goals and tasks of these reforms were formulated in the legislation “Principles of Federal Housing Policy” (1992) and within the acts: Federal Programme “Dwelling” (1993), and the Concepts of Housing Reform in the Russian Federation (1997).

The goals of the reforms included the establishment of a free market for houses, the improvement of housing quality and the general improvement of housing services.

The reduction in budget expenditures for communal and housing services, through the establishment of a free market, aims at increasing the level of housing quality, improving housing services while enabling an overall reduction to be made in federal and regional budget expenditures. In order to achieve the reform’s goals, four major policies were planned:

- The privatisation of dwellings.
- The de-monopolisation of the communal and housing services market through a liberalisation of both demand and supply.
- Changing the state subsidiary policy in two ways 1) A gradual reduction of state subsidies for housing and communal services, and 2) A transition from subsidising municipal communal services to subsidising low-income people
- A rise in prices for communal and housing services aimed at increasing the attractiveness of this type of business

The federal government was interested in the rapid privatisation of housing. In the Soviet period all multi-dwelling buildings were state or municipal property. The object of private property ownership was therefore only buildings considered to be single dwellings.

In 1991 however the new Law on Dwelling Privatisation was adopted and special state agencies were established throughout the country to oversee it. Property rights to individual dwellings were given to the tenants without payment and the tenants only paid the costs of issuing the documents of ownership – showing that the dwellings had become *their* private property. But after the private sector appeared in households with individual objects of property, tenement-houses were also beginning to be split up. Flats became legal units, with economic and legal liability. Still, even if there was no ownership but only

**BOX 31: NEW HOUSING IN GREENLAND**

Since 1990 it has been possible to establish housing cooperatives in both villages and towns in Greenland. In the villages a housing cooperative consists of at least 4 houses and in towns of less than 6 dwellings. These houses could be apartment buildings, townhouses, terraced or semi-detached dwellings. The Greenland Government may, in special circumstances, allow cooperative housing construction or that acquired as single houses or duplexes.

A housing cooperative is financed by the individual members themselves holding 5% of the costs. The Green-

land government and the municipality provide mortgage free loans of 50% of the total construction costs, half by the government and half by the municipality. The remainder of the total construction costs should be provided through self-financing loans.

The housing cooperatives have become a popular type of accommodation in Greenland, and today a large number of housing associations in major towns along the coast are in charge of close to 1,000 dwellings. Still more housing cooperatives are waiting to be built, while others are being formed.

Changes in the legislation are constantly increasing the level of flexibility in order to promote the housing cooperative and enable it to create its own housing. This type of housing provides a number of advantages in Greenland, and is for many the most realistic opportunity to build their own home, thereby strengthening the private economic sector through the need for saving. Share Housing is helping to create more responsibility and thus a better level of maintenance in terms of the housing stock. This in turn has a significant impact on value retention.

*usufruct* rights to flats during the Soviet Period, the rights of “user-ship” also encompassed rights such as rent support helping to realise income entitlements, registration of grandchildren which enabled inheritance rights, flat exchange options, including *pro forma* marriages, and the registration of relatives, enabling the realisation of other rights.

In many ways individual rights, in this regard, at least up until the late 1980s were more or less informal interests which could be seen as a legal framework defined through a common property perspective. This however gave way to the Law on Dwelling Privatisation through, on the one hand, the legalisation of actual regulations encouraged by a reduction in transaction costs, and on the other, through the definition of a new set of legal relationships and property rights.

According to the law, flats in multi-dwelling buildings could be the property of different owners. These owners at the same time, received additional property rights or so-called “common property of the multi-dwelling building”, which included such things as the walls, the roof, sanitation system, land, etc. The common property became jointly owned by all dwelling owners in a specific building encompassing also the corresponding maintenance responsibility. Hence, the privatisation of a dwelling entails serious consequences for the tenants. There are consequences not only through the disposal rights of the flat, but also through the possibilities for the disposal of adjacent land and responsibility for the maintenance of the building.

Passing property rights to the current tenants therefore included the transition of management responsibilities. Before the change management of the building was conducted by a special municipal company. Now, according to the Housing Code (2004), responsibility for housing management had been turned over to an assembly of dwelling owners. This new organisation was supposed to

put in place one out of three possible forms of management schemes:

- Direct management by the dwelling owners.
- An association of dwelling owners, a housing co-operative, or another form of consumers’ co-operative.
- A private or municipal management company.

Every dwelling owner of a specific house should be officially informed of when an assembly is held (date, time, place and agenda). An assembly is *quorate* when more than 50% of the dwelling owners of the house are in attendance.

In accordance with the Housing Code, all dwelling owners are required to participate in the management and assembly of the house. If an assembly is not convened, or if there is no quorum, the municipality appoints a management company to be responsible for the management of the house.

The housing reform seems to be one among many reforms in Russia that remain far from complete. Some of the goals of the reform have been reached. A free market in private dwellings has been established and tenants have participated actively in dwelling privatisation. The northern region is however still lagging behind the Russian average in both the rate of privatisation and the volume of housing construction.

The acquisition of property rights for many people is not associated with new rights and responsibilities. For a majority of people dwelling privatisation may only be a possibility to devolve the financial responsibilities and not the decision rights. On the whole, therefore, the process of housing reform may eventually evolve in a direction which is somewhat contrary to the inhabitants’ initial expectations. At the same time people generally do not think of themselves as being participants in the

## BOX 32: NEW HOUSING IN RUSSIA



The privatisation of the former state owned housing stock over the last decade or more represents a major change in the Russian context. The share of privatised dwellings reached a level of 50% by the beginning of 2000 and has now reached 77% in Russia in general. The level in northern regions is indicated in the table below.

The difference between the average Russian level and that for the northern regions occurs for various reasons. In the case of the Murmansk region a number of

restricted military towns remain, and in general, people employed by the military are not interested in privatisation since the employment is time-limited and characterised by temporary residence. Hence, the level of dwelling privatisation is very low in these towns.

The Koryakia, Chukotka and Evenkia regions, where the low level of privatisation is connected with a lack of demand for dwellings, represent another case. However, as a whole, it is difficult to give an unambiguous evaluation due to

the slow increase in dwelling privatisation in the north. A case study on the public evaluation of the consequences of the housing reform was conducted in the town of Apatity, in the Murmansk region in 2006. The survey involved 500 households. Most people (44%) reported that they privatised their flats “for their children”. Some people (27%) wanted to move, which was easier after privatisation. It was generally a surprise, that as much as 17% perceived privatisation to be “a good investment”. Other answers





included statements like “I want to have my own property”, “I want to be an owner” or “property is better than nothing”.

Among municipal tenants, there were people who wanted to privatise their dwellings but for various reasons were not able to do so. Around 22% did not have the necessary money, while 20% did not have the time, and another 10% were afraid of high taxes. However, 50% of tenants thought that they should do it as an investment for their children, while

a total of 24% of tenants were simply not interested in privatisation. Thus we can infer that around 75% of the population are interested in privatisation.

So in reality, both the state and the sampled respondents were in favour of privatisation. This enabled the state to carry out the process quite quickly. Consequently, in Apatity in the middle of 2007, around 73% of dwellings had been privatised.

Housing reform created expectations in terms of improvements in housing

services, new forms of housing services, new options for participation in house management, and a reassessment of security issues. Nevertheless, the results of the housing reform are far from what people expected. Hopes were high regarding improvements, but reform was accompanied by a fear in rising prices. The outcome was however rather disappointing in respect of improvements, while the only expectation fulfilled was the rise in prices!

reform process nor do they think they possess the ability to change the course of events.

### **Case Greenland**

The public sector plays a significant role in the housing market in Greenland. For decades there has basically been no open market as almost all dwellings and most houses have been owned either by the state or by the municipality. One major consequence of this has been a situation where rent has generally been subsidised. Another has been a housing shortage and long waiting lists. In addition, the demographic trend places additional pressure on the housing market with the current housing stock estimated to require a growth of one quarter in order to cover likely future housing demand. In addition, there remains a considerable need to renovate the already existing housing stock.

Another problem with housing privatisation in Greenland is the question of financing. The costs are high and in most cases this will be a significant problem for most people seeking to borrow the necessary capital. Since 1990 however it has been possible to develop housing cooperatives in both villages and cities. In the settlements a housing cooperative is required to consist of at least 4 houses and in towns of more than 6 dwellings. The houses concerned can be apartment buildings, townhouses or close/low construction, but the Greenland Government may in special circumstances also allow cooperative housing constructed as single houses or duplexes (box 32 provides further details on housing developments).

The main problem area – financing – is undertaken by means of co-financing by the individual members themselves with a share of 5%. In addition the municipality and the government provide debt and mortgage-free loans of 50% of the total construction costs. The loan is also provided – half from the government and half from the municipality. The remainder of the total construction

costs are covered by mortgages taken out by the cooperative association (box 28 highlights some of the experiences of privatisation in Greenland).

### **Case Nunavut**

Nunavut has a total of 8,077 (2001 Census) units for a population of approximately 30,000 persons with the private rental market being, in addition, rather limited. The Nunavut Housing Corporation (NHC) has about 4,400 public housing units and approximately 1,200 staff units. More than 60% of the approximately 18,000 tenants in public housing are on income support. Local Housing Organisations (LHO) allocate public housing at the community level and these LHOs answer to locally elected Boards or Councils. Applicants in Core Housing Need are point-rated and placed on a waiting list for a unit.

Rents are heavily subsidised due to extremely high utility costs. For example, a three-bedroom unit would cost in excess of \$1800/month to operate. Rents are, however, set according to income. Minimum rent would be from \$60.00 per month with the maximum being set at 28% of income.

As a consequence of the policy there seems, more or less, to be a perpetual housing shortage and the constant construction of more public housing units will not fix the problem as indeed was noted by the 2010 Nunavut Economic Outlook. According to the report the territory's housing shortage will become a permanent feature of life unless Nunavut makes "significant changes" to the way it approaches the housing issue. The reason for the increased demand is that the territory's young population puts demands on the government's housing supply that it simply cannot meet drawing funds away from other areas of need and adding to the overall operations and maintenance budget.

To fix this, Nunavut needs more people who are financially independent, which means a stronger wage-based

economy, more job opportunities and more education, skills and labour mobility. A key element here would be a stronger and more competitive private-sector residential construction sector, more home ownership incentives and more stringent rules and regulations for social housing tenants. Another option would be to seek an “alternative housing market model” through policy mechanisms that make private housing available to larger numbers of people.

In 2009, Nunavut’s total housing stock, public and private, stood at 9,041 units. Of those, 4 183 were government-owned homes and 1,359 were government-leased homes. About 54% of Nunavut’s population lives in government-subsidised public housing. About 99% of these public housing tenants are Inuit.





# Renewable energy and the Green Economy



Continued energy consumption based on non-renewable carbon and hydrocarbon sources is generally understood to be responsible for some of the major changes in the Arctic's natural makeup. Compared to the generation of CO<sub>2</sub> from the industrialised and industrialising countries the output of CO<sub>2</sub> from the Arctic may seem to be insignificant. On the other hand, the Arctic is one of the regions in the world most influenced by the adverse effects of global CO<sub>2</sub> emissions.

Many regions in the Arctic are among the largest consumers of hydrocarbons *per capita*, and moving from non-renewable to renewable energy resources is recognised to be a long term process. The problems are contrasted through the maps 13 and 14, showing the current increase in generation of electricity, and the share of renewable energy as of today. It is quite obvious that new technologies are needed which are able to sustain the Arctic climate, while also recognising the fact that changes in consumption patterns and price structures must be implemented in order to promote a shift in development focus. This dilemma is elaborated further in box 33.

The concept of "green development" is for many considered synonymous with development in the Arctic. Living in the Arctic once meant relying on local resources

or simply perishing. To what extent is the Arctic ready to move further along this path? This question presents both a political and a practical challenge. The Arctic is also, like the rest of the world, increasingly dependent on imports, where distances and transport costs – primarily due to the amount of hydrocarbons used – are critical issues.

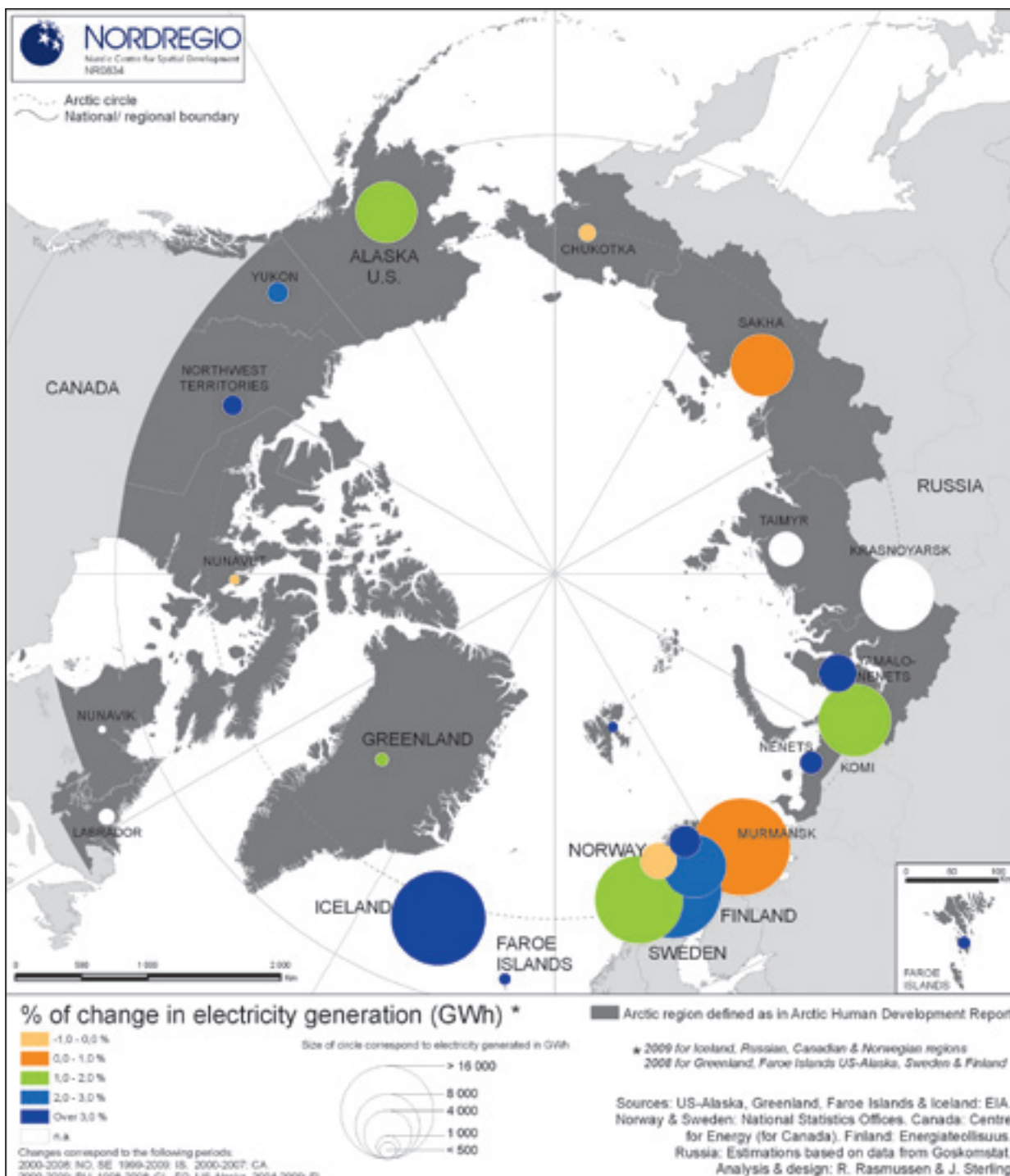
Energy is a key component for development. A major problem here is the fact that the Arctic is among the most sparsely populated areas in the world with a significant problem in establishing energy related infrastructures. Many of the energy systems are therefore "energy islands", which adds to the complexity in introducing several of the renewable resource options. Photovoltaic electricity may be an option during the summer months but needs year-round supplementation. Access to wind-based energy may be abundant in some regions but cannot function as a stand-alone system when the backbone of energy supply is absent. The question of storage is crucial in this context. While there are good ideas available (as outlined in box 34) and in the status of access to renewable energy in the Arctic there remains a long way to go here.

#### MAP 13: PERCENTAGE CHANGE IN ELECTRICITY GENERATION 2000–2010

While economic development in developed countries is increasingly considered to be de-coupled from energy consumption, the general pattern for the Arctic over the last decade has seen a marked increase in electricity consumption. For a few regions data has not been available for the time series, and they are marked in white. Otherwise the colour scale indicates the level of increase

or decrease. In Chukotka, Nunavut and in one of the Norwegian regions production has declined and in a couple of Russian regions – Sakha and Murmansk – the increase has been rather limited. In the other regions a larger increase has taken place, with Iceland, the Faroe Islands, NWT, Yamalo-Nenets, Nenets and Finnmark Fylke in Norway experiencing increases of over 3%. In some cases the

increased generation of electricity has been connected to an increased focus on renewable energy resources, primarily hydropower and wind power. The current situation regarding types of energy is presented in map 14.



## Status of access to renewable energy

### ALASKA

Alaska can be divided into three separate energy regimes: Rural Alaska, South-central Alaska and Southeast Alaska.

In rural Alaska many villages are in fact in deep crisis due to high energy costs. People are migrating to hub communities and the rail belt, and many towns are closing municipal offices because it is too expensive to keep buildings lit and heated. Consequently, the basic social support systems here are in serious decline.

South Central Alaska is heavily dependent on supplies from Cook Inlet gas. The majority is used locally, while around a third is exported. The level of gas supply is however soon expected to be insufficient to satisfy domestic demand. A proposed gas pipeline from the North Slope, with a spur to South-Central, should be completed by 2013. This will improve the situation.

In Southeast Alaska communities are connected through a common grid system which allows them to be supplied by low cost energy from the Southeast Hydro projects. The suppliers are The Thomas Bay and Swan Lake-Tyee hydropower plants which are able to provide energy for the Southeast region. In addition they are able to export excess energy to BC Hydro in British Columbia, Canada, thereby generating a much needed financial input to the region. Income from state-owned transmission lines will provide the funds necessary to build the Southeast Intertie connecting all of the Southeast's communities by 2030 thus enabling a substantial portion of the Alaskan population to have access to a renewable energy supply.

In 2008, the Alaska State Legislature established the Renewable Energy Fund (REF) to reduce dependence on hydrocarbons and promote investment in renewable energy across Alaska. At present nineteen wind-turbine

## MAP 14: GENERATION OF ELECTRICITY BY SOURCE

The different sources of electricity generation in the Arctic have been subdivided into four classes: Fossil fuels, Hydropower, Wind and other Renewable sources, and Nuclear energy. The fossil fuels are either large scale coal, gas or oil-based generators, generating electricity to a larger grid which is often connected to other generating systems. Or it is small scale diesel or gas generators just connected to a local network supplying typically a municipality, a town or a village.

Hydropower is usually a large-scale dam-based system though river-based floating generators are also in use in

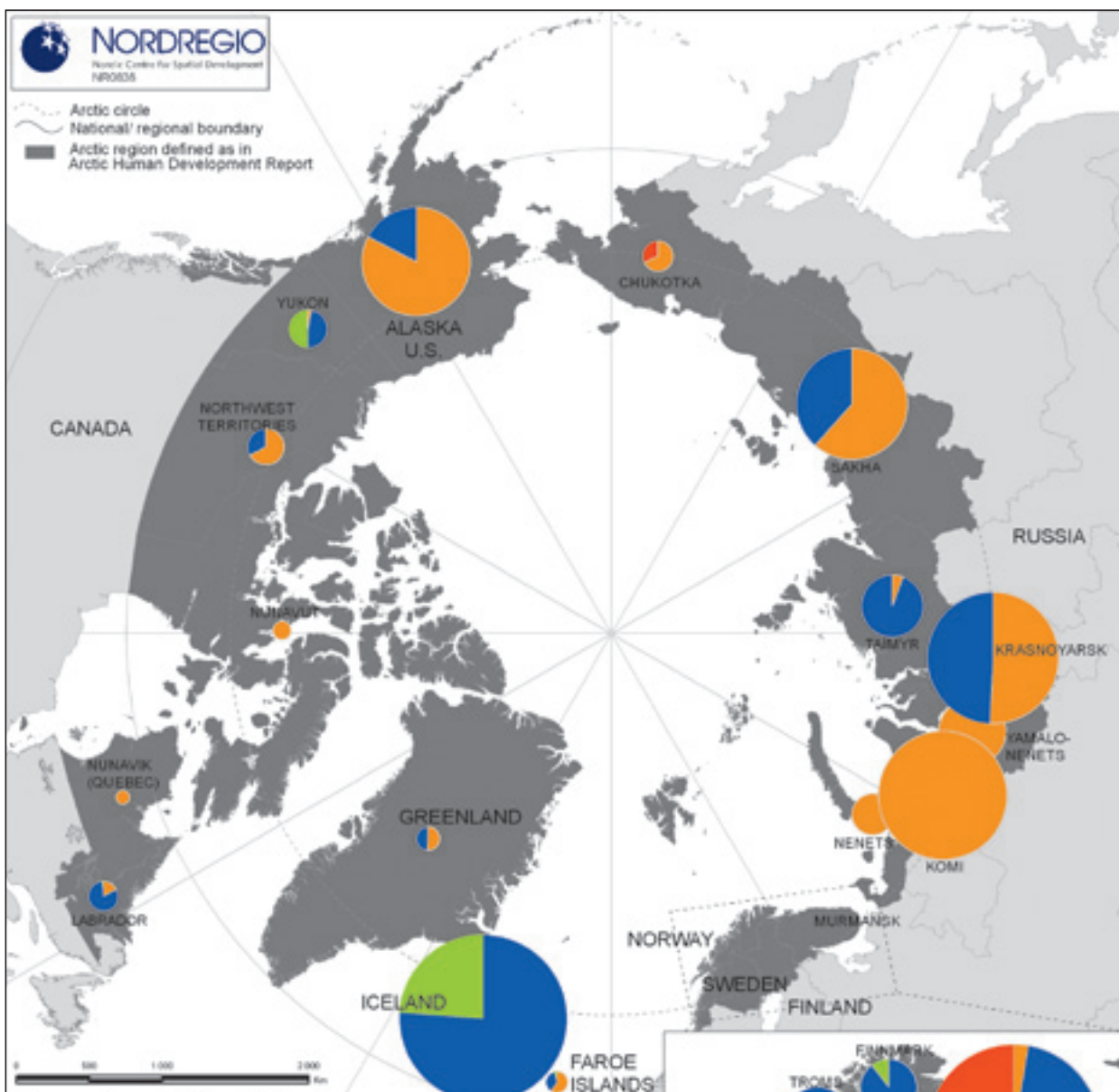
the Arctic as are small scale dam-based systems.

Wind power is currently the most widely used renewable generating system, but photovoltaic systems also exist, mainly as energy contributors to single houses. As generators of heat and electricity biomass systems have also become more common in the Arctic, for instance by combusting household waste or by means of wood pellets, often using waste material from the timber and pulp and paper industries. And finally geothermic energy is also utilised. Iceland is the acknowledged leader here though the potential does

exist for its use in a few other places across the Arctic. Finally nuclear power is present in two regions, Chukotka where it provides a third of the energy, and in Murmansk region where more than 50% of electricity is generated by means of nuclear power.

In many parts of the Arctic energy systems function as "islands" in isolation, i.e. without connection to other energy systems. This makes the energy supply vulnerable to breakdowns just as many of the renewable energy sources have a temporal characteristic, for instance wind not blowing constantly, and therefore the need for local backup systems.

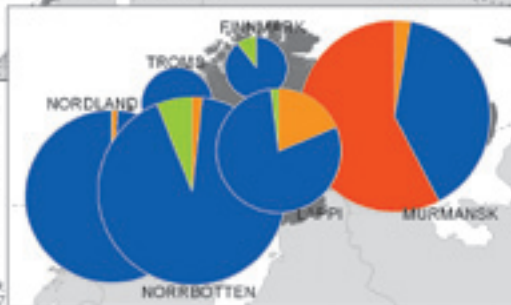
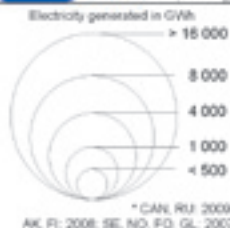
Arctic circle  
National/ regional boundary  
Arctic region defined as in  
Arctic Human Development Report



### Generation of electricity by source\*

- Fossil fuels
- Hydropower
- Wind and other sources
- Nuclear

Sources: NO, SE: National Statistics Institutions; FI: Energiateollisuus;  
GL, IS, FO, Alaska: EIA and own data; RU: Estimations based on  
data from Goskomstat. Canada: Centre for Energy



projects have been completed. Six of these projects are in Kotzebue, and the total installed capacity here is approximately 10,559 kW. Of these projects, the largest and least expensive, on an installed-kW basis, is the Pillar Mountain project on Kodiak.

## CANADA

Canada boasts being world's leading producer of hydro-electricity and with a production level at about 6% of the

global energy supply is the fifth largest producer of energy in the world.

Canadian energy policies reflect the constitutional division of powers between the federal government and the provincial governments. Therefore the two must coordinate their energy policies. The five regions in the arctic area, Yukon Territory, Labrador, Northwest Territories, Nunavut and Nunavik in Quebec, may face comparable climatic and environmental conditions but are

### BOX 33: GREENLAND'S RESPONSE TO THE CHALLENGE OF CLIMATE CHANGE

As emphasised by Greenland's Prime Minister, Mr. Kuupik Klejst, Greenland both can and will take its share of the responsibility for protecting the environment and maintaining sustainability. At the same time he emphasises that climate talks are complicated because they have an impact on global political and economic power and particularly on the right to development for the poorer parts of the globe. It is important to take the oath of developing countries and respect their historic right to development and to do something about the uneven distribution of global resources if a new, binding, climate agreement is to be reached.

The people of Greenland have voted in favour of self-government, which will take over more and more areas of responsibility from Denmark. But this requires that Greenland creates a more stable and healthy economic foundation than it currently has. Today, fishing is the most important source of income,

followed by a block grant from the Danish state. The hope is that the country's management of climate change in the long term will be the leveraging factor that gives autonomous government greater meaning. It is recognised that there is still space for improvement, the most important in this respect being renewable energy in the form of hydropower that will soon account for more than half of the country's total energy supply. Greenland is also looking at other renewable energy sources, while the country's own energy utility company is researching into hydrogen technology for energy storage. Energy savings are also on the national agenda. For example, in 2012 Greenland will be the first country to have 100% coverage with remote monitoring of energy meters which help end users keep control of their energy consumption and encourage them to reduce it.

The virtually inexhaustible supplies of energy from hydropower, obtained

from fresh water lakes on the inland ice, means that Greenland can supply energy-demanding industry with green energy. One such project currently under way is the establishment of an aluminium smelting plant. In the future, the people of the world will continue to require industrial products, but they will demand cleaner and more environmentally friendly products. Greenland can deliver this, and even though the new industry will increase the country's own emissions of CO<sub>2</sub>, it will be an advantage in a global context.

Greenland's Government, in accordance with the Copenhagen Declaration notified the UN Climate Secretariat that Greenland will reduce greenhouse gases by 5% by 2020 compared to emissions in 2007 except for mining activities and energy-intensive industries, and will continue to develop renewable energies up to 2020 to cover more than 60% of Greenland's energy requirements with renewable energy.



also exposed to a rather different mix of critical energy needs.

Hydroelectricity is dependent on rising oil prices and hydrocarbons and holds the promise of a sustainable energy source for future generations. Most of the Canadian Arctic region is populated sparsely by indigenous peoples. The most isolated places are outside the national grid and currently depend on power supplied by local diesel-fired generation or local natural gas resources.

The only alternative energy source for these towns is currently biomass production.

At present some 87% of the Yukon's electricity needs are met by hydroelectricity and 13% from thermal sources. Diesel is used for communities located off the electrical grid as well as in situations where there is not enough hydroelectricity to meet the demand. A small amount of electricity, less than 1% comes from wind.

#### BOX 34: STORING RENEWABLE ENERGY



The hydrogen and fuel cell plant that will be established at the *Nukissiorfiit* headquarters in Nuuk, are to function as an experimental plant giving *Nukissiorfiit* specific experiences in both the production and the use of hydrogen. The plant will produce hydrogen based on

electricity from the hydro power plant in Nuuk, and the hydrogen will then be used for supplying energy for *Nukissiorfiit*'s headquarters. The plant will also help increase public awareness in respect of hydrogen and fuel cells in Greenland. The plant is supplied by H<sub>2</sub>

Logic and consists of a hydrogen electrolysis system that uses electricity to split water into hydrogen. The hydrogen is then stored for later use in a fuel cell where it is converted into electricity and heat. Waste heat from the hydrogen production process and the fuel cell is used for local heating while the electricity is supplied to the grid or used in *Nukissiorfiit*'s headquarters.

The plant also includes a compression and distribution system that enables the storing of the hydrogen under pressure in distributable bulks. In this way the hydrogen can be distributed to other cities and settlements in Greenland where it can be used for local energy production. The plant has also been prepared for a future upgrade with a hydrogen refuelling station, enabling the use of hydrogen as fuel for transport.

Labrador produces enough energy for its own use and exports far more to consumers outside the province. The main source is hydropower, first of all from the 5,428 MW Churchill Falls Hydroelectric Generating Station, in addition there are a few isolated systems on the coasts receiving their power from diesel generators.

In Northwest Territories energy sources derived from renewable energy forms are primarily generated from hydro and wind power. Approximately 70% of the total electricity generated for Northwest Territories residents and communities is from hydroelectric power. According to the Canadian National Energy Agency the majority of the Northwest Territories' world-class hydro potential is

not yet developed. In fact, only 0.5% of Northwest Territories potential 11,000 megawatts has been developed.

Like Nunavut, Northwest Territories also rely heavily on refined petroleum to fuel the generators that power its remote communities. A significant amount of natural gas is used for room heating and electrical generation in Inuvik and Norman Wells.

Nunavut region, despite its proven potential energy resources, is currently dependent on imported energy. In the future there will be a need to use energy more efficiently and to diversify Nunavut's energy sources. This includes the refurbishment of existing diesel generators and the construction of the territory's first hydroelectric

#### BOX 35: WOOD PELLETS – SWEDEN-FINLAND-CANADA



Wood pellets are among the least expensive way of meeting the increased demand for renewable energy. Burning pellets releases the amount of carbon

that would have been emitted in nature when they die and decompose, and restored when new forest re-grow. The process is therefore regarded as

largely carbon neutral, and currently competitive in relation to pricing. The pellets are pricier than coal but less-expensive than for instance solar panels or wind turbines. Large forest areas of the Arctic and sub-Arctic serve as excellent reservoirs for this kind of energy storage.

Power generation and district heating based on wood chips and other biomass products have thus become an important source of energy in the North. In Rovaniemi the community are in the process of establishing a new power plant. When completed the plant will be fuelled with logging waste, tree stumps and woodchips made from small trees from young forests, and be able to provide a substantial contribution to both the district heating system of the town, and to the generation of electricity.

power station. It was originally planned for completion in 2012 though it is more likely now that this will slip to 2015.

The major consumer of electricity in Nunavut is the local government, followed by commercial buildings, public housing, and local communities. The public sector purchases around 37% of all petroleum products used for heating buildings and generating hot water. This means that the local government also becomes the largest indirect consumer. And as Iqaluit is the government city, around 12 million litres of fuel are used here annually to generate electricity. This is one-third of the total consumed for electricity generation in Nunavut.

In Nunavik *Hydro-Québec* is the main provider of elec-

tricity. Due to the relatively isolated situation for most of the settlements their energy supply is based on an off-grid system powered by diesel, with 23 facilities with a total capacity of 122 MW. Since the late 1970s there have been several suggestions regarding the possibility of supplementing the diesel generators with renewable alternatives. The first – and so far the only – wind turbine in the region, with a capacity of 65 KW, was established in Kuujuaq in 1986 and continued producing until it was removed and handed over to an educational institution in the Gaspee region. Recently, however, the idea of combining the diesel generators with larger wind turbines has come up again. And with the possibility of *Hydro-Quebec*

The plant will be able to fulfil the need for an increase in district heating capacity by means of a CO<sub>2</sub> neutral system. The use of local fuels, primarily forest chips and peat, could mean a direct increase in annual employment figures by 1,000 man-years – if a new big power plant in the city of Rovaniemi and a biodiesel refinery in the city of Kemi were implemented the forest energy potential of Lapland would be more effectively utilised. In comparison, the direct increase in employment figures during the operation of a nuclear power plant is estimated to be approximately 400–500 man-years.

Efficient utilisation of wood fuels can reduce emissions by about 30–40% from the current level significantly supporting the achieving the objectives of Finland's and the EU's climate and renewable energy policy. Currently renewable energy already accounts for over 90% of

all electricity produced in the region of Lapland.

Wood pellet-based energy supply does not require large scale operations. An example of a small scale installation is the system installed at the campus of the University of Northern British Columbia in Prince George, Canada, illustrating the multiple benefits that can occur when a community is engaged with the academic and operational goals of a campus. UNBC's bioenergy project currently consists of two components: a wood pellet system and a biomass gasification system currently under construction. In both cases, the fuel is from the local forest industry, either in the form of wood pellets or residue from sawmill operations. Both systems also heat water, which integrates with the existing systems on campus to heat the buildings and provide hot water on campus. The wood pellet system

burns pellets to produce heat while the gasification actually converts biomass to a synthetic gas that is then burned.

In recognition of the achievements of the system The Association for the Advancement of Sustainability in Higher Education (AASHE) has selected UNBC's bioenergy project for its ability to connect teaching and research to campus operations, while serving as a model for communities and other campuses. The system not only provides a sustainable energy system for the campus. For northern communities, the bioenergy project shows how future energy supply in areas with access to biomass may provide a sustainable energy supply.

extending their power grid to the settlements in the region a better opportunity to replace the old generators with renewable replacements has presented itself.

### **FINLAND**

The abundant hydropower energy resources of Lapland have long enabled it to produce energy for its own needs as well as for the rest of Finland. Lapland also utilises local wood fuels, peat and waste liquor from the forest industry. Wood pellets have become a worldwide commodity inspired by Finland, and have also become an important resource in the boreal parts of the North (see box 35).

According to Finland's energy agency, Lapland produces more energy than it needs and renewable energy accounts for over 90% of electricity production. In the future, energy consumption in Lapland will primarily be dependent on the development of industry and the service sector. Forecasted investments such as the Tornio steel mill, mining projects and growing tourism will increase energy consumption significantly. There is also a plan to build a nuclear power plant in Lapland.

### **GREENLAND**

Greenland has become increasingly focused on the use of renewable energy in its energy supply. The Greenland icecap is the world's largest freshwater reservoir and it constitutes an ideal source for generating hydroelectric power, and it is estimated that Greenland has a hydropower gross potential of approximately 800,000 GWh per year.

Today, however, most of the power generated is based on diesel based generators. One of the reasons for this is the "island" structure of the settlements with no on-land connections, and with power supply thus far only based on local production. Establishing a common grid for several of the larger settlements would be extremely

expensive, so solutions to the broader problem have been directed to the individual settlements.

In this context more than 15 large potential sites for hydroelectric power stations for both consumer and industrial purposes have been pinpointed. Estimations show that this could comprise a total potential of 13,000 GWh. The most attractive industrial hydropower potentials are located along the western edge of Greenland's ice cap, between 62 and 68 degrees north. In this region the vast interior contains a potential for each reservoir of somewhere between 600–2,500 GWh per year. 4–5 reservoirs are seen as being particularly attractive, namely, Taserisuaq, Imarsuup Isua, Søndre Isortup Isua and Tasersuup Isua.

It is a political objective to reduce fossil fuel imports. Research is ongoing into the ways in which Greenland can accommodate the energy needs of power-intensive industry by supplying clean and cheap hydroelectric power. As in other parts of the Arctic the option of exporting energy through energy requiring products is actively under consideration. Thus, the international aluminium industry is currently investigating the investment potential of Greenland.

Greenland's supply of fresh water also forms the basis for an ambitious plan to look into the potential of establishing a hydrogen industry and what it has to offer. An important question in this context concerns the options for storage, an issue which is discussed more fully in box 34 above.

### **ICELAND**

Iceland is generally viewed as a leader in green energy, in technical development, utilisation and education. The country has ample potential to expand its hydroelectric and thermal power-supplies. Nearly all of Iceland's electricity comes from geothermal or hydro power. According to the government, the ultimate chal-

lenge would be to turn the entire island into a carbon-free society.

Some twenty years ago a consultation body was formed between energy companies and the environmental authorities to facilitate compromises in future energy-projects. The municipalities have long had a legislative role and such powers have increased through new planning laws.

The legislation on EIA (Environmental Impact Assessment) was introduced in 1993 based on the European directive, and has influenced project decisions and project design. The power-market was deregulated at the beginning of 2005. Up to that time *Landsvirkjun* – the national Energy Agency – had a legal obligation to fulfil electrical demand in Iceland.

In 2007, geothermal energy provided about 66% of primary energy in Iceland. Some of it is distributed directly to buildings through extensive district-pipe systems, with around 90% of the housing stock geothermally heated, while 9% is heated with electricity and 1% with oil.

In 2008 Iceland's total installed capacity of hydroelectric power was 1,880 MW, generating 75.5% of the country's electricity production, while the remaining 24.5 % was produced primarily by geothermal power plants.

In 2008, the power intensive industries used around 90% of all electricity produced in Iceland. Most of the hydropower plants are owned by *Landsvirkjun*, the National Power Company, *Landsvirkjun* currently has 16 power stations, of which 13 are hydro-power stations, two geothermal power stations and one a natural-gas-fired station. Krafla and Bjarnarflag are geothermal power stations. Blanda, Búrfell, Fljotsdalur, Hrauneyjafoss, Laxá, Sigalda, Sog and Sultartangiand Vatnsfell are all hydropower stations. Straumsvík is the natural-gas fired station.

*Landsvirkjun* has recently finalised one new hydropower station in eastern Iceland, the Karahnjúkar Hydro-

power Project; named after two nearby mountains. It will be the largest power station in Iceland and will provide 690 MW of power to the *Alcoa* aluminium plant in Reyðarfjörður.

## NORWAY

In the Norwegian Arctic area, there are 6 regions: Svalbard, Bjørnøya, Jan Mayen, Nordland, Troms and Finnmark. Already in the early 1900s hydroelectric power was the main source of the energy in Norway and in particular used by heavy industry.

In northern Norway, hydro-electricity is the most important source of power. The plants are connected to the Northern European grid, via both Sweden and southern Norway.

The market and the current price of electricity, to an increasing extent, decide how the reservoirs of stored water are run through the year, or years, for the multilayer storages. Similarly, those years with problems in filling the reservoirs also impact the price level.

Spitzbergen has coal-mines which are mainly used for exports. Locally the community is totally dependent on coal and oil. However, there are ongoing experiments to produce CO<sub>2</sub> neutral electricity based on coal. The Chinese in particular are interested in these experiments. Oil drives all transport needs, it might slowly be replaced by LNG (gas), which pollutes less in the local Arctic environment, but is still hydrocarbon-based.

The Norwegian government has tried to develop green energy also in the Arctic regions. Alternatives are available: In the sub-arctic, as in the 3 northern provinces of Nordland, Troms and Finnmark, hydropower is the main source of energy, but usage of wind and tidal current energy are increasing. This is also the case for small scale hydropower facilities.

Significant barriers however exist to the transition from non-renewable to renewable energy in this area.



Climate is the biggest issue: frost and icing remain a problem for wind turbines and aridity for hydropower. The nuclear option has been favoured by the Russians. In the sub-Arctic solar energy (photovoltaic) might be an alternative – from February to November, but here the infrastructure and the institutional arrangements may prove to be something of a constraint, two-way measuring instruments and new rules for electricity companies are needed so that house owners can sell their generated energy to the companies – as with similar schemes in Germany and Switzerland.

At the same time it is very important to underline that in northern Norway and Russia, petro-exploration and production is really only now being developed. A majority of the new discoveries are likely to be gas. With the argument that gas is cleaner than oil, gas will realistically be the “big” alternative in the next 25 years. Ferries and boats, taxis and buses, indeed, are all in the process of transferring to gas.

In September 2010, Norway and Russia signed an initial agreement on the EEZ zone and shelf sea-border after four decades of negotiations, paving the way to open up the potentially oil- and gas-rich region for offshore exploration. In this context the oil industry says the waters near the Lofoten and Vesteraalen islands in the Arctic now have the best prospects off Norway for oil and must be tapped to prolong the oil bonanza as output from mature oilfields declines.

An industry-backed survey published in January 2010 showed most Norwegians favour an impact study that could pave the way for the opening up of a pristine, fish-rich Arctic area to oil activities in order to prolong Norway’s energy boom.

Environmentalists say that any spill in the hitherto unspoiled region would be disastrous for its diverse ecosystem. A number of opinion polls in recent months have suggested that Norwegians are split down the middle on

Arctic drilling and the issue was a major theme in last year’s general election.

## **RUSSIA**

Russia plans to develop vast hydrocarbon reserves located in the country’s Arctic region. Projects are currently developing slowly mostly due to the lack of funding for the huge investments required. In January 2010, Russia’s Natural Resources Minister Yuri Trutnev proposed to ease the possibilities for foreign participation in offshore energy projects in the Russian Arctic regions. An important reason for this was that the two state energy companies *Gazprom* and *Rosneft* needed more foreign capital.

The amount of money the two companies are currently investing in the development and exploration of fields is not enough to develop them within any reasonable timeframe. From the official side it has been suggested that the Russian government itself should select foreign partners for such projects, rather than letting *Rosneft* and *Gazprom* handle this themselves.

With regard to the Yamal Nenets and northern Krasnoyarsk regions, Russia will need increased production to compensate for an anticipated decline in production in other regions over the same period. This information was distributed in the summer of 2010 by the Russian Energy Ministry, Victor Khristenko.

According to statistics from the Ministry of Energy a total of 314.2 million barrels of crude oil was pumped in July, 2010. The plan here is to further increase the output of gas condensate by an additional 35.7 million tons a year, or 717,000 barrels a day. This will be in both the Yamal Nenets region and the northern part of the Krasnoyarsk region.

The Kola energy systems’ installed capacity is the second largest in the north-west of Russia (after Leningrad region) and the largest in the world beyond the Polar Cir-

cle. Its total capacity is 3 758 MW. The Kola system consists of 17 hydro power stations, 5 heating stations (operating on fossil fuel), the only tidal power station in Russia, and the Kola nuclear power plant (NPP). Centralised electricity supply covers 50% of the territory of the region and more than 99% of its population.

At the same time, there are many outlying villages, which, due to significant distance and small electricity consumption levels, are not covered by centralised supply and which instead get their energy from small diesel power plants with a power of 8–500 kW. Their total power is estimated to be nearly 5 MW.

*Kola NPP* produces about 60% of the electricity consumed in the Murmansk region. The region itself is an energy surplus region, so a portion of the energy produced is sold to the Archangelsk region and to the Republic of Karelia. The energy is distributed there through the united grid.

The main objective of the Russian energy strategy in the coming years is to attain a better mix of fuel and energy, aiming at enhancing the competitive ability of Russian energy production and services on the world market. For this purpose the long-term energy policy should concentrate on energy safety, energy effectiveness, budget effectiveness and ecological energy security.

According to the Russian Energy Ministry, Yamalo-Nenets is the richest region of Russia in terms of hydrocarbons: its share of confirmed Russian reserves of hydrocarbons is 70% for gas and 18% for oil and condensate. Fully 92% of the gas and 18% of the oil produced in Russia comes from this region.

Today there are 229 oil and gas fields in Yamal. Initial total resources of natural gas in the region (including the Kara Sea) are estimated to be 125.3 trillion cu. m, with only 14 trillion cu. m produced today. This is slightly more than 11% of the total resource base and about 30% of the industrial gas reserves of the region.

At present, Yamal reserves allow a production of 630–650 billion cu. m of gas per year. The yearly capacity of the region in gas production could however exceed 700 billion cu. m given full use of the reserves, implementation of advanced scientific technologies, mass-scale geological exploration and sufficient capacity in respect of the gas pipeline.

There are seven oil and gas refining enterprises in Yamal: Gazprom Pererabotka Urengoy, Gubkin refinery, Noyabrsk refinery, Novatek-Yurkharovneftegaz (methanol production unit), Novatek-Purovsky refinery, Tarasovsky refinery, Purnefteprodukt refinery.

Over 4 billion cu. m of associated oil gas, about 10 million t of gas condensate and about 57,000 t of oil have been produced in the region since 2008.

There are also plans to put up seven oil and gas deposits for auction soon, a deputy head of the regional administration, Vladimir Vladimirov, said in June 2010.

## FAROE ISLANDS

The main energy production in the Faeroe Islands is fossil-based such as natural gas, bunker fuel, petrol, and other hydrocarbon-based products. The oil consumption on land and at sea is essentially the same. At sea, most oil is used by the fishing fleet, while on land oil is used to produce electricity and heat, and for transport. According to the National Statistical Authority of the Faroe Islands the major part of the oil is related to fisheries as the fishing fleet consumes 44.4% of the oil while other vessels consume another 3.5% while 10.6% is related to other types of transport. Households, public institutions, retail and service businesses and industry together consume 28.4%. Renewable energy resources and the burning of refuse represent some 9% of the energy consumption on land.

Looking at electricity production, total production in 2009 was 275 538 MWh of which a little more than 60% is

generated by thermal power plants while a third is hydro-power based, and around 5% comes from wind energy.

The land-based consumption of electricity is gener-

ally projected to increase by 2% *per annum*. Using these projections consumption in 2015 is predicted to be 300 GWh. Recently the installation of plants generating heat

### BOX 36: DISTRICT HEATING AS A COMBINED SOLUTION TO ENERGY AND WASTE – THE GREENLAND AND FAROE ISLANDS CASES



District heating is produced on a larger heating plant or power plant, which supplies a wide range of heat. At the centre of the heating systems are combined heating and power generating plants where the main part of the generated heat is distributed to heat the connected households, while in the connected power generators excess heat is converted into power. This ensures the maximum use of the provided energy.

Diesel may be one supply to the plant, but in some of the larger towns, heat from municipal waste incinerators is fed

into the network. After production the heat is distributed to the customers in the form of hot water through insulated pipes, a pipe for delivery and a return wire. Approximately 2–10% of the energy is lost in this process.

All buildings which receive the heating are installed with a central heating system where the heat is transferred from the network to the building's heating and hot water system. Transfer takes place in a heat exchanger which ensures a suitable temperature and that the heat is transported from one system to the

other without direct connection between the two systems.

Even if there is heat loss in the distribution system, the advantage of this system is that you get the maximum energy utilisation efficiency when using both heat output and power generation. Between 85% and 94% of the energy content is utilised when the production of district heating is at its peak.

Waste incineration is based on household waste and waste products from local production, the building industry, and other sources of burnable materials. Also included are oil residues from the processing of fish and shrimp at the local fish factory, since waste products from the industry are heat treated so that any oil residue can be extracted.

By the waste plant the waste material is sorted for recycling and incineration. Moreover discarded non-combustible materials (iron, other metals) and products which if burnt may generate hazardous gases and waste products (light bulbs, batteries, medicine residues, paint residues, etc.) are sent to Denmark for further processing. After combustion the generated ash is sent to the Danish cement industry since fly ash is an important element in this process.

for district heating in combination with electrical power generation based on the incineration of waste materials, has become a new element in the North, and also on the Faroe Islands (see box 36).

## SWEDEN

In Norrbotten, northern Sweden about 15 TWh (terawatt hours) is produced yearly, which represents about 11% of Sweden's total production of electric power. The energy sector is highly developed and out of its 250,000 inhabitants no less than 4,000 earn their livelihoods in the energy sector. Considerable energy resources however remain available for further development. These include sources such as wood, crops for biomass production, and wind power in mountain and coastal areas. In addition the vast open areas provide the opportunity to make use of geothermal heating/cooling systems, as well as of the waste heat flow from the large base industries in the region.

Ms Kristina Leufstedt, press manager for *Vattenfall*, one of Europe's leading energy companies, said: "The countries in the Arctic region where *Vattenfall* operates, Finland and Sweden, have a quite significant share of renewable energy in their electricity system, mainly hydropower" and according to her: "in Sweden, the electricity system is based on hydro power and nuclear power, which generates a stable supply of electricity with low emissions. This stable and affordable base load has historically provided competitive advantages to Sweden's energy intensive industry but has also encouraged improved energy efficiency throughout the industry."

On the issue of dependency on hydrocarbons in respect of these areas, Ms Leufstedt notes: "Many industrial processes in Sweden now use electricity instead of fossil fuels, significantly reducing the primary energy input. The consumption patterns across days and seasons vary in the Arctic region due to weather conditions, which is catered to by the regulating capacity of hydro power."

In 1998 one of the world's major energy producers *Vattenfall AB*, set up its first wind turbine, a 600 kW MK IV turbine from the Danish company *Bonus Energy A/S* thus contributing to a path that was to become fundamentally important in terms of Swedish energy supply. The turbine was equipped for Arctic conditions and situated at Suorva in northern Sweden, producing a total of 1,710 MWh of electricity during its first year of operation. To work successfully in the prevailing Arctic conditions, wind turbines have been modified to withstand low operating temperatures and ice accumulation on the rotor blades which is one of the biggest problems with wind energy in the Arctic regions. The system was designed to operate at temperatures down to 20°C below zero, with the lowest temperature so far being -37°C.

## A Greener Economy

The need to "green the economy" has become an important issue for many countries, and the OECD seems to be taking a lead, focusing in particular on renewable energy and "green production" in remote regions. Many of the perspectives brought forward in this context are, moreover, applicable as development issues in the Arctic.

The current impetus to green the economy reflects three major concerns: the need to tackle climate change and other environmental problems; the desire to strengthen energy security by reducing dependence on imported oil and gas; and the need to stimulate job-creation in many rural areas, particularly in the aftermath of the economic and financial crisis. The first two points are compatible with higher prices for energy, the third is harder to reconcile.

The emphasis on job creation is justified by positive employment impact forecasts and several OECD countries have identified "green power" as a major rural development opportunity. Examples include: Spain (solar and wind); England (off-shore wind and wave); and Finland

(forest-based cellulosic ethanol and wood co-generation). However, despite the positive forecast and current regional specialisation, there is no sound evidence concerning the positive impact “green power” may be having on rural economies or about the potential of green energy to be a major driver of rural development.

The impact the transition towards a “green economy” will have on labour markets should not be underestimated especially in rural areas. For instance, the stricter environmental regulations needed to encourage the use of renewable energy might well act as a “job-killer”, reducing the net number of jobs in a given rural region. Hence, to assess the impact of green power on rural economies, both the macro and the local levels should be taken into account in the analysis.

At the macro level the issue is net new jobs, as evidenced in a rise in the participation rate or a fall in the structural unemployment rate. To what extent will green power displace other jobs? How much will green energy jobs displace jobs in the traditional power supply? If green power is more expensive how many jobs will be lost due to lower GDP?

At the local level, the key question is to understand how many jobs are associated with each specific project. Certain jobs will be in operation and maintenance (O&M), while others will be in the construction of the required facilities. As a consequence, both temporary and long-term jobs will be created in the regions.

If employment creation is the overriding aim of the policy, a thorough assessment of employment effects should thus focus on job multipliers, the backward and forward linkages green power can generate at the regional level, and income effects. Power generation typically creates relatively few local jobs and has small local job multipliers. It is a capital-intensive activity and has low linkages to the local economy. This is especially true for those

forms of renewable generation that rely on free energy inputs, like wind and sun.

Conversely, indirect job creation at provincial/state or national level can be significant. For instance, a region can specialise in the production of component manufacturing for renewables. Finally, displacement effects at the national level can offset many of the green power effect jobs.

Due to the lock-in dynamics that may take place at the national level, some regions win (becoming home to a “green power” supply chain) and others lose (gaining only power generation with limited or no linkages to the local economy).

The timescale for national and local specialisation is crucial here. Green power is largely displacing existing generation modes of conventional energy. The faster the displacement takes place, the greater the industry’s annual installations and economic impact in terms of jobs and output, but the shorter the window of displacement becomes. After the displacement takes place, there is only replacement, so the industry shrinks unless it can export.

All countries undertaking renewable developments anticipate export activity; it is unlikely that all of their ambitions can be satisfied. Moreover, developed-country forecasts may need to take better account of developments in China, whose increasing specialisation in green energy production could influence specialisation patterns in other regional and national economies.

### **Northern approaches**

For Iceland – rich in natural energy resources – the 2008 economic crash has dramatically changed the way it wants to exploit its energy reserves. Experts argue that greed, impatience and short-sightedness dominated decisions on the country’s energy planning before 2008. Now, a recent report, commissioned by the country’s Depart-



ment of Industry, argues that a new energy policy for Iceland should prioritise profitability, sustainability and national gain. Energy is seen as the key to Iceland's welfare.

The Atlantic island's natural energy reserves include hydro and geothermal power. However, a large amount of the energy produced is sold cheaply to heavy industry – mainly aluminium plants – much to the discontent of the Icelandic population who are still struggling to recover economically after 2008. Even aluminium plants in Africa pay more for the energy they use than the plants in Iceland.

Similar discontent among the Icelandic people recently pushed the Icelandic government to expropriate a power plant from a Canadian company. In the immediate aftermath of the economic crash, the rights to exploit the geothermal reserves on a peninsula in south-western Iceland for the next 65 years were sold at a giveaway price to the Canadian company.

Norway, despite being rich in oil and gas, feeds much of its electricity demands with hydropower. One of the main energy discussions at the moment, however, is still whether or not to give the go-ahead for new oil and gas exploitation at sea in northern Norway. The area is an important spawning ground for cod and therefore crucial for Norway's large fishing industry. So far, the current three-party government coalition has been unable to find a balance between two of the country's main industries – fishing and petroleum.

Finland and Sweden, on the other hand, are looking at building new nuclear power plants. In Finland, for example, Helsinki recently took two major decisions on shaping the country's energy for the future: Firstly, to increase the country's domestic renewable energy sources; and secondly, to construct new nuclear power plants. The motivation behind those two political decisions was increasing global warming and the wish for self-sufficiency

in energy and employment. For Finland, energy independence is the primary factor as regards energy policy.

Despite the open Nordic electricity market, Finland aims to keep the production of most of the energy used within the country. If not, the Finnish fear it could become dependent on energy from its eastern neighbour, Russia.

Across the border in Sweden, a thirty-year-old ban on the building of new nuclear reactors was recently reversed – a move that divided the Swedish population. Building new nuclear power plants will increase Swedish production of domestic energy. Some 50% of Sweden's energy comes from 10 nuclear power plants which are around 30–40 years old and which, at present, only work at 63% of their capacity.

Furthermore, Swedish hydropower is also one of the country's big energy sources. But the amount of hydro-electricity depends on rainfall. Hence, when rainfall is scarce, coupled with a high energy demand, Sweden must buy energy at higher prices – sometimes from abroad – leaving consumers and energy intensive industries with soaring energy bills. Sweden is also looking at introducing more renewable energy into the Swedish electricity grid – mainly in the form of wind power. More than 1,000 wind power plants will be built in the country over the next few years at the price of 70 billion Swedish kronor.

### **Saving energy and turning waste into a resource**

The AEA's Rural Power System Upgrade (RPSU) in Alaska is a programme which aims to replace obsolete, inefficient diesel powerhouses with regulatory-compliant facilities that employ new diesel and control technology in rural Alaskan communities. These improvements have increased diesel fuel efficiency by 20%–50%, saving hundreds of thousands of gallons of fuel to date.

The RPSU programme also offers technical and emer-

gency assistance to over 130 isolated, rural villages, and has a longstanding relationship with the Alaskan rural utilities and local native organisations. The Village End-Use Energy Efficiency Programme helps communities to achieve significant progress toward energy efficiency by replacing or installing energy-efficient lighting, switch boxes, motion sensors, set back thermostats, weather stripping, and low mass boilers.

The inflow of consumption goods to the Arctic in combination with a more urban lifestyle provides the Arctic with large amounts of “junk-food” which is a problem in itself. The imports also generate substantial amounts of waste materials. The traditional waste management procedures with low temperature burning on large dumpsites is thus no longer feasible given the health challenges associated with this approach, namely, the generation of dioxin and similar toxic fumes, thus constituting a significant environmental threat. Similarly the discharge of untreated sewage serves as a potential health hazard and source of drinking water contaminant.

Increasingly, the conversion of waste into useable products has become an important alternative. In the symbiosis approach waste material from one sector is considered a resource in another, which means that the regeneration and re-use of some products and increased use of recyclable materials provide a new approach to waste management, while the conversion of other non-recyclable materials is converted into energy.

One way to achieve this is through the generation of biogas, where sewage fractions and biomass, for instance waste material from fish processing, can provide an important input. Another is the controlled burning of materials in district heating systems where the energy is extracted and burning takes place at high temperatures which together with filters contribute to the prevention of the generation of toxic fumes. It adds to a limitation of non-renewable energy resource consumption and ensures a cleaner environment. But such approaches are costly and require continuous monitoring by skilled staff in order to be successful.





A question of  
accessibility



The Arctic region is becoming increasingly dependent on connections between people, through communication networks and through ground-, air-, and sea-based transportation networks – from resources to processors and consumers – by air and sea, pipelines, and power-grids.

In this context the Arctic does not differ much from most of the rest of the world, with three significant exceptions: The distances, the sparsely populated areas, and the problems generated through the geographical and seasonal variations in accessibility. The distances from, and the problems of accessibility to the major markets contribute to constraining economic development perspectives.

And the distribution of the sparse population between many more or less isolated places poses further hindrances in connection with the establishment of a proper infrastructure, just as it provides many challenges in establishing proper health care, education and other basic services. Besides being more difficult to justify because of the small numbers of people being served the remoteness and nature of accessibility is at the same time more costly. The complexity of the accessibility question is illustrated on map 15 which shows settlements and ports as well as major inland transport routes.

Therefore the prospects for Arctic communities are not as positive as in many other parts of the world. For this reason, transportation within and beyond the region has generally been dependent on the most expensive solutions – primarily air travel. Moreover, there are no indications that this kind of connection will in the future become less expensive.

As already discussed in the first part of the book, one consequence of this has been a delocalisation of many economic activities as well as the residence of the population to places providing the most favourable access, with increasing urbanisation as an obvious consequence.

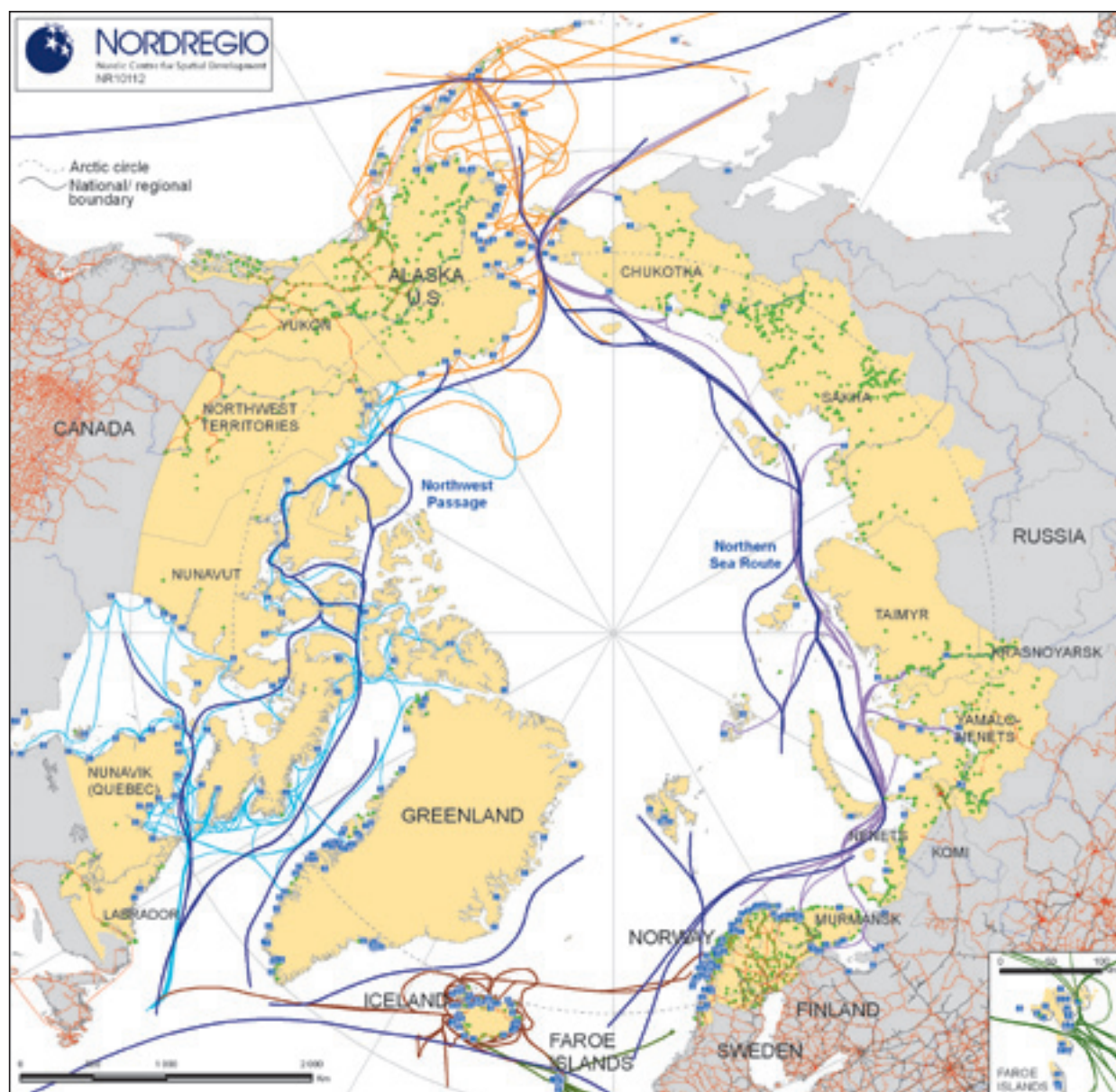
Access by the sea has always been important in spite of the limitations imposed by sea ice and harsh weather conditions. The – in this context – positive consequences of warming in the Arctic would be an increased use of marine transport. This may help to alleviate the isolation of some Arctic communities if future transport systems could serve as connections between the places. The problem, however, is the size of the places in combination with the costs of maintaining transport routes. In that context the vessels used in international transportation would be far too large and costly.

#### MAP 15: TRANSPORT ROUTES IN THE ARCTIC

The map shows the overall characteristic of transport in the Arctic except for connections by air. Besides the existing major shipping routes by country the existing ports are also shown. And on-land transport is illustrated by means of the major roads and main railways, as well as the rivers where transport is tak-

ing place. Finally the distribution of all populated places is shown. What is obvious is on the one hand a relatively dense network of ports and sea routes, and on the other, the vast areas not connected by roads, or only road connections open for transport during winter time, just as railroads are only available in very

few parts of the Arctic. And land-based transport lines mainly run North-South, providing limited connections across the regions. Connections, therefore, are rather unequally distributed and thus travel of any sort remains a challenge for many of the region's inhabitants.



### Transport routes in the Arctic

- Northwest Passage & Northern Sea Route
- Iceland shipping routes
- Faroes shipping routes
- Russian shipping routes
- Canadian shipping routes
- US shipping routes
- Ports
- Roads
- Main railways
- Main rivers
- Populated places

Arctic region defined as in Arctic Human Development Report

Alaska (US); CA - Yukon, Northwest Territories, Nunavut, Nunavik (Quebec), Labrador  
Greenland, Iceland, the Faroe Islands; NO - Nordland, Troms, Finnmark; SE - Norrbotten;  
FI - Lappland; RUS - Murmansk, Nenets, Vorkuta (Komi), Yamalo-Nenets, Norilsk & Igarka  
(Krasnoyarsky Krai), Taimyr, Sakha (13 northernmost subregions), Chukotka

Source: ArcticData Portal, ESRI Data, 2011  
Analysis & design: J. Sterling

More important here would probably be a continuation of the rise of the internet, wireless devices, and other information and communications technologies. They connect Arctic communities with one another and with other regions, providing opportunities for a number of services for instance in relation to education, health, and business development not least simply by connecting people. Map 16, showing GSM coverage in the Arctic, illustrates that even when not connected by physically by boat, rail or road, that communication is still an option, at least for most places. As presented in box 37 the Arctic has clearly become a member of the new globalised community of communication.

While average temperature increases may reduce sea ice levels and make transport both safer and easier the melting of permafrost has numerous negative effects on land; making for an unstable base for housing, ground-based transportation, pipelines and power-grids. Moreover, while there has been much discussion about how commercial ships should move through the Arctic, which routes to choose, how to minimise risks and transportation time, there has been very little focus on transportation needs *within* the Arctic. For instance in relation to the question of how to access the resources, to bring the machinery, labour force and goods required in, and arrange the shipment of produce out of the region when

there are problems with road access, the thawing of permafrost, ice- and snow cover is then actually a significant problem for the maintenance of year long connections. In the context of new economic activities such as tourism the question of having the necessary facilities to service cruise ships adds to the list of problems that need to be taken care of in relation to the future transportation infrastructure.

For communities to take advantage of the new activities when resource industries are expanding, more tourists are arriving, and new marine service activities are required, it is clear that the Arctic communities will require a new marine infrastructure. Northern municipalities need stable long-term funding but they simply do not have the resources required to put this in place. Moreover, such an infrastructure creates a growth in demand, not only for transportation and communication networks, but also for other basic services such as the management of solid waste, sewage, power and water and increasingly also access to recreational areas and leisure time facilities.

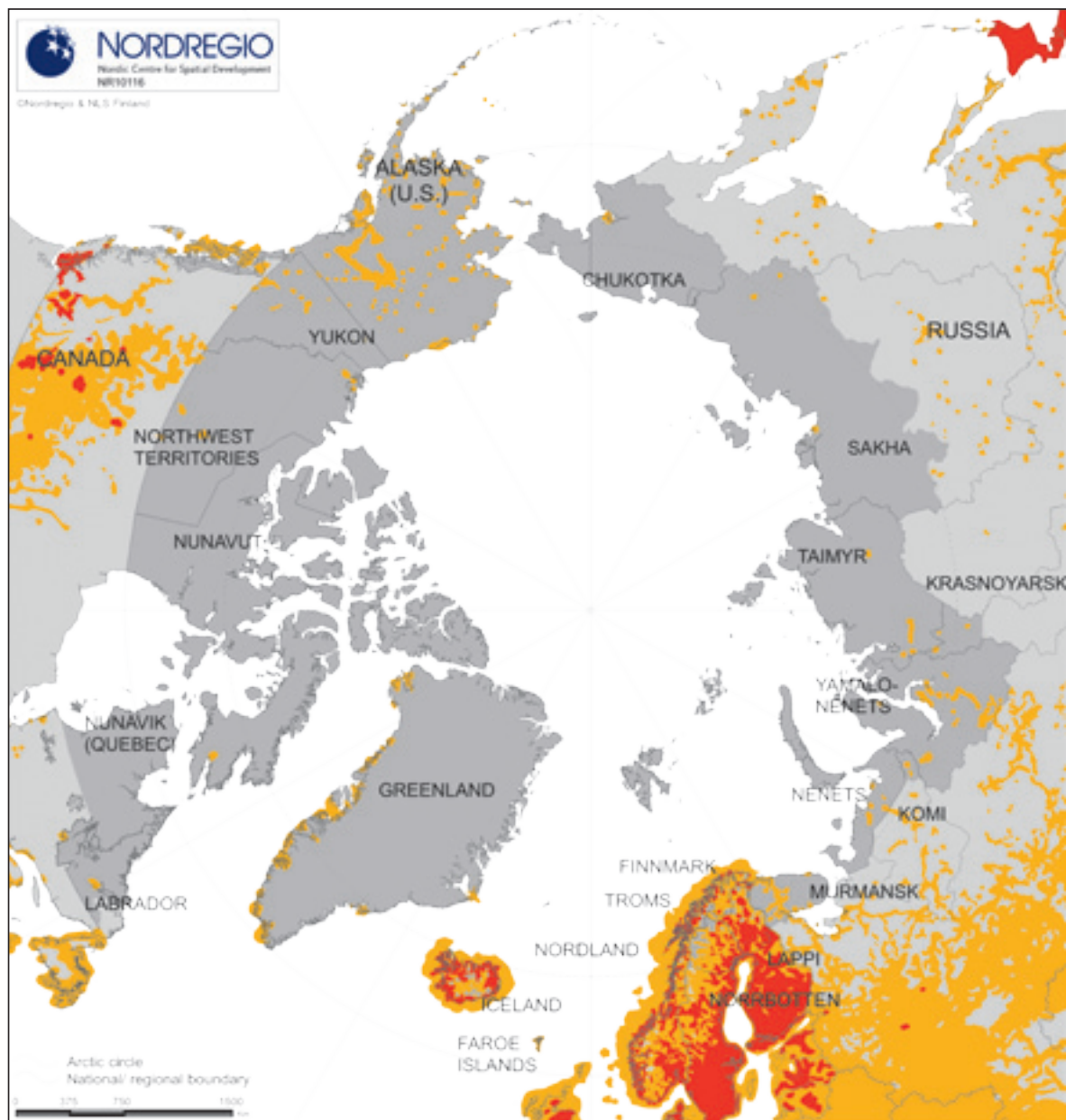
Similarly, resources are also required to construct and maintain the necessary information technology infrastructure which services the new physical infrastructure. If the trans-shipment of goods between cargo vessels does become a routine practice in the North a

#### MAP 16: GSM COVERAGE IN THE ARCTIC

While physical transport by sea or on land is limited, access by means of telephone is often referred to as a means of communication that helps overcome some of these obstacles. As shown on the map telephone access is definitely a good option here. But as shown, access remains highly unequal, both due to the

distribution of networks, and especially due to inherent limitations in these networks. Only the larger towns and nearby villages provide a reasonably dense network, and only a small fraction of the Arctic is provided with 3GSM coverage. As such, access to a number of services which could be useful in connection

with overcoming some of the physical problems, for instance social networks independent of computers, remains limited. Contrary to what is provided by means of the telephone system, internet access is generally available for a larger part of the population in the Arctic, a situation discussed further in box 39.



### GSM Coverage in the Arctic

- GSM coverage
- 3GSM coverage

Arctic region defined as in AHDR

Analysis & design: J. Roto

This map is a compilation of coverage information gathered from various telecom companies in March 2011. Data from Alaska: Alaska Department of Administration - Enterprise technology services



new port infrastructure will be needed to service these vessels and to ensure that adequate repair facilities are in place.

### Sea transport

Since the turn of the century climate change has had an important impact on accessibility by sea. In recent years the area of Arctic sea-ice has contracted substantially. At the same time new findings show that the ice thickness

has decreased by 10–15% while predictions for 2040 (and perhaps earlier) suggest that easier ocean access to the resources of the Arctic will be available. The consequence of this is that maritime activity may increase as observations show that the opening of new shipping routes around the margins of the Arctic Basin would make shipping feasible and result in a situation where ships in the Arctic could operate successfully where previously operations were difficult and expensive. Resources could thus

### BOX 37: HIGHLIGHTS FROM THE HISTORY OF COMMUNICATION IN THE ARCTIC

Arctic Europe has for more than 300 years had its own mail route system. In the 1690s the Danish-Norwegian mail route system was extended to include Vardøhus in the most north-eastern part of northern Norway.

In Greenland, the central colonial administration established a Greenlandic language newspaper as early as in 1861. The newspaper, *Atuagagdliutit*, is still published and is today one of the Arctic's oldest newspapers. The newspaper's very first issue included probably the world's first coloured newspaper illustrations.

The history of wired telecommunication in the Arctic began in Alaska in 1900. That year the US Army Signal Corps began to build the Washington-Alaska Military Cable and Telegraph System. In 1903 Alaska was linked by wire to the rest of the United States with the following words: "Alaska is now open to civilisation". Commercial and non-military traffic was only partly allowed.



The first Arctic radiotelegraphy station system was constructed in Novo-Mariinsk (today named Anadyr) in Russia in 1912. It was a Russian Navy station with a 40-metre mast. The station was

constructed as one of several stations that covered the Russian Arctic Ocean coast and islands, from Franz Josef Land in the Barents Sea to Wrangel Island in the Chukchi Sea.



be more easily exploited in areas where once this had been extremely difficult.

This has led to increasing concern in respect of economic activity for example in much of the Atlantic part of the Arctic region. The Arctic sea routes may become the key to an extensive increase in the level of economic activity which may have a substantial socio-economic impact in the Arctic and Sub-Arctic regions. Increased access raises several questions such as sovereignty over

shipping routes and seabed resources, security and safety both for the new activities and their impact on the activities already there, for instance commercial fishing, the hunting of marine wildlife by indigenous people, tourism and existing shipping. In addition, increased access to shipping routes and resources entails a higher risk of environmental degradation, significantly impacting the environment, such as marine mammal migration and the introduction of alien invasive species in the region.



In 1936 the telecommunication system in Alaska was reorganised as the Alaska Communication Systems (ACS, later *Alascom*) but military communications

still had first priority. In 1946, the first telephone system was established, and civilian access increased. Only from 1971, when *Alascom* was formed, did Alaska's

telecommunications however become commercially, rather than military based.

In 1972 *Telesat Canada* launched its first Anik satellite which covered the North American Arctic including the west coast of Greenland, making Canada the first country in the world to have a satellite in geostationary orbit for domestic communications purposes.

In the 1970s, a UHF network connected Greenland internally. This network was modernised and digitalised in 1996 and Greenland became the second nation in the world with a 100% digital telecommunication network backbone system. Greenland's neighbour to the east, Iceland, had as the first nation reached that goal only a few months earlier. 1996 was also the year access to the Internet was established in Greenland.

It is not, however, only global warming and the enormous deposits of natural resources that will ensure the Arctic region's importance in the world of the future. Its central location in geographical terms and the short direct sea routes to the main population centres of the globe, still predominantly located in the northern hemisphere, are a significant asset here. Arctic resource development will go hand in hand with the opening up of shipping routes in the Arctic Ocean as well as shipping on the increasingly ice-free rivers that run north into the Arctic Ocean.

Increased marine access has implications for national and regional governments which will be called upon for services such as icebreaking, ice charting and forecasting as well as emergency preparedness, and several studies conclude that oil spills and other industrial accidents could have serious, long-lasting effects in a high-latitude, cold ocean environment. Despite preventive measures such as improved boat-building standards, "spill response operations" are more complex and demanding in ice-covered waters and effective response strategies have yet to be developed while better port facilities and operating procedures in relation to oil spills are also required.

### **Tourism**

Cruise liners generally sail under flags of convenience. In some cases they do not follow national regulations on environmental standards, national fees, renovation costs for attractions and ports, wastewater taxes, income taxes etc. The cruise industry can also easily shift ports leaving local communities with unused and costly infrastructure installations and failed businesses. As a result, many local communities are reluctant to try to effectively regulate cruise operations for fear of reprisals. The national regulation of tourist operations is more effective and efficient.

The cruise industry has not been critically assessed in the Arctic with a view to limiting its potentially det-

rimonental effects. Cruise ships are believed by some to be a destructive form of tourism, with few benefits to host destinations and many negative environmental impacts such as carrying capacity problems in over-visited attraction spots, pollution, waste management and the need for a highly developed infrastructure. As already addressed by several scholars this issue could become a serious concern in the Arctic context where the vulnerable ecosystem balance can easily be threatened.

Global warming quickly facilitates access to previously secluded villages. Some studies of indigenous communities have found many residents are not prepared for mass tourism and are still highly dependent on the environment for survival in both a physical and a cultural sense.

Despite these potentially problematic implications, cruising remains the most convenient means of access to the Arctic's coastal communities. Since cruises include accommodation, they reduce the strain on small villages that are often unprepared to accommodate tourists. Locals can instead focus on selling arts and crafts, conducting performances, communicating traditional knowledge and providing guiding services for day visitors. Cruises can also be a provisional solution for tour operators, who consider the Arctic industry as being too young to fully support land-based tourism activities for a long period, but still want to organise trips that can be beneficial to these communities.

The greater potential for collisions in the North Atlantic and the Greenland Sea as the number of polar expedition rises during accessible periods has drawn attention to a number of new governance challenges. The additional pressure from tourist flow has generated a response in the form of various ideas in respect of different forms of conservation. While community-based conservation for the sake of the polar bear, arctic national wildlife refuges and bear-human safety plans have been discussed in

**BOX 38: THE ROLE OF SOCIAL MEDIA – THE FINNISH AND GREENLAND CASES**

Social media and especially *Facebook* has become an integral part of their daily life for many people in the North. The technique is good for low band-

width, a critical mass has been reached, the concept appeals to the well-known impersonal spread of information (“someone has said ...”), and people

can stay in contact in spite of the huge distances involved.

Several politicians in Greenland communicate intensively through *Facebook*. The member of the Danish Parliament for Greenland Juliane Henningsen is one of the most popular. She has 4 973 friends, which is about 9% of the total population in Greenland. This gives her – and other politicians – potentially a very strong outreach. Indeed, it was through *Facebook* that Juliane Henningsen recently announced a marked change in her private life.

The private business sector has also adopted *Facebook*. The only internet news provider, *sermitsiaq.ag* is extensively using *Facebook* for interactivity with its readers. Photos of specific events are requested on *Facebook* from among the 3 368 friends of the website. The municipal office responsible for nurturing new business entrepreneurs in the municipality communicates primarily through *Facebook*. Invitations for castings for film actors are spread through *Facebook*, and so on.

The broader private use of *Facebook* shows a generally high ICT literacy among many of the users. The group of experienced users of course includes many people born after 1990 (the Internet generation), but also significantly older users – aged 50+ – are both dedicated and advanced users. This reflects the fact that Greenland has never really experienced significant age-differentiation in respect of ICT use.



the US and Canada, European ideas have focused on the designation of wildlife refuges, national parks and even marine protected areas to safeguard animals and the environment, including the perspectives of indigenous people, hunters and fishermen.

The prospect of Arctic tourist spots continuing to grow in popularity heightens the risk of social and environmental stress on natural habitats, wildlife and indigenous peoples. This prospect has generated numerous suggestions for the formation of an Arctic Tourism Association. The formation of a European Arctic Tourism Association (EATA) to manage Europe-based tourism to the Arctic has also been suggested (Ecology Institute 2010).

The creation of an International Arctic Tourism Association (IATA) has also been raised with the IAATO/International Association of Antarctic Tour Operators being a role-model in this respect. As suggested by the expert group behind the EU Arctic footprint and policy assessment report (2010), their role would encompass managing all tourism in the Arctic thus contributing to the simplification and more effective management of tourism in the region.

Russia is, from a geographical perspective, the most important stakeholder in Arctic marine governance. After a significant change of heart and a move away from traditional positions Russia's new geopolitical vision is no longer that of the "isolated heartland" but is instead one of a strong maritime state that draws its strength from its arctic coast and vast arctic watershed.

Russia perceives security, ocean and coastal resources, northern transportation infrastructure and regional economic development in the Arctic watershed to be the most important aspects in development. Though not explicitly mentioned, tourism is part of at least three of the above-mentioned categories.

Russia held the chairmanship of the Arctic Council during the period 2007–2009. The priority of the Rus-

sian Chairmanship was to ensure sustainable development in the Barents Region with an emphasis on social and economic factors, linking this closely to compliance with environmental requirements while also supporting indigenous peoples. An action plan was developed by the working group on culture for the period 2008–2010 supporting various studies on indigenous peoples' cultures and other cultural events of different kinds (films, festivals folklore, music and exhibitions etc).

So far then there is reason to be optimistic. In December 2010 seven of the eight Arctic nations came to an agreement on search and rescue in the ocean and aviation zones of the North Atlantic and the Arctic. About 50 experts from the USA, Denmark, Finland, Iceland, Canada, Norway, Russia and Sweden met in Reykjavik with a representative from the International Air Transport Association (IATA) to draw up a contract responding to the perceived need to coordinate efforts on search and rescue in the Arctic Ocean and its associated aviation space. This agreement includes designated search and rescue zones divided into the individual nations' responsibility. It will be signed at the Arctic Council meeting in Nuuk, in May 2011 (Icelandic ministry of foreign affairs, 16.12.2010).

### **Internet access**

Ubiquitous low cost communications technology (especially mobile phones and mobile internet) will change the relationship between citizens and states. This is a truly global trend, with map 16 on the distribution of mobile telephone coverage clearly illustrating that it has being a significant factor in "connecting" the Arctic. At the same time it also shows the uneven distribution of opportunities for this type of communication. The future for internet access is discussed in box 39.

As in the rest of the world we now see in the Arctic:

- an ongoing convergence between communication devices,
- growing capacity on the communication network systems,
- a liberalisation of the provision of access to communication systems,
- increasing digitalisation of the public administration,
- growing and widespread use of social platforms.

It has long been supposed that improvements in communication opportunities in the Arctic would provide a valuable tool in and be a major contributor to sustainable development, capacity-building, human health and welfare in the region, and that it would be essential that residents in the Arctic be given access to cost-effective telecommunications systems with sufficient carrying capacity. The extent to which these initiatives prove sufficient and whether they are able to generate the expected outcomes remain unanswered questions, as does that of whether they may even have an adverse effect.

In the Nordic Countries, for instance, the expansion of broadband internet connections has taken place at the same time as the out-migration of both population and industries has speeded up. In a survey on the consequences of broadband development among rural companies dependent on customer interaction, several companies have indicated that access to broadband internet instead of attracting new business activities has taken businesses away from the sparsely populated areas. Similar processes have been seen with other infrastructure constructions. New roads and tunnels not only provide better access to remote communities, but also new options for leaving these places.

Current digital communication systems are hugely expensive to research and develop. As such, they can only be developed within economies much larger than those in the Arctic. To get a backbone network with a minimum level of capacity up and running takes a critical mass of customers to effectively ensure a healthy economic return is made by investors. This presents a significant challenge to most Arctic societies. Not only are the sizes of the local populations relatively small but the basic cost of building and running a backbone network is much higher in the Arctic than almost anywhere else.

Huge distances between numerous small and sparsely populated communities together with challenging physical conditions is the reality for many in the Arctic with a significant lack of coverage over vast areas and a continuing lack of fibre-optical networks in many inhabited areas.

Available information on the various communications systems is lacking and little in the way of locally produced information is available. This means that little or no information is produced in local languages. The reason is structural and can be understood in relation to the fact that a “critical mass” of customers simply does not exist in these relatively small communities.

#### **Other limitation to access?**

Nowhere in the Arctic can any politically defined limitations in the access to the digital means of communication be observed, but in some areas socio-economic limitations undoubtedly remain an issue. This type of limitation is primarily due to charging systems based on the amount of traffic. With this charging structure it is difficult to define the expense per month, and thus people tend to minimise their communication traffic.

In some areas in the Arctic, in principle, access to the Internet does exist, but the traffic speed is so slow or so unstable that it is in practice almost unusable. The socio-



cultural limitations are also visible primarily in relation to the level of education, the level of ICT skills and the level of linguistic competence. The level of education and

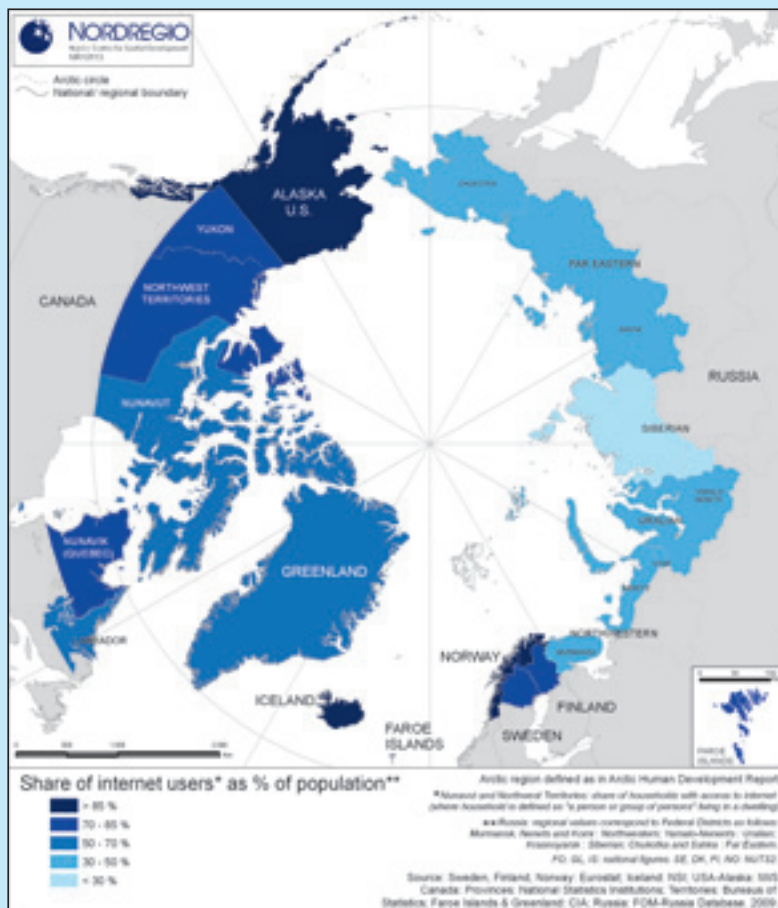
of ICT skills in general are not the most significant issue here, rather it is linguistic skills, or the lack thereof, that remains an important limiter here.

### BOX 39: INTERNET ACCESS

Access to internet has become one of the most important means of communication worldwide. This is also the case

in the Arctic. The internet is a medium with which we can view information from anywhere in the world. Documents from

the World Wide Web and various other services such as instant chat, email are available through the internet. As its use has become more popular, there has been an increase in the speed of the internet and also a reduction in the cost. This has made it possible for many people to benefit, and the internet has made many activities much easier. The medium is used for almost all purposes, even with important issues such as education and government organisations. The map shows the current situation regarding internet access in the Circumpolar North.



In the future we will see less dependence on ground station based networks and more accessibility to high speed wireless satellite network systems. Arctic societies will continue to lag behind in terms of such innovations and will ultimately have to depend on a fall in prices. The delay in access to new gadgets and technical progress will however continue to shrink. Most likely, we will see new systems developed and they will demand even higher speed capacities. The Arctic societies with their small populations will in this respect be a number of steps behind, never quite reaching the general global level of connectivity.

Demographic research in the Arctic has demonstrated a link between education and mobility. The better educated people are the more mobile they tend to be. One of the visions associated with digital communication systems is that they should be able to provide more and better education to remote and small settlements. If better *e-learning* systems can cover more settlements generating better opportunities for young people in the remote areas, then it might also contribute to a more mobile youth in these remote settlements, which in itself will probably only provide a further spur to emigration.

Other reasons encouraging this likely increase in emigration include the lack, in such small settlements, of suitable and challenging jobs and career opportunities. With better education it follows also that better linguistic skills will also be developed. When moving from monolingual to multi-lingual the invisible barrier in terms of limitations to mobility in the form of poor linguistic skills will no longer restrain young people from moving to new places perhaps even well beyond the Arctic, and the new social media (presented in box 40) will expand their interconnectivity.

Access to qualified *e-learning* will undoubtedly increase the likelihood of young people choosing to move from these small places to larger settlements. Again, de-

mographic research in the Arctic here is of the highest interest, as it tends to suggest that in the beginning it is likely to be the teenage girls and younger women who will abandon the smaller settlements.

The global communications network also forms a single huge commercial market. This means that in Arctic societies, from the smallest settlement to the largest Arctic metropolis, everyone should have an equal opportunity to sell or buy services and goods on a global scale. Here only one's own imagination sets the limits. The unique combination of access to products globally and detailed knowledge of the market locally is socio-economically a potential "gold mine" for the good entrepreneur.

Higher accessibility to the communications network will – in principle – be to the benefit of the use of local languages, but there is a risk that the production of information in the local languages will be too slow, too unprofessional, too unstable and too limited for the local population to benefit from this.

Growing access to the network of global communication will affect both actors and content. The actors will improve their navigation and ICT skills and their critical sense and the local providers of content will increase their production of information. This points to improving conditions for more fully elaborated democratic societies but access in itself will not produce societies, in the Arctic or anywhere else. Growing access to digital networks and to information, combined with rising competence levels in respect of using this information, represents a slowly developing megatrend across the globe. A critical point here may be to what extent the local authorities in charge of the local, regional or national communications systems support this to the benefit of the general public.

### **Voluntary or forced involvement**

The compound effects of the impact of numerous inter-related components – causing an increase in Arctic tour-

**BOX 40: PROBLEMS WITH VIABLE INTER-ARCTIC TRANSPORT CONNECTIONS ICELAND/GREENLAND/FAROE/CANADA**

The infrastructure in the Arctic is generally characterised by two issues: Insularity and Predominantly One-directional linkages. In principle there are four possible means of transportation: Air, Sea, Road and Railway. In most of the Arctic, however, few of these options

are available in relation to interaction between the Arctic regions, and in some cases there are even differences in availability through the year. Almost all trade connections go North-South, taking resources out of the Arctic, and consumer goods into the region. This is

a pattern that has existed for a century or more, and even the last 30 years have shown that while there have been several attempts to open up for alternatives, many of them have only lasted for short periods of time simply because of the limited volume, which was deemed





insufficient to maintain economically viable connections.

The ICC has emphasised the need to promote trade activities in the North by establishing a task force on trade initiatives. Similarly a statement from Canada from 2011 emphasised that the goal is to continue to seek trade and investment opportunities that would enhance its trading ties with other Arctic states. Recently a free trade agreement with the European Free Trade Association (EFTA) member countries has been

implemented, an agreement that has the potential to enhance trade and investment between the northern regions of the respective countries. It is emphasised how this might create trade ties with other Arctic states as well. One of the instruments has been the upgrading the Port of Churchill, Manitoba, to facilitate increased export options as well as promoting the flow of two-way trade with other northern ports.

The question is, however, what the realities may be. Even if the opening of the

Polar Sea for international transportation in principle enables a closer connection between the Arctic countries it is not very likely that it will result in any substantial increase in transport relations. The Arctic regions, while large in terms of land areas, are very small population-wise, and the costs of establishing a network of harbours in combination with the costs of making stopovers for the small exchanges of goods and passengers make the substantial increase in such activities rather unlikely.



## BOX 41: NEW LOCAL PRODUCTIONS – GREENLAND



With the option of low cost film making the potentials of taking advantage of local talents has become an asset for northern communities. The company *Tumit Production* in Greenland is an excellent example of what may represent a future trend. The company consists of three persons, Aka Hansen, Malik Kleist and Angajo Lennert-Sandgreen.

Aka has been working on short films, documentaries and TV projects since 2003. The first steps in becoming a professional producer were taken in 2007 with a view to responding to the interests of young people and especially to those who would normally not be seen or heard. After presenting some of the first productions at the workshop “NUFF” (Nordic Youth Film Festival) in Tromsø in June 2008 the next steps were the production of a number of documentary programmes as well as being involved in the production of a series of television programme “*Inuusuttut Silar-suaat*” which was intended to entertain

young people in an educational way. Aka has most recently directed and two documentaries, “*Green Country*” and “*Double Impact*”, while she produced and wrote the screenplay for the comedy movie “*Hinnarik Sinnattunilu*” along with Malik Kleist and Angajo Lennert-Sandgreen. Aka’s strengths lie in producing, cutting and writing screenplays. Aka is also a producer on *Tumit Productions* next big feature film project with the working title “*Iliveq*”.

Malik has worked on short films, short stories, films, documentaries, music videos and TV since 1999. He was trained as an AV technician at media school (2000–2004) and worked at the National TV initially as a student intern from 2000 and later as operations engineer from 2004 to 2009, where he mainly worked as a photographer, editing technician, sound technician and technical coordinator. At the National TV, he has worked in recent years with youth programmes but has also made

documentaries as well as music videos. Malik and Aka joined forces in connection with documentary films such as “*Green Country*” and “*Double Impact*” and the comedy movie “*Hinnarik Sinnattunilu*” and most recently has worked in conjunction with Aka Hansen and Angajo Lennert-Sandgreen on their most recent productions where he has been adept at photography, rock, sound technique and script writing.

Angajo became involved with the team in 2009 in connection with the film “*Hinnarik Sinnattunilu*” which he directed and starred in, while also writing the screenplay for it with Aka Hansen and Malik Kleist (*Tumit Production*).

The three documentaries: “*Green Land*” – “*Double Effect*” – “*The World is listening*” – all focus on Greenland’s youth and their relationship with the ongoing climate change and are available from the website: [www.nordregio.se/films](http://www.nordregio.se/films).



ism – raises the question of whether this is voluntary or forced. Globalisation has a penetrating effect. Places that succeed in drawing the world's attention do so based primarily on an ability to “tap into” an increasingly communications-centred “consumerist” civilisation. For those who market tourist destinations the ability to attract “desirable” socio-economic groups already rests on new skills based on thinking socially, interactively and passionately. The numerous waterfalls of invented and widely used social media will undoubtedly have a significant effect, most likely in a form of cooperative combination between social networking sites and next generation mobile phones.

As most studies of psycho-social behaviour on the net have shown, hierarchies of social media, specifically aimed at travel will have gained importance in mediating what are considered the most exciting places to visit based on the interaction of users, with the professionalised hints of opinion makers. The ability of local developers, marketers and tourism businesses alike

to understand how technology drives interest in tourist spots, identifying elusive points of attraction on the net and taking advantage of it for one's own benefit, will be crucial. This is to some extent already happening, i.e. in relation to the build-up on Greenland and the counter-campaign against the shock of the Eyjafjallajökull eruption in spring 2010, in Iceland.

The future of the media landscape as market makers become more aggressive (or invasive) in penetrating every available channel of air, sound, image and space will likely also have a counter-effect on some groups of potential travellers. Observers have pointed to the tendency for the return of slow travel as one means of reaction to a stressful instant day-to-day world. Undertaking meaningful travel, like volunteering, or taking a trip involving more than just sight-seeing, by getting involved in different types of NGO-activities, on a farm, in hunting or raising awareness of the environment etc., will most likely also be part of the new tourist experience in the Arctic.



New positions in the  
global system

The Arctic is no longer an isolated or remote region. It is a member of the global society, often at the centre of global attention and is fundamentally influenced by global changes, just as the globe has an increasing interest in what is happening in the Arctic. There is clearly now a growing multi-level process of cooperation, stewardship for the region and various modes of partnership within the “New Arctic”. There is also a real need for new data, knowledge, and information on numerous questions and issues, for instance: What lies in store for the “New Arctic”? How should cooperation be structured? How can the national interests of the Arctic and non-Arctic States aspiring to have a say in Arctic-related decision-making processes as well as access to its resources be better coordinated? How can the challenges of Arctic social and economic development be better addressed in the light of new levels of accessibility? What are the emerging challenges and opportunities? In which areas should human and financial capital be best invested? And how legitimate is the science in its support for existing developments in the Arctic?

The magnitude of changes occurring in the Arctic region, including climate change and estimates of potential new riches have generated a number of developments resulting in increased action among several Arctic states in asserting their claims across the region. These developments have also prompted a discourse by other interested stakeholders over a variety of Arctic issues. Regardless of the existence of numerous general agreements between the Arctic states, unilateral efforts by several states to buttress their regional claims and geopolitical interests and the persistence of a number of unresolved legal and political matters all interested parties should continue to seek new modes of regime governance in the Arctic.

The policies undertaken by the governments of the various Arctic states and sub-national entities in han-

dling matters of security, sovereignty and development questions that affect the Arctic’s basic economic, social, political, and environmental settings necessarily bring to the fore questions relating to the involvement and role of sub-national entities in the future of the Arctic.

Existing academic and political discourse on Arctic matters indicates that differing approaches and views exist on who should control, own or benefit from various areas of Arctic development and how cooperation and possible partnerships should be enhanced. The state of Arctic affairs and a new geopolitical framework are currently marked by several challenges heightened by uncertainty, climate change, globalisation and the shifting geopolitical, security, economic, and international significance of the region. These challenges have re-shaped perceptions, concerns, legal disagreements and political cooperation among several Arctic states and others.

Growing legal and political discourse over emerging and clashing Arctic interests and the rebirth of a public focus on the North have generated a necessity for more coherent Arctic policies and responses to Arctic issues. These trends have crystallised in the actions of a number of actors among the Arctic and non-Arctic states, supranational institutions like the EU, sub-national entities, indigenous collectivities and other residents of the North, all of whom are eager to have a greater stake in the region’s political development, the re-distribution of resources, legal claims, collaboration, dialogue and numerous other vital activities. Several maps throughout the book have contributed valuable information in this regard. For instance box 15 on resources, maps 7 and 8 on protected areas and zones of marine activity, box 29 on international sea boundaries, and maps 15 and 16 on transport routes and GSM coverage.

The growing activities in the Arctic reveal that we are in the midst of a fundamental transformation which will continue to affect the future of the region, its citizens and



developments beyond the Arctic rim. While the Arctic states seem to agree on a number of important and fundamental questions, the current situation also points to the growing number of environmental, social and cultural concerns on impacts of this transformation on “northerners” and indigenous residents. It amplifies the necessity to find reasonable solutions to the problems raised by the need for sustainable development, environmental stability, security and human capacity-building in the region for the benefit of current and future generations. In this context the recognition of both new stakeholders and new activities is important. So in addition to the previous maps, this section includes two further maps. Map 17 shows the delineation of international cooperation institutions in the Arctic, emphasising the fact that both older and newer institutions are working on Arctic issues, usually cooperatively. While map 18 highlights the distribution of “University of the Arctic” member institutions, the result of a decade of fruitful emphasis on cooperation in education as a means of creating new opportunities in the Arctic.

As indicated above, the ongoing transformation points to a number of issues that will undoubtedly contribute to the shaping of future discussions, these include;

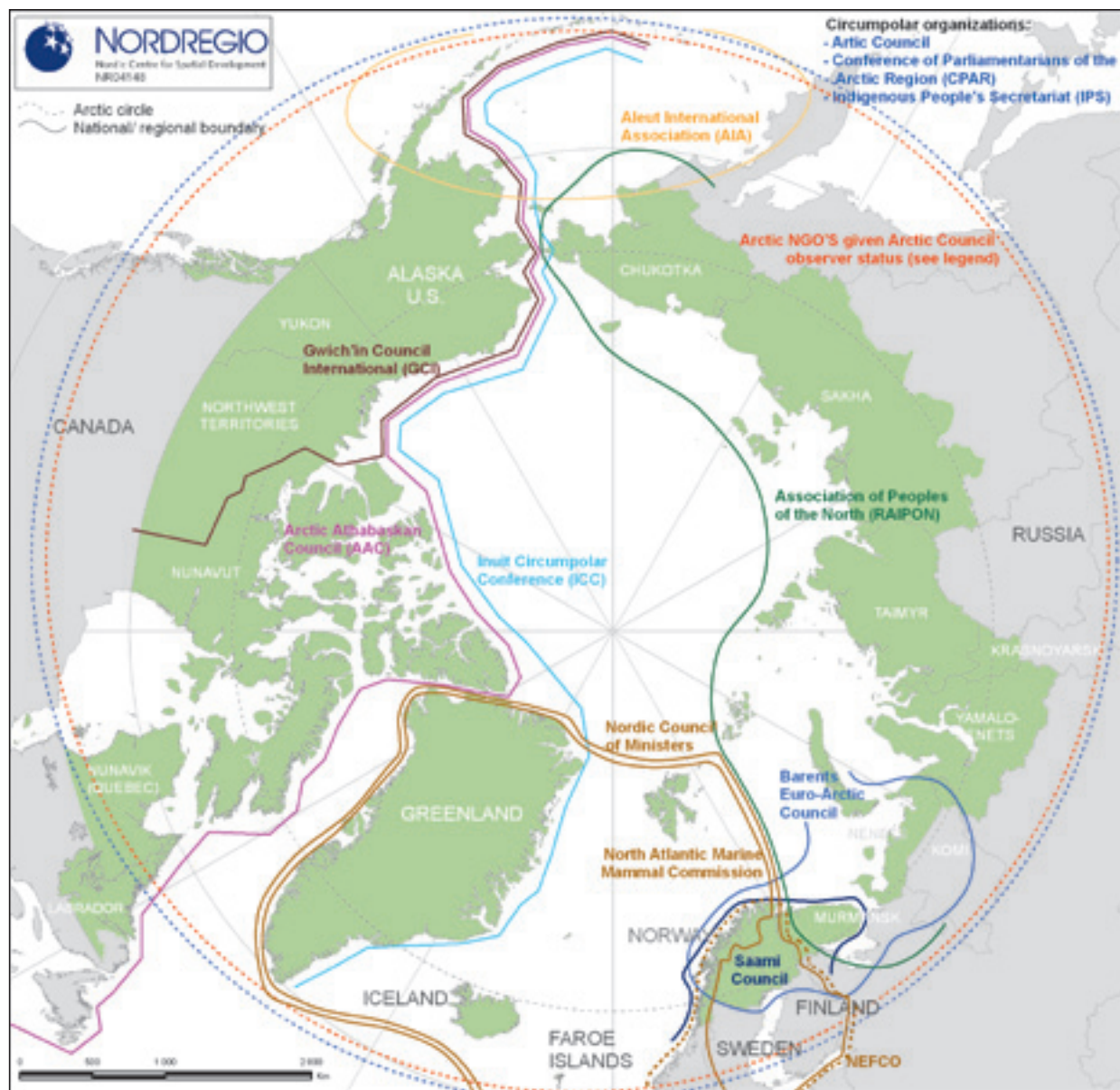
- new geopolitics, including new security and Arctic policies, the tackling of current and emerging environmental issues and Arctic-related jurisdictional disagreements;
- new resource development, including the “race” for control of potentially lucrative untapped resources, energy supplies and exploitation of renewable stocks;
- new shipping routes and issues of navigation and transportation in the Arctic, including matters of marine regulation, pollution, search and rescue activities, marine and bio-security, Arctic Ocean governance and biodiversity;
- new frontiers for knowledge, i.e. intellectual, scientific, and knowledge-based technologies, research and cooperation;
- new approaches to Arctic governance, including innovation in governmental practices, plausible solutions to issues of accountability, transparency, conflict and liability; the human rights approach to Arctic-related matters; new governance arrangements for northerners as part of their broader sustainable future, devolution processes, etc.;
- new vision of the challenges and concerns to come, including the resolution of, or feasible solutions for, existing legal disagreements and prospects for building an adequate level of capacity to respond to Arctic issues locally and globally.

### The Pillars of Development

The identification of current gaps and challenges and the preparation needed to deal with forthcoming issues which present both problems and opportunities in respect of Arctic development. This is an ongoing development and continues to grow in the form of the rapid evolution of Arctic-related legislation and Arctic-oriented legislative policies. Currently, major areas of concern will continue to form the crux of geopolitical and legal attention in the years to come. Several of them have been touched upon in the previous chapters, and in a nutshell, those areas can be summarised as follows:

- Environment relating to matters of climate change, environmental protection, conservation of the environment and resources, usage of the precautionary approach, environmental impact assessments, multilateral environmental agreements, monitoring, pollution, oil spill prevention and response meas-





## International cooperation institutions in the Arctic\*

### Circumpolar organizations:

- Arctic Council
- Conference of Parliamentarians of the Arctic Region (CPAR)
- Indigenous People's Secretariat (IPS)

### Arctic organizations given Arctic Council observer status:

- Nordic Council of Ministers
- North Atlantic Marine Mammal Commission
- NEFCO - Nordic Environment Finance Corporation

### Arctic Council Permanent Organisations:

- Gwich'in Council International (GCI)
- Arctic Athabaskan Council (AAC)
- Inuit Circumpolar Conference (ICC)
- Aleut International Association (AIA)
- Saami Council
- Association of Peoples of the North (RAIPON)

### Arctic NGO'S given Arctic Council observer status

- Arctic Circumpolar Gateway
- Association of World Reindeer Herders (AWRH)
- Circumpolar Conservation Union (CCU)
- International Arctic Science Committee (IASC)
- International Arctic Social Sciences Association (IASSA)
- International Union for Circumpolar Health (IUCH)
- University of the Arctic (UArctic)
- Worldwide Fund for Nature-Global Arctic Program (WWF)

Source: Institutions websites, Arctic Council, 2011

### MAP 17: INTERNATIONAL INSTITUTIONS IN THE ARCTIC

The Arctic is rich in organisations promoting cooperation across countries, regions, and institutions. The map shows the basic “geography” the various organisations cover and at the same time provides a list over most of the major organisations involved.

ures. In this context also issues in relation to the preservation of biodiversity should be mentioned as well as questions of ecosystem-based management where interaction and impact on and by humans remain relevant issues. Issues of animal welfare, the mitigation of and protection from invasive species to the Arctic, and the preservation of species that are under threat of extinction should also be included here.

The Arctic is something of a “barometer” of global change; changes in the Arctic environment have implications for global systems. Thus, impacts from emergent and current activities such as shipping or tourism require further consideration with respect to the Arctic’s fragile eco-system. Emerging environmental hazards and concerns in and beyond the Arctic and the complex connections between Arctic ecology and global systems related for instance to the risk of oil spills, the impacts of the Arctic haze or the ramifications of global environmental changes for the region with regard to POPs or PCBs, impose new demands on the framework of Arctic governance.

- Resources include various questions of rights, ownership, access, economic benefit distribution,
- Marine and airspace access for shipping, navigation, transportation and air communications raises ques-

sharing, extraction, exploration, sustainable management, subsistence, conservation, the impacts of industrial development, etc. For instance questions such as the following: what are the options for the control of various resources in the region? Are existing legal instruments, for instance the UN Convention on the Law of the Sea, sufficient or is more bi-lateral or multi-lateral diplomacy and legal cooperation needed, particularly in respect of the negotiation of Arctic-specific treaties or agreements – i.e., on Fisheries? Should the emphasis here be on the enhanced “soft-law” instruments declarations and resolutions of various Arctic bodies? In relation to the latter the Arctic Council is currently working on the development of an obligatory search and rescue agreement, something which is expected to be endorsed in May 2011.

Geographical questions are also important, for instance: Where is resource development likely to progress and what measures should be taken to ensure proper environmental protection and the sustainable use of those resources? What significance or value would the resources bring to peoples’ living in the Arctic: e.g., bio-resources, water, genetic resources, impact on fisheries, marine mammals and terrestrial eco-systems? And what are the prospects for non-renewable resources, including offshore, and in this context what are the pros and cons of such a development for wildlife and humans and do they impose challenges on traditional activities? The role of environmental organisations and NGOs in dealing with resource-specific developments on how to share existing resources is undoubtedly an important question also in this regard.

Arctic circle  
National/ regional boundary



## University of the Arctic Member Institutions

Arctic region defined as in Arctic Human Development Report

Alaska (US): CA - Yukon, Northwest Territories, Nunavut, Nunavik (Quebec), Labrador  
Greenland, Iceland, the Faroe Islands; NO - Nordland, Troms, Finnmark; SE - Norrbotten;  
FI - Lappeenranta; RUS - Murmansk, Nenets, Vorkuta (Komi), Yamalo-Nenets, Norilsk & Igarka  
(Krasnoyarsky Krai), Taymyr, Sakha (13 northernmost subregions), Chukotka

Source: University of the Arctic, 2011



tions over the development of an adequate and efficient Arctic shipping regime which would promote security, reliability, the cultural sustainability of the Arctic peoples and safety within the context of the growth of trade/commercial, tourism, and military shipping in the Arctic Ocean.

The operation of such a regime will require more effective Arctic Ocean governance, and several recommendations on this were issued by the Arctic Marine Shipping Assessment Report produced by the Arctic Council in 2009. In addition, various experts have advocated several recommendations to make the 2009 International Maritime Organisation's Polar Code legally-binding. Airspace issues also form a developing area of research and scientific interest in the Arctic particularly in respect of pollution and technological innovation.

- Governance addresses a number of areas listed here in this document, but mainly focuses on institutions, modes, structures and governmental practices, novelty in governance, self-government and devolution processes. In addition there are still unre-

solved or emergent political and legal disagreements and challenges in connection with Arctic sovereignty remain the being concerns by of some states., In addition, claims to resources and the extension of continental-shelves, maritime-boundary questions, political views or partnerships on certain Arctic issues and cooperative processes, security issues, and not the least the question of the need for, and value of, binding commitments versus "soft" declarations in the region are all important questions.

- Human development as the overarching theme relating to all of the above. For instance the question of local participation in ecosystem-based management, the meaning of resource rights, ownership, access, economic benefit distribution, and sustainable management. Additional questions however related in particular to the consequences of an increase in Arctic transport, and safety issues relating to the growth of trade/commercial, tourism, and the continuing military presence in the region are also important here. The value that change would bring to peoples lives in the Arctic, connected to ques-

#### MAP 18: UNIVERSITY OF THE ARCTIC MEMBER INSTITUTIONS

Counting in terms of "heads", i.e. how many persons are directly involved in cooperation activities, one of the more successful organisations is definitely the University of the Arctic. It is a non-profit cooperative network of universities, colleges, and other organisations committed to higher education and research in the North, sharing resources, facilities, and expertise to provide post-secondary

education relevant and accessible to students and communities of the North. The network includes more than 120 institutions, and involves students at undergraduate as well as graduate levels, often connected through joint research activities between the participating institutions. Web-based programmes and exchange arrangements, where students from one institution are able to

take part of their education at another institution in another part of the Arctic, provide both insight and experiences within the context of the marked differences that can exist across the Arctic, and thus contribute to the skills and knowledge needed in connection with further development in the Arctic.



tions of local involvement and future perspectives in relation to Arctic sovereignty is also an important question here.

The framework of development is marked by complexity and operates at several levels. It is partially explained by the growing number of stakeholders engaged in Arctic affairs and seeking to pursue their many interests at local, sub-national, national, regional and global scales. Depending on their agenda and jurisdictional capacity these stakeholders employ different approaches in addressing Arctic issues based on unilateral, bi-lateral or multi-lateral policies or a combination of all three seeking to develop international and regional cooperation on Arctic-specific matters, whereas most Arctic stakeholders protect their national interests first.

Despite the apparent desire of the Arctic states to continue to promote their national interests this does not suggest that unilateral action is more successful than bi- or multi-lateral approaches at achieving results. In other words, despite differences in the priorities of the various national policies and the interests of the Arctic states in the region all Arctic stakeholders and others are, to a certain extent interdependent sharing common areas of concern or benefits that may be best delivered by means of multi-lateral cooperation and diplomacy.

Thus, the tendency to share common concerns for the region and the exercise of stewardship and multi-layered collaboration is likely to continue despite the continuing differences in national interests reflected through the various interpretations made of the outcome of the Ilulissat (Greenland) 2008 and Chelsea (Quebec) 2010 meetings. The general trend is that all Arctic states – with or without direct access to the Arctic Ocean – will need to cooperate on matters of vital significance for the region, they all

share responsibility for the Arctic and this can best be realised in the fostering of dialogue, partnerships and collaboration.

In light of the continuous transformations that affect life in the North it is no surprise that seven of the eight Arctic states have recently issued new or revised Arctic strategies/policies, e.g., Norway – 2009 update, Denmark and the Russian Federation – 2008, USA and Iceland – 2009, Canada and Finland in 2010 while Sweden may also do so in the near future. Moreover, each Arctic state is trying to find its own strong voice or special role or niche. For example, Finland is working on generating a greater “think-tank” capacity on Arctic matters, Russia is trying to re-invent its role in the region and to become more pro-active in addressing matters of Arctic collaboration, etc.

Denmark, Sweden and Finland, as EU members, will need to take notice of the EU’s Arctic policy which is currently under development, raising questions also about the roles of Norway and Iceland which have European Economic Area agreements with the EU, although Iceland has now begun accession negotiations with the EU.

In the light of Greenland’s self-governance and its special arrangements with the EU, the role of this Arctic entity may become pivotal in the future particularly if Greenland is to become a new Arctic state.

In this new geopolitical reality several non-Arctic States including China, Japan, S. Korea, and supra-national entities like the EU have also expressed an interest in Arctic politics, policies and developments. The EU has in fact made several statements and commissioned studies to show that despite the lack of geographic proximity except for the 3 EU Arctic States, it has its own place, expertise and role to play



as far as the Arctic region is concerned, something that is mentioned in the EU Arctic strategy statements 2008–2010 and other related reports.

### **Arctic and non-Arctic actors**

This new geopolitical reality suggests that this growing level of interest from non-Arctic actors is likely to continue and that all Arctic states will have to find a balance in addressing matters of cooperation with non-Arctic states; they will also need to find better venues in collaborating with their sub-regional entities, indigenous groups and all “northerners”, and with each other. For instance Russia has been labelled by many observers as an important partner for various initiatives, including energy security matters in Europe. Despite varying opinions on Russia’s ambitions and stance on the Arctic, recently, Russian politicians have reiterated the country’s desire for further international cooperation and peaceful dialogue on Arctic matters. The changes that we are witnessing are taking place at such a rapid speed that policy statements and strategies cannot really be seen as definitive, indeed, they often express only a declaration of intent or interest and cannot really ever fully reflect on changing conditions.

The growing and urgent desire to address various social ills and compensate for the inadequate levels of human-capital in many Arctic communities is a trend that is likely to continue to put pressure on local, sub-regional and national governments. The new partnership arrangement between EU and Greenland (box 42) illustrates that. Despite differences in governance (self-governance) models within the Arctic states which are pre-conditioned by a variety of factors, for instance differing stages of political and constitutional development, colonialism and decolonisation, socio-economic predicaments in place, etc., there are several issues of concern that often form the core of the discourse on governance. These questions include matters of:

Institutional capacity and political development e.g., legitimacy, transparency, liability, efficacy, innovation, workability, quality and the facilitation of the existing and emerging governance structures, challenges with the implementation of contemporary political and legal agreements, etc.;

Northern economic development including formal and informal economies, sustainability and fiscal autonomy related to the infrastructure and fiscal arrangements that define the patterns, structures and the nature of governmental economic policies and financial instruments; issues of resource development and sustainability, jurisdictional capabilities of northerners on fiscal, resource and economic development;

Human capacity, community “wellness” and social stability including the dealing with social ills that affect many northerners; matters of education that are closely connected to the needs of human capacity-building in the North and the filling in gaps in the workforce by northerners; the raising of a new cohort of Northern leaders who will be able to embrace local and Indigenous values and could best represent the interests of their communities in various fora;

Jurisdictional capacity and the legal scope of governance and land-claims arrangements related to matters of legitimacy and the adequacy of existing arrangements for northerners; limitations of existing jurisdictional capability; the resilience and adaptive capacity of Northern governments to meet the challenges posed by environmental change or globalisation; devolution processes and the nature of inter-governmental cooperation, the non-implementation of existing arrangements and the challenge of fiscal dependency on external grants and governmental subsidies; fiscal flexibility and self-reliance – the problem of the reconciliation of autonomous authority with financial dependency on national transfers/government expenditures and sectors.

The challenges faced by northerners clearly transcend the boundaries of the circumpolar region and thus require substantial transnational cooperation. The likely trend here is that the nature of such cooperation is going to be “thickened” by the ongoing evolution of the institutional governance complex that has come into existence over the last two decades for instance the Northern Fo-

rum, the Barents Euro-Arctic Council, the Arctic Council, etc.; it will be further influenced by the advanced position of indigenous peoples in Arctic institutional structures and the stronger international engagement of sub-national entities in dealing with educational, cultural, environmental, health, commerce and other matters that do not breach traditional areas of jurisdiction claimed by

#### BOX 42: NEW PARTNERSHIPS – NEW RESOURCES?



states or international organisations. Box 42 illustrates an example of the new approaches to cooperation that might be valuable in the future.

### **Management from the inside – out**

Currently, despite increasing and often productive cooperation among various Arctic actors and the various

forms of Arctic collaboration outlined in maps 17 and 18: globally via the UN, regionally via the Arctic Council, in European terms through the EU, functionally in the Nordic Council of Ministers, the Inuit Circumpolar Council ICC etc., and sectorally the role of education through, for instance, the University of the Arctic, and the growing number and strength of different regional networks

Access to valuable minerals and raw materials in the Arctic has been underlined time and again as a future asset in connection with the ongoing changes in climate. e Questions over the availability of human resources, however, should be included here in any future debate.

In the summer of 2006 a new partnership agreement between Greenland and the EU was established, replacing a previous arrangement. Using the concept of “Partnership” is a political statement that the parties because of historical, political, economic and cultural ties and relations want to continue thus extending cooperation in a variety of areas.

The previous arrangement was based on rights to access to fish resources. The EU compensated Greenland for this access to the fisheries grounds in Greenland’s waters by transferring a yearly amount of around 50 million Euro without any strings attached. Debate has raged, however, over the extent to which the arrangement was advantageous for Greenland or for the EU. For many years it was a major concern of the fisheries organisation in Greenland that valuable resources were being lost and not properly compensated for.

In a Joint Declaration it is stated that Greenland’s interest in enhanced cooperation, besides fishing, is in the fields of education and employment, mineral resources, energy, tourism, culture and climate research. And that Greenland has a general interest in continued cooperation to ensure a continuation of the financial support from the EU. The EU’s interest in the arrangement is emphasised as being bound up with a desire to contribute to the sustainable development of the Overseas Countries and Territories (OCT). There are also geostrategic considerations here as well as the possibility of enhanced cooperation in research and development on northern maritime routes and Greenland’s exclusive economic zone, fisheries, marine environment, climate change and alternative energy sources.

The Partnership Agreement aims to broaden and strengthen relationships between Greenland and the EU. The agreement provides for cooperation in the economic, financial, investigative, educational and cultural fields. Financial support is obtained by transferring funds that have thus far been distributed to Greenland to pay for fishing rights has

especially been delegated to education becoming another important component in the future development process. Through the Partnership, Greenland gets annually approximately 25 million Euros in budget support earmarked for extraordinary educational efforts. As a yearly obligation Greenland describes what initiatives should be emphasised in relation to educational planning in the coming year and what goals are expected to be achieved.

It is important to note that this is the first time that the Commission has proposed a cooperation agreement with a single OCT, which goes beyond the existing OCT system framework. It may however indicate that these new partnership arrangements will make an important contribution to further cooperation with other Arctic regions in the future.

and regimes, the institutional complex of the Arctic is however still marked by fragmentation and characterised as nascent. This situation is expected to continue as we deal with a growing number of initiatives at the non-governmental, governmental, inter-governmental, sub-national, sub-regional and supra-national levels within and beyond the Arctic that challenge the efficiency of this complex.

Should then the primarily informal structure of many Arctic institutions and their grounding in the “soft-law” approach be modified to more conventional institutional forms? The current web of soft-law declarations and informal actions is often challenged in the meeting of current challenges. The activities of NGOs, for instance the ICC, also point to the efficacy of informal strategies in fostering the rights of indigenous peoples and Arctic diplomacy.

At the same time, existing examples of hard law instruments in relation to the Arctic such as the Agreement on the Conservation of Polar Bears; the UN Convention on the Law of the Sea of 1982 (UNCLOS); the Convention on Biological Diversity, etc., are also beneficial for particular issues of Arctic governance.

It is no accident that the Arctic Council, despite being a “soft”-law issuing body, is currently working on the binding search and rescue agreement. It is expected that the role of this policy-shaping entity may evolve towards being a more substantial and influential body which will eventually become of vital importance for the Arctic and beyond.

One of the most important trends in Arctic governance relates to the ongoing devolution processes in Greenland and Nunavut. Despite some commonalities in relation to the desire for sub-national authorities to assume more responsibilities for their lives through the transfer of essential jurisdictions – e.g., resources, from the centre to sub-national governments, in each Arctic entity devolu-

tion has its own variables dealing with the particularities of local and national, constitutional, economic and political settings. Thus, generalisations on this subject are not particularly helpful.

It is clear, however, that in each area, high hopes are raised in connection with devolution as it is expected to bring about a more prosperous and sustainable future for local peoples. This trend also highlights the changing relationships between former colonisers and the colonised, who by using the methods and strategies of the former colonisers, have advanced to a new level of political identity, maturity and diplomacy and are able to achieve goals by means of constructive negotiation, persuasiveness etc., while putting in place a new vision for their homelands.

A number of political and legal challenges and trends have thus now come to the fore in relation to the need to adopt adequate, science-based, responsible policies. Policy-making decisions regarding the Arctic region cannot be realised in isolation, there is also now a strong emphasis on dialogue and possible partnerships with various Arctic stakeholders.

### **New trends and tendencies**

The Arctic has entered into a new era of transformation regionally, nationally and globally. Thus, the novel tendency in respect of quickly concluding long unresolved legal and political disagreements as soon as possible is set to continue. This is clear from Canada and the USA’s “agreement to disagree” approach to control over the North-West Passage or the need to resolve the maritime boundary issue in the Barents Sea; or from Canada and Denmark’s “agreement to disagree” over the ownership of tiny Hans Island which may potentially become important from a resource or strategic view point.

Multilevel collaboration with regard to the Arctic covers questions of the Law of the Sea, search and rescue ca-

capacities, shipping and navigation, scientific cooperation on data collection relating to claims on the extension of continental shelves by some Arctic states, a holistic approach to the development and management of Arctic fisheries and other marine and terrestrial resources, environmental protection and security matters, cooperation on the assertion of sovereignty and stewardship in the Arctic, cultural, linguistic and educational collaboration, as well as initiatives on dealing with the pros and cons of climate change, etc. As indicated, there are many models of collaboration available, but each form is intertwined with several others. Thus, the continuing tendency will be to provide efficient and multi-dimensional collaboration for the benefit of the whole region and the rest of the globe.

Other tendencies deal with the emerging militarisation of the region and demonstrations of military power by a number of the Arctic states through improved military vessels, new icebreaker fleets and equipment, military activities in the “High North”, enhanced air patrolling, for the assertion of Arctic sovereignty, control and presence in the region. After the end of the Cold War and the opening of the region to multi-lateral cooperation, the recent wave of militarisation is indicative of the fact that despite improved openness, dialogue and partnerships on many issues, including trans-national collaboration on security issues, it is of the utmost significance for Arctic States to foster their military capabilities and have leverage on this matter if required.

The desire to develop advanced military technologies then is a trend that will undoubtedly continue. For a variety of reasons, employment of the principle of demilitarisation which was entrenched in the Antarctic Treaty of 1959 is impossible in the Arctic. It should however be emphasised that this trend towards militarisation is happening within legitimate frameworks under the banner of the protection of national interests and stability in the

region in the light of terrorism and other significant security threats.

Other matters concern questions relating to the necessity for, or the benefits of, binding regional commitments – e.g., an all-Arctic Treaty, Charter or a Constitution, etc. Debates on this issue are not new and they resurface within the academic, political and legal discourse from time to time. Over the past decade or more several statements have been made by various Arctic bodies and the EU on the need for an Arctic Treaty – a legally binding instrument. The possibilities of such a treaty are subject to ongoing policy developments and discourse.

On the one hand, the current web of “soft”-law instruments mainly produced or concluded by various Arctic forums or which can be issued by other actors often prove to be effective in addressing various Arctic-related matters. On the other hand, despite the various pros and cons attached to having an Arctic Treaty, the matter of legally binding arrangements in the Arctic versus soft-law instruments is complex. As noted previously, both approaches are valid and can be beneficial to the resolution of specific Arctic matters.

The opponents of the Arctic Treaty support the development of several legal regimes which will substitute for such a Treaty e.g., Human Rights, Arctic Fisheries, Shipping, Environmental, Marine Scientific Research, Search and Rescue, Minerals, regulations, etc. Consensus also exists among the Arctic Ocean States that existing international law instruments are sufficient e.g., UNCLOS, and there is no further need for such a Treaty. The proponents of such a Treaty argue that it is needed as a form of further stability and enhanced cooperation in the area which is marked by a nascent, ad-hoc institutional complex and gaps in the regulation of certain all-Arctic areas.

The trend will be towards the usage of both soft-law and hard-law approaches in the resolution of Arctic is-



sues. A lot will depend here on the political will of the Arctic states to foster any sort of development.

Potentially emerging or current disagreements among some Arctic states and others over Arctic-specific matters stimulate discourse and attract international attention to the need for a special Arctic legal regime. It remains to be seen whether any kind of a binding all-Arctic agreement will however be feasible.

### **Arctic resources revisited**

The growing global demand for fossil-fuel resources, secured energy supplies and the continuing desire of the oil companies to explore/exploit new fields in northern waters places a renewed focus on the Arctic. Ongoing tensions exist between the need for exploration or exploitation and the conservation or management of resources in the region which require effective governance. Resource development is required to be conducted in the framework of stewardship, a greater emphasis is placed on sustainability and the principle of inter-generational equity as well as the development of various enterprises with long-term economic potential.

Conservation and management strategies are expected to be able to respond to emerging risks as well as possible environmental and safety issues. Increasing national and international maritime and terrestrial resource activities require improved measures to ensure the protection, operation, maintenance, planning, monitoring and preservation of existing resources. They also suggest the need for further inquiry into the adequacy of existing mechanisms e.g., environmental impact assessments, the meeting of technological requirements, impacts on indigenous lands and livelihoods, impacts on wildlife and fauna, the fragile Arctic ecological balance, sharing, etc.

Resource development in the region implies substantial investments of financial, technological and intel-

lectual capital, which is expensive, does not always guarantee quick economic returns and is complicated by risks caused by the severe Arctic climate and testing geographic conditions. Thus, the problem of attracting public and private capital nationally or globally through favourable taxation regimes, less complicated systems of regulatory control, or other incentives remains a challenge for many Arctic nations. The focus on investment in improved technology, alternative sources of energy, efficient energy-saving equipment, safe marine vessels, ice-breakers, or on scientific research or communication and transportation, can deliver enhanced benefits in the long run as opposed to a concentration on short-term profits.

Investment on the human-capacity building of northerners, indigenous peoples, governments and entrepreneurs in the region is crucial for its sustainable future. Options for resource development however vary depending on the type of resources concerned. With respect to fisheries, one suggestion is to employ an eco-system based management approach via a regional agreement on fisheries. The development of an adequate scientific plan for Arctic fisheries could be important, thus addressing the challenges of illegal, unreported, and unregulated fishing and the conduct of sustainable fisheries due to growing concerns for the over-exploitation of fish and marine Arctic resources.

One final question here concerns that of identifying which areas are likely to see resource development expand further in the years to come? It is not however possible to speculate further on such matters, as Arctic resource developments vary significantly across the region. Given the scarcity of some resources on world markets however, aside from the current focus on untapped fossil-fuels and minerals in the Arctic both off-shore and inshore, one strategically important resource in the area is water.

In this regard, questions of ownership, resource benefits, and the legal status of icebergs originating in one Arctic jurisdiction but floating into another may become important; thus raising the issues of the value, protection and usage of fresh ice, snow and water resources within Arctic areas, especially in light of ongoing climatic change, waste management requirements and pollution issues.

Another area of interest concerns biological resources, bio-prospecting and genetic resources as they each present promising possibilities in the development of new sources of energy, new pharmaceutical products, food and other industries. These will undoubtedly become increasingly interesting for various Arctic and non-Arctic stakeholders. Given ongoing climate change some Arctic areas may see a benefit in terms of agricultural and forestry resource developments as well as from the development of aquaculture resources.

Across the region greater emphasis will be placed on alternative sources of energy – e.g., the production of energy from waste which is in great abundance in many Arctic communities. All kinds of tourism related to e.g. climate change, eco-, extreme tourism, spot-hunting, etc., are likely to become more important in relation to matters of environmental protection and economic possibilities. There is no doubt, however, that resource development in the region cannot be tackled without proper measures of sustainable use, management and protection; thus, a holistic, eco-system management approach, the employment of the precautionary principle and of the principle of inter-generational equity are squarely on the current agenda of various environmental agencies and NGOs while also being actively taken into consideration by governments across the region in the exercise of their resource and wildlife management and development policies.



# Perspectives



The complexity and rapidity of the social, economic, legal and geopolitical changes that are taking place in the Arctic region requires substantial international efforts to share stewardship and concern for this ecologically fragile area which retains a vital importance for all residents of the North, the many Arctic and non-Arctic stakeholders and for the globe more generally.

The Arctic, which is richly endowed with resources, fully engaged in new frontier research for scientific and intellectual capital/knowledge and highly diverse is becoming gradually integrated into global developments. This however presents both challenges and opportunities for the potential prosperity of some Arctic communities, creating conflicts over interests between developers and

indigenous peoples and disagreements in relation to the most basic issues of power and control.

These general geopolitical trends indicate that we are dealing with a work in progress and that significant effort will need to be made to ensure stability, peaceful cooperation and the exercise of good governance practices. The Arctic is not just a source of resources, a strategic resource base for geopolitical power or the avenue for new shipping routes, it is the homeland for many peoples and a region of increasing concern at several levels and where this is likely to be the case for many years to come.

Thus, the “new” geopolitical framework can be addressed only in conjunction with other areas that affect various questions of Arctic politics, law, knowledge,



environment, development, and governance. In other words, despite the existing diversity, the development of increasingly integrated and proactive policy approaches and the sharing of common concerns are likely to be highly beneficial in dealing with the region, although for those parts of the North which remain unclaimed first of all the status of High Seas and control over the North Pole or unresolved current legal disagreements shall continue to be the focal point of intensive geopolitical interest.

As mentioned already in the introduction to the book, generalisations are not always plausible as each aspect of the dynamics requires a detailed analysis and may present its own particularities. The impact of unforeseen global processes or unexpected developments therefore

should be taken into consideration. It is nevertheless hoped that this book will be useful for policy-makers from across the region and beyond. The megatrends suggested here are trends that are deemed so powerful that they have the potential to transform society across social categories and at all levels from the individual and local players to global structures. They will change our ways of living and thinking. Hopefully dissemination of the state of knowledge and information on the various processes of transformation connected with policy, governance and physical and economic evolution in the Arctic will also benefit other parts of the globe.



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[www.norden.org](http://www.norden.org)

The current pace of global change has already had a decisive impact on the Arctic. To understand the current and likely future situation in the Arctic it is important to acknowledge the pre-conditions, challenges and tendencies at work here.

Some of these developments should be characterised as megatrends because they overarch and impact on everything else. They are trends deemed so powerful that they have the potential to transform society across social categories and at all levels, from individuals and local-level players to global structures, and eventually to change our ways of living and thinking.



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