



## **Uncertain Futures: The Changing Global Context of the European Arctic**

**Report of a scenario-building workshop in Pajala, Sweden**

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Cover photo: Sign in Pajala town

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Please cite as: Nilsson, Annika E., Carlsen, Henrik and van der Watt, Lize-Marié (2015). Uncertain Futures: The Changing Global Context of the European Arctic, Report of a Scenario-building Workshop in Pajala, Sweden. Working Paper no. 2015-12. Stockholm Environment Institute, Stockholm.

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Uncertain Futures: The Changing Global Context of the European Arctic  
Workshop, 9-10 March 2015, Pajala, Sweden  
Organized by Mistra Arctic Sustainable Development (MASD)

### **ABSTRACT**

What does the future look like from the perspective of a small municipality in northern Sweden? What social and environmental challenges might there be and how might local people respond? This report presents findings from a workshop in which actors from Pajala municipality and the surrounding region in northern Sweden discussed, together with researchers, challenges for long-term planning posed by a rapidly changing and uncertain global context. The workshop piloted a new approach combining bottom-up participation with scenario work generated within the international climate change research community, in order to construct locally and regionally relevant narratives of possible futures. The resulting narratives feature some issues that do not figure prominently in the assessment of global futures, but also show that local development is perceived as closely linked to global processes, such as changes related to climate and demography. The report's purpose is to document the workshop results and offer a description of and reflection on the methods employed as a basis for further development of the approach.

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## ACKNOWLEDGEMENTS

The authors would like to thank all the participants in the Pajala workshop for sharing their insights and taking part in the discussion. We especially thank the representatives for Pajala Municipality, Lena Jatko, Maj-Lis Ejderlöf and Leif Rönnbäck, for welcoming us, along with Thomas Sevä, Muonio Sami community and Tiina Elo, Regional Council of Lapland. The workshop was generously funded by the research programme Mistra Arctic Sustainable Development (MASD).

# 1. INTRODUCTION

## 1.1 Imagining the future

Sustainable development is increasingly ingrained in global, national and local decision-making. Its basic goal is to achieve “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development 1987). Planning for sustainable development thus demands not only understanding the challenges of the present, but also trying to anticipate the challenges of the future.

While future imagining has a long history in the North, interest in it has intensified in recent years (Arbo et al. 2013). Climate change has become an important variable, and we can no longer take for granted the notion that future generations will live in the same physical environment as we do today. In addition, globalization, with its compression of time and space, has accelerated the pace of change and exposed once remote localities, including many in the North, to a wide range of geographically dispersed influences (Heininen and Southcott 2010; Keskitalo and Southcott 2015). Thinking about the future thus involves thinking about a rapidly changing world in which the local and the global are intimately interconnected.

Some of the changes we are likely to see in the next generation or two are fairly predictable, given the current knowledge base and the fact that there is a certain built-in inertia in particular systems. For example, we know with growing certainty that due to the emission of greenhouse gases, global average temperatures will increase (IPCC 2014). We know that the global human population will continue to grow and that the middle class is likely to expand. The demand for food, water and energy will grow, fuelled by changing economic conditions in the developing world.

Various groups of experts have identified a number of current megatrends that will affect the future, both at the global level and for the Arctic region (e.g. Rasmussen 2011; European Environment Agency 2010; Andrew 2014). They also point to the possibility of so-called game changers: unpredictable events that change the course of history.

In a globalized setting, these trends and game changes increasingly interact. For example, a development that starts with a change in the physical environment, such as the decline in Arctic Ocean sea ice, influences the way in which different actors view the Arctic and how they position their political and economic interests in areas that have little to do with the ice as such (Christensen et al. 2013). Sometimes seemingly small changes in ideas, technology or behaviour can interact and alter both the physical and the social characteristics of a region. This complexity makes it difficult to plan for the future, and necessary to be prepared for surprises.

Given this complexity and the consequent inherent uncertainty, how can we plan for sustainable development? One way is to focus more on creating processes for continuous evaluation than trying to predict the impacts of each driver of change at a specific point in time. These processes must take different perspectives into account, partly because we need knowledge on a range of different issues but also for democratic reasons, as envisioning the future is also a step towards influencing, and effecting, change. Moreover, it includes creating processes that serve as platforms for learning to live with change and uncertainty.

Within the scientific community some have identified this as an important feature of a new research agenda – sustainability science – which includes closer interaction between knowledge producers and users (Kates et al. 2001). However, knowledge production and decision making have always interacted, not least in the environmental sciences, and “co-production of knowledge” is an established term describing the relationship between knowledge producers and users (Jasanoff and Wynne 1998; Jasanoff 2004). What is new is the imperative to *design* research in such a way that it

facilitates co-production of knowledge and learning across different communities of practice. Moreover, it requires methods in which uncertainty is managed rather than banished (Funtowicz and Ravetz 1995).

This becomes especially relevant when trying to think about the future in the northern regions. Historically, the future for most parts of the Arctic has been defined by actors from elsewhere, be it policymakers in southern capitals, scientists, transnational companies, or environmental non-governmental organizations (see e.g. Bravo and Sörlin 2002). Policymakers and researchers have only recently recognized local residents as legitimate actors in defining development in the North. An even more recent development is the recognition of local traditional knowledge as legitimate in scientific contexts (Krupnik et al. 2011). However, for the most part, external actors still narrate futures in the Arctic. Moreover, many of these narratives speak about the Arctic as a uniform region, without taking into account the myriad different local contexts.

Given the changing global context and the goal of sustainable development at both the local and global levels, there is thus a need to create spaces for dialogue between local perspectives and the communities of experts that focus on global drivers, which may also affect the Arctic. There is also a need for spaces within which different types of knowledge can interact, whether it is scientific expert knowledge, practical experiences from local and regional government, or insights from practitioners drawn from different sectors of society. It is only in this interaction that it is possible to learn from each other's perspectives; and, hopefully, to gain a more richly textured picture of both the challenges ahead and the ways in which we can face them productively.

One way to create such a platform for social learning is to bring many perspectives together in a workshop format, co-creating narratives of potential futures that can reveal what additional knowledge we need, and what policies have the best chance of being robust regardless of the inevitable uncertainties.

This report presents the results of a workshop that was held in Pajala, Sweden, 9-10 March 2015. It was a pilot study and part of an effort to develop a bottom-up participatory scenario-building process that would be relevant for actors in the Barents region, with initial focus on the northern parts of Sweden, Finland and Norway. The workshop was funded by the research programme Mistra Arctic Sustainable Development (MASD; see [www.mistraarctic.se](http://www.mistraarctic.se)), under work package 3, "The Changing Global Context of the European Arctic".

The workshop also informed the development of a chapter on future narratives in the Barents regional report for the Arctic Council assessment process Adaptation Action for a Changing Arctic (AACA; [www.amap.no/adaptation-actions-for-a-changing-arctic-part-c](http://www.amap.no/adaptation-actions-for-a-changing-arctic-part-c)).

AACA set some boundary conditions for scenario-building processes. One of these is a timeframe of one or two generations (30–50 years). While most policy-related planning processes, such as spatial planning, do not look this far into the future, this timeframe remains relevant and useful for dealing with uncertainty in decision-making. In the workshop, participants were encouraged to think about the world in which their children and grandchildren would live, as well as changes over the past 30 years.

Furthermore, AACA required special attention to the Barents region, where one aim is to help local and regional actors make decisions about the future that are informed by rapid projected social and environmental change.

## 1.2 Scenarios

Scenario approaches are frequently used in decision-making when future developments are highly uncertain but the resulting decisions may have long-term implications (Raskin et al. 2002). They were first used for military purposes (Kahn and Wiener 1967), but in the 1970s they began to be used by

businesses, first by the Royal Dutch Shell group (Wack 1985b), and for global environmental issues in the well-known book *The Limits to Growth* (Meadows et al. 1972). Today, scenario development is used in contexts ranging from political decision-making to business planning, local community management and global environmental understanding (Kok and van Vliet 2011).

Scenario development and other related techniques can be roughly categorized according to the principal questions they seek to answer. *Trend analysis* (or *forecasting*) aims to answer the question What will happen? *Explorative scenarios* address the question What can happen? And *normative scenarios* ask How can we reach our target? (Börjeson et al. 2006).

Within the climate change community scenarios have been used to better understand how emissions of greenhouse gases might develop in the future (e.g. the "SRES report", Nakicenovic et al. 2000), to assess how climate change might impact a locality (e.g. Berkhout et al. 2002), and as a tool for climate adaptation planning (e.g. Kok et al. 2007; Baard et al. 2012; Carlsen et al. 2012).

Our scenario-building methodology was inspired by a new scenario framework that has recently been developed by the climate change community to help the assessment of both possible future emissions of greenhouse gases and the potential for adaptation (O'Neill et al. 2014 and references therein). The new scenario framework combines *representative concentration pathways* (RCPs), focusing on future concentrations of greenhouse gases in the atmosphere (Vuuren et al. 2011), with *shared socioeconomic pathways* (SSPs): storylines of global social and economic development (O'Neill et al. 2015). The SSPs offer visions of future global society and natural systems throughout the 21st century free of assumptions about climate change, climate impacts or new climate policies. Climate policies can be addressed using shared policy assumptions (SPAs), which are a third key determinant of uncertainty (Kriegler et al. 2014).

The SSPs are also relevant for exploring dimensions of future change not directly related to climate, and one purpose of this new approach is to create a better way to link *impact, adaptation and vulnerability* studies to global trends (van Ruijven et al. 2014). A long-term ambition is to give more prominence to lessons learned in local and regional bottom-up studies of adaptation, and to be able to highlight cross-scale dynamics (Rothman et al. 2014).

#### From expert-led processes to participation

To date most climate change scenario work has been carried out by researchers, and been focused on global development. Researchers are also attempting to scale down narratives to the level of the Arctic region (Peters et al. forthcoming). Given the complexity of the issues involved and the need for more inclusive processes for sustainable development, however, it is useful to involve more diverse expertise, including local and regional actors, in building explorative scenarios.

Scenarios can incorporate insights from scientific research, such as trajectories of climate change, but they also involve subjective – and often political – interpretations of how different trends might interact. In the Arctic, political ambitions have long played “a rhetorical role in producing futures” (Avango et al. 2013). This highlights the fact that while scenarios attempt to describe potential futures, they are also reflections of contemporary knowledge, discourses, ambitions, and power relations. Moreover, they can also be used to push through changes intended to bring about a chosen vision of the future, raising questions about who can, or should, be involved in producing them. Most often the perspectives represented in future scenarios have been those of males in mainstream Western society. There is thus a need to reflect on how we “narrate” the environment, and how our stories determine our understanding of adaptation to change. How are risks defined? Who has the authority to join in the change debate? What range of policy options are considered? (Paschen and Ison 2014).



While some scenario-building processes rely on analysing trends in quantitative data and sometimes more advanced modelling based on quantitative data, other approaches focus more on narratives, or storylines, that describe internally coherent development paths. Narrative approaches fit well with other efforts to engage different types of expertise and knowledge traditions, something that is often essential when addressing so-called wicked problems: those that have no simple solution and which include many different definitions of the problems involved (Rittel and Webber 1973). These efforts shift the focus from expert knowledge to deliberation and participation. The idea that people “make sense together” (Healey 1999; Allmendinger and Tewdwr-Jones 2002) is fundamental to social learning, which given today’s complex environmental challenges is in turn an essential aspect of knowledge production and policy (Chapin et al. 2009).

## 2. METHODOLOGY

### 2.1 Combining top-down and bottom-up approaches

There are several good descriptions of how to design a scenario workshop (Mercer 1995). For this workshop we used an experimental process based on the standard procedure of “intuitive logics” (Schwartz 1996; Wack 1985a), but with some slight modifications: whereas intuitive logics is a purely bottom-up process, we combined bottom-up and top-down approaches, with the aim of producing local scenarios embedded in global pathways – so-called extended SSPs.

On the top-down side, we used the new global scenario framework that has been developed within the climate change research community – the global SSPs – as boundary conditions in creating the locally informed future scenario narratives.

The scenarios developed in the workshop were explorative. Explorative scenarios have been described as “... plausible and often simplified descriptions of how the future may develop based on a coherent and internally consistent set of assumptions about key driving forces and relationships” (Ash et al. 2010). They usually explore a range of distinct but plausible development paths: an approach that is especially useful when there is a need to assess the value of proposed actions or decisions under conditions of inherent uncertainty.

Emphasis was placed on making the workshop highly interactive. Interviews and surveys can also be used to explore local people’s perspectives, but the advantage of a workshop is that interaction between the participants encourage the generation of new ideas and insights. Furthermore, a workshop can be a platform for social learning in which the participants re-evaluate their earlier views in ways that can affect their behaviour in the longer term – for example when making decisions in relevant planning processes.

The following account describes the *process* we used in detail, while chapters 3–7 are more concerned with the setting and content. Appendix A reproduces the facilitation manual prepared for the workshop.

### 2.2 Preparations

#### *Selecting participants*

A major issue in the use of participatory methods is who to engage. We designed the workshop with the aim of involving approximately 35 participants who could bring local, regional and sector-specific perspectives, and included both practitioners and researchers. The premise was that a mixed group would facilitate learning across different experiences and expertise.

The participants representing local, regional or sectoral perspectives were recruited via prior contacts in the MASD programme and AACAs, along with web-based searches for names in relevant



organizations, and via recommendations made by initial contacts. The researchers were engaged in the MASD or the AACA.

In the final group, approximately half were researchers and half were local, regional or sectoral stakeholders with some professional responsibility for longer-term thinking. There was a balance between women and men. People in the 30-60 year age bracket were over-represented, with youth and people past retirement missing. This was no surprise, as we had targeted professionally active people.

### ***Pre-workshop participation***

Both the invitations to the workshop and the registration procedure proposed a framing question for the scenario work: What future changes may influence this region economically, environmentally and socially within one to two generations? Prospective participants were asked to tell us whether this question was relevant to them (options were “yes”, “no”, or “with modifications”). This process had two aims: firstly to check that the question was an appropriate one, and secondly to encourage prospective participants to start thinking about the question before coming. As all the answers indicated that the question was relevant, no major changes were made. In a longer engagement process, an alternative would have been to start with an even more open-ended methodology, and use participatory approaches for defining the focus question.

In order to give us a better sense of the group participating, before the workshop, the registration form also prompted participants to outline how future planning was relevant to their specific work. This information was useful mainly for ensuring that the workshop participants represented a breadth of perspectives and to arrange for mixed groups for the discussion.

Another important decision in planning participatory processes and scenario work is the amount and type of information related to the workshop topic the participants should receive in advance. One approach is to start with a completely blank slate. However, in work dealing with impacts, adaptation and vulnerability to climate change it is often beneficial to provide some basic information on possible climate change and, more importantly, prospective climate change impacts in the region or sector (Carlsen et al. 2012). We therefore distributed a popular science fact sheet that summarizes the region-relevant literature on the impacts of climate change (van der Watt 2015).

As the Barents region is experiencing rapid industrial development, in particular mineral resource exploitation and energy infrastructure (offshore, wind), we shared a draft discussion brief about the geopolitics of mineral resources flow with a focus on iron and copper (Jürisoo and Nilsson 2015). The fact sheet and the discussion brief were developed as part of the MASD programme. We also distributed a copy of the global SSPs (O'Neill et al. 2015) in both English (original language) and a Swedish translation.

In addition to this pre-workshop information, we invited some local and regional actors to offer their perspectives on issues they considered relevant for sustainable development and adaptation to climate change in the beginning of the workshop itself.

## **2.3 Workshop structure**

The workshop included the following stages, over one and a half days:

**Information and background:** In the first session, local and regional actors presented some of the challenges they perceive for long-term planning. The purpose was to familiarize outsiders with the local context, and to ensure that local and regional actors' perspectives were given prominence – rather than simply allowing outside “experts” to dominate in framing the issues.

**Identifying and clustering “drivers”:** The building blocks of the SSPs are *drivers* (also sometimes referred to by “variables”, “driving forces” and other terms). The idea was to generate a list of issues that are relevant for answering the focus question.

In a plenary brainstorming activity, participants each proposed the two drivers most relevant to potential economic, environmental and social change in the region within the coming decades. They wrote these on sticky notes and stuck them on a board, giving a short explanation to the group, creating a common working/thinking space. They were asked to put their notes close to others they considered similar. Researchers then proposed further conceptual clustering of the sticky notes, and names for the clusters (e.g. “climate change”, “international security”, “energy demand”). The clustering and names were then refined and finalized with the participants.

**Presentations of insights from research:** The second day of the workshop started with presentations about ongoing research. These included information based on a the fact sheet on climate change impacts in the region, a discussion brief on mineral resource flows, and a review of Russia’s Arctic policies (see Section 4.2 for details). While these presentations were relevant for this particular workshop as part of the MASD programme, in general this step is not necessary. There are indeed potential disadvantages as research-driven perspectives may bias the further discussion. However, such presentations can also be seen as contributing to the co-learning experience of the workshop as a whole, complementing the local presentations given at the beginning.

**Prioritizing clusters of drivers:** In order to prioritize the clusters, participants were asked to vote on the most important clusters and those in which uncertainty was greatest. This was done individually with red and blue sticky “dots” that participants placed on the cluster names. Each individual received a set number of these stickers. They were asked to mark the most important and most uncertain clusters, and could spread their “votes” among the clusters as they wished. Those scoring highly on both parameters were selected as the major topics for the group discussion that followed.

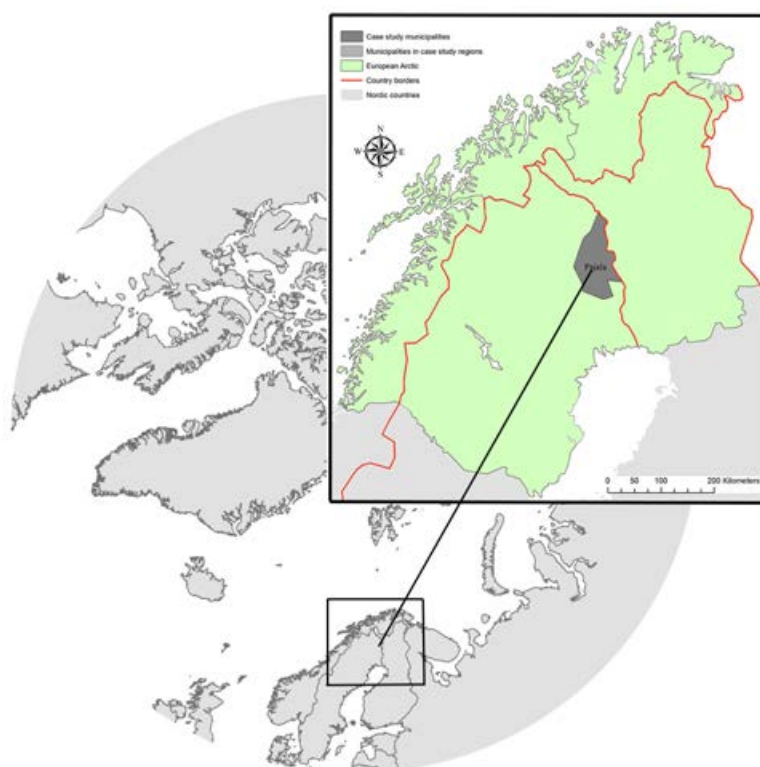
**Creating local narratives for different global scenarios:** In the last session, participants discussed how the prioritized drivers might play out on in Pajala and the surrounding region in order to create extended SSPs. Participants split into four groups, each looking at one of the SSPs offered. Group discussions were facilitated and a rapporteur took detailed notes. In order to retain a free flow of ideas and an open atmosphere we did not make audio recordings of the discussions. The groups reported back in plenary, then very briefly discussed similarities and differences between their findings.

These findings formed the basis of full written narrative, which were drafted by the facilitators and rapporteurs after the workshop. These were researchers from the MASD programme of the AACA process. These drafts were sent to the workshop participants for comment using e-mail and an online survey tool ([www.surveymonkey.com](http://www.surveymonkey.com)).

Participants were asked to give both oral and written evaluations of the workshop. Feedback from the evaluations indicates that the group discussions were seen as both creative and fun. They also generated rich material, which is summarized in tables for each of the global SSPs.

### 3. PAJALA MUNICIPALITY AND THE TORNE VALLEY REGION

The workshop was held in Pajala, a Swedish municipality right at the border to Finland in the Torne Valley. Pajala has featured in recent media coverage as the site of the iron mine in Kaunisvaara, which was operated by the company Northland Resources from 2012 to 2014. The mine raised expectations of new jobs for a community where unemployment, a small tax base and out-migration have been major challenges since the 1960s and 1970s, when many local jobs were lost due to the mechanization of forestry. However, in the autumn of 2014 Northland Resources went bankrupt,



**Figure 1. Pajala is part of the study area in focus for Mistra Arctic Sustainable Development. It is located in northern Sweden.**

partly due to falling prices on the global iron market. By the time of the workshop, all mining activities had come to a halt, and no new owner had been found for the mine.

Pajala has a total of 6300 inhabitants spread over the main town and around 80 smaller villages, in an area of 7.9 km<sup>2</sup>. The Municipality is the largest employer. Other important sectors are tourism, electronics, services and forestry. The Muonio Sami community has winter grazing and calving grounds for reindeer herding within the municipality.

Cultural features specific to Pajala include strong links to Finland and the language Meänkiäli, which is closely related to Finnish. Historically the revivalist religion of Laestadianism has also played an important role. The Municipality's website ([www.pajala.se](http://www.pajala.se)) highlights the attractive natural environment, five free-flowing rivers, a well-developed childcare system, and awards for high quality work in both schools and elderly care.

## 4. PRESENTATIONS: KEY ISSUES FOR PLANNING

### 4.1 Regional and local perspectives

To set the stage for the discussion in the workshop, the first session featured presentations from three local and regional entities on the question: Which issues are most difficult to handle in your regional long-term planning?

The first presentation was given by three officials from Pajala Municipality. A reindeer herder from a Sami community in Pajala offered a different perspective. The third was from an environmental specialist with the Regional Council of Lapland. The presentations are summarized below.

### **Pajala Municipality**

Lena Jatko, then administrative head of the Municipality of Pajala, began by highlighting the Municipality's motto "A good life in a living municipality" (Swedish: *Ett gott liv in en levande kommun*). However, she then moved on to the challenges of administering such a large area with a small municipal staff. Some of Pajala's 80 villages have only one inhabitant. This small, dispersed population creates problems for the economy, and the Municipality finished 2015 with a deficit of 10 million SEK. "We need more people in order to manage the budget."

Since the 1950s Pajala's population has declined from over 15 000 to 6 303 as of January 2015. After a long period of population decline, the start of mining operations led to a slight increase. The birth rate in 2014 was also comparatively high. Overall the population is old, however, and until 2014 the mortality rate was twice as high as the fertility rate.

Unemployment has become a major problem since the closure of the mine. Unemployment is currently 9.3% among young people (18-24). Overall unemployment for the adult population (18-64) is also around 9%, which makes Pajala one of the northern municipalities with the highest unemployment rates in Sweden.

Jatko also emphasized the positive attributes of Pajala, not least the rich leisure opportunities in beautiful natural surroundings, showing slides of Swedish ski champion Charlotte Kalla and a happy child in a woodlands berry patch. "We have five free-flowing rivers in the municipality, with salmon, whitefish and grayling; but we also need jobs, not just leisure activities."

Infrastructure is also problematic, with power interruptions and non-existent web access a frequent occurrence. These are critical issues, not least for businesses operating in the northern parts of the municipality.

Jatko also highlighted the importance of transport infrastructure. While Pajala's airport previously allowed people to make the return trips to or from Stockholm during one day, the airport operator recently declared bankruptcy. Also, road and other infrastructure is important, allowing people to get to and from Pajala. Jatko said she was confident that a new airline operator would soon be in place.

Finally, Jatko discussed the mine. "We saw the upswing we had while it was in operation, with new businesses and people moving in and new housing going up," she noted. People have yet to give up hope but the longer it takes for things to improve, the worse it becomes. Employment is essential, she concluded.

Maj-Lis Ejderlöf from the Pajala social services department, complemented the picture drawn by Jatko. Her department employs about 350 people and is responsible for social support to individuals, families, people with disabilities, and the elderly for the whole of Pajala. Elderly care includes operating four residential homes as well as home-based care for the many elderly people who have stayed in their villages. This entails a lot of driving: in one month alone it amounts to travelling two times round the earth, she said. A major challenge is that the number of elderly people is increasing. By 2033 there will be 200 more people over 80. At the same time many people working within elderly and social care will retire in the coming years. It has also been difficult to recruit young people to the relevant jobs and training course. The social services department "will have jobs to offer, that we can say for sure."

When it comes to reducing the driving (and related vehicle emissions), new means of keeping in contact with elderly people without being actually present using information and communications technology could be important; for example, emergency alert technologies and running rehabilitation programmes at a distance. Another environmental issue the municipality deals with is reducing food waste and finding ways of sorting rubbish for the elderly living in remote locations. Electric cars would be a future option. They exist but do not work so far in Pajala, she stated. Nonetheless they are

potentially important for the future because vehicle transport constitutes such a large part of the municipality's environmental impact, she concluded.

Leif Rönnbäck from the unit responsible for culture and education in Pajala started his presentation by highlighting the many skilled cultural workers in the municipality, including the multilingual Tornedalen theatre (performing in Meankäli, Swedish and Finnish) and a civil society organization that puts together a yearly European Festival of the Night.<sup>1</sup>

From the point of view of municipal responsibility, however, education is in focus, with a vision of safe schools and preschools that keep up with the times. Moreover, he claimed, Pajala's schools hold top positions in national rankings. "Even if we should keep developing in the areas where we don't perform so well, we are also proud when we come out as the winner," he said.

A major challenge in education is the dispersed, small communities and large distances involved, and current efforts are focused on structural changes to the school system to address the smaller number of pupils in the different localities. The political dilemma is whether to close schools and merge them in order to achieve larger units that are economically more efficient. The downside of this, however, is that pupils will have to travel further – up to 60 kilometres – which makes for long school days and increased traffic-related risks. Last year one pupil who travelled 90 kilometres each way cost the Swedish taxpayer half a million kronor in subsidized school transport. In preschools the focus is on pedagogics for the future, including using new technologies.

Language is an issue in Pajala. Currently, 27 different languages are spoken by the pupils within the regional school system. Society is changing, not only from a global perspective but also within the municipalities. In recent years children from refugee families have added to language diversity within Pajala's schools. Pajala had 300 refugees at the time of the workshop but expected to receive more soon afterwards, including many new school and preschool children. This creates new and very positive interactions in our schools, Rönnbäck said.

Locally, politicians have identified knowledge, sustainable development and cultural diversity as priority goals for the schools. In practice this has meant developing programs to strengthen competence about global issues among the staff, including lectures about future perspectives and exchanges with schools in other countries. Visitors from other countries have been impressed by the use of video conferencing equipment for distance teaching, for example for teaching languages, Rönnbäck said.

Rönnbäck concluded his presentation by introducing the audience to his grandchild Elvira. In 2031 she will be 18. She will turn 50 in 2063 and 90 in 2103. "These perspectives are important for us in the schools. This is what it is all about," he concluded.

### **Muonio Sami community**

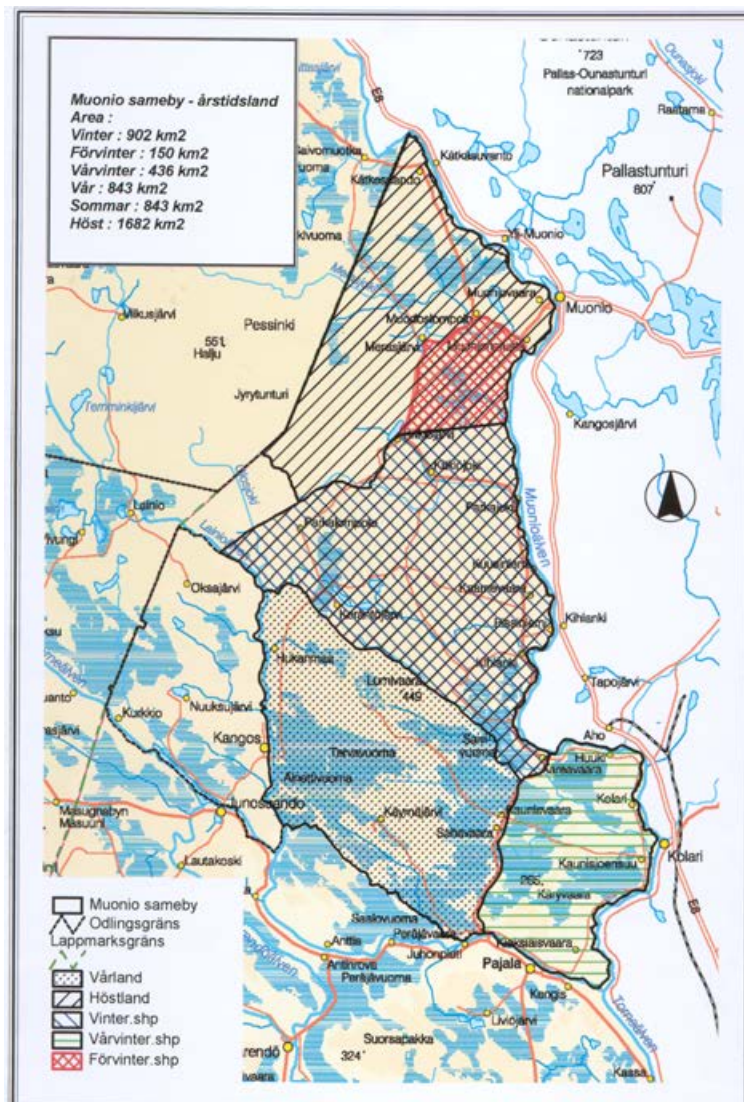
Thomas Sevä, a herder from Muonio Sami community (*siida*, or *sameby* in Swedish) had planned to join the whole workshop, but spring came early in 2015 and his 2500 reindeer started to become restive. Consequently, he had started to gather the herd in preparation for moving them to their summer grazing grounds a month earlier than normal. Nevertheless, Sevä was able to attend the first day of the workshop and present some of his concerns about the future. This was the second year in a row that the gathering, which takes place in Kaunisvaara, near the location of the iron mine, has had to be done early. "I blame it on the bad weather," he said.

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<sup>1</sup> <http://www.nightfestival.se/>.

<sup>2</sup> One of the major issues in focus has been the lowering of the groundwater level in ways that affect a biologically important





**Figure 2. Reindeer herding grounds used by Muonio Sami community**

Source: Muonio Sami community

Sevä inherited the reindeer herding vocation from his grandfather, as is not uncommon in Sami communities. “It’s a second chance if your own children don’t want to become reindeer herders”, he explained. Responsibilities for passing on reindeer herding skills within the family are important, Sevä noted. His own grandchildren now take part in the marking of calves.

Muonio has an extensive historical record, dating back to the 17th century, of activities in the region. Until 1936 people lived in traditional Sami dwellings.

Everyday life for a reindeer herder involves a lot of driving, either by snowmobile or by car. Winter days can be very cold. “That is good weather,” Sevä said. “The way it is now is not good at all and the reindeer start wanting to move to their summer grazing grounds early, due to the greenhouse effect.” Marking of the calves takes place around midsummer, not far from the Kaunisvaara mine. Figure 2 shows the summer, autumn and winter herding grounds for Pajala.

After Sweden became a member of the European Union, the Muonio community started to receive funding, which is used for restoration. This included traditional Sami dwellings built with the bark of birch trees. This knowledge of the community and dwelling structures has since been used for

rebuilding a Sami community on the Kola Peninsula, which was demolished when nickel mining started there.

The Kaunisvaara mine poses a future challenge for this community, whose activities had until recently not been affected by extractive industries. “According to traditional herding methods, all Sami communities need large areas where the reindeer can move about freely to find the food they need at different times of the year. It is possible to keep the reindeer in enclosures and feed them, but that is not the reindeer herding we want,” Sevä argued.

He talked about how the community members had responded to the mine, when exploration started nine years previously. “How do you deal with this as a Sami community?”, said Sevä. “Either you say no, no, no; or you say OK, but do it this way. Muonio Sami community chose the latter path: their response was ‘maybe, but on our conditions’”. The community members initiated a dialogue and invited the company bosses to come and see reindeer herding for themselves, as a way of making sure that their arguments would be seen as credible.

Change, conditions and understanding – *“förändringar, förutsättningar och förståelse”* – are key words in this type of dialogue, but they are also difficult to get companies and authorities to listen to, Sevä noted. “And even then,” he noted, “how will we be able to influence what happens?” Opening a mine today means having an impact on the vegetation on which the reindeer rely, which makes it understandable that many would want to say no. For many Sami communities, this kind of negotiation has become part of daily life. “We want to make it work on condition that we can continue traditional reindeer herding, regardless of whether there is a mine or not”, Sevä said. “Then you need the mining company to understand the demands of reindeer herding, for example the need for peace and quiet during the three weeks in the summer when 3500 reindeer with calves are only a few kilometres away. They accepted that,” he concluded.

“To keep things working in the traditional way we need both the land and traditional yearly planning, but we also need a vision. Our vision has focused on coming to agreements with the forestry industry: How do we carry out reindeer herding within the context of forestry as it is practised today? We also shared a vision of how we were going to work with Northland Mining, but then they went bankrupt and now we have nothing”, he stated. “We are sitting on an imminent environmental disaster in Kaunisvaara that will permanently destroy grazing for reindeer.”<sup>2</sup>

Mining is not the only challenge. Sevä also cited the greenhouse effect, and predators. Together with the Swedish Sami reindeer herders’ organization Svenska Samers Riksförbund, and in opposition to the government, the community works towards a change in the way in which predators are managed. In the past few years they have succeeded in reaching an agreement that a Sami community only has to suffer 10% losses due to predators killing its reindeer before the predators can be killed. “We have a vision of how we want to work given all these circumstances”, Sevä concluded.

### **Regional Council of Lapland**

Tiina Elo, environmental specialist at the Regional Council of Lapland, presented perspectives from the northernmost of Finland’s 19 counties. The regional councils are politically guided joint authorities, principally funded by their member municipalities, and for Lapland this includes 21 municipalities. The regional councils are responsible for regional planning and development, international cooperation and interest promotion.

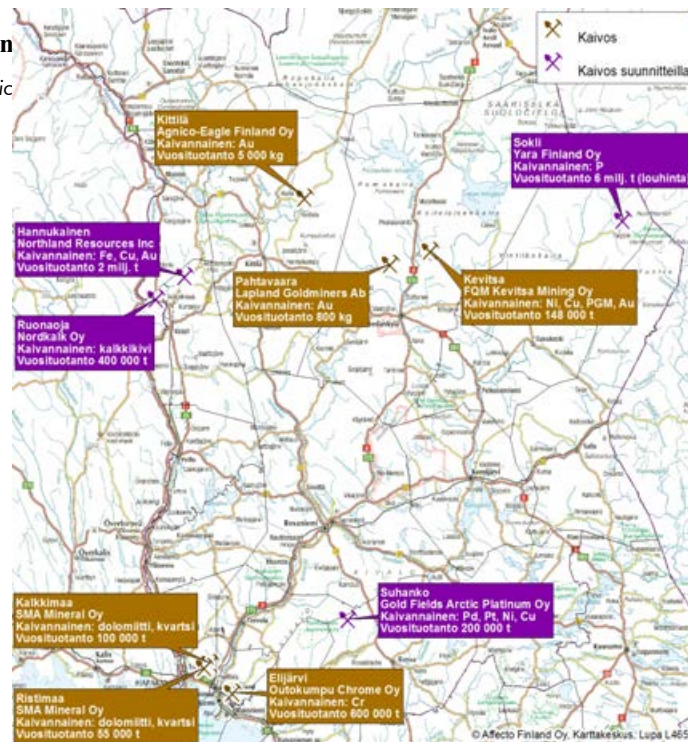
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<sup>2</sup> One of the major issues in focus has been the lowering of the groundwater level in ways that affect a biologically important wetland.



**Figure 3. Operating an**

Source: Centre for Economic



Explaining the Finnish planning system, Elo first highlighted the National Land Use Guidelines. These include general planning of living conditions, natural resource use, communication networks, energy supply, natural and cultural heritage. In addition, there are issues of special interest for northern areas, including Sami peoples' rights to language, culture and livelihoods as well as an imperative to ensure that land-use conditions for reindeer herding are protected. While the national plan provides an overall framework, the regional plans set out local conditions for land use and community structure and also aim to address national, regional and intermunicipal issues of land use. Lapland, covering as it does such large areas, has five subregional plans.

Several land-use issues are especially relevant for Lapland. They include the presence of major tourism centres and the region's important role in energy production, such as hydropower and wind power. The region in fact produces more energy than it uses. Elo mentioned that Finland aims to increase its wind energy generation capacity, and many of its wind power projects are located in Lapland. The mining industry is also important. There are four functioning mines, with additional projects also planned in Lapland (see figure 3).

Reindeer herding covers the whole area of Lapland as well as part of the neighbouring Oulu region. It is one of the most important sources of livelihood in Lapland, requires broad pastures and is affected by all other herding activities, Elo noted. While it is a traditional Sami activity, others also participate in reindeer herding in Finland. Nature protection is also a major issue related to land use and about 30% of Lapland is protected under either the Nature Conservation Act or the Act on the Preservation of Wilderness Reserves.

The various activities require coordination, noted Elo, especially as many livelihood sources and industries are operating in either the same areas or close to each other.

## 4.2 Perspectives from ongoing research

The second day of the workshop included three presentations of ongoing research, with the Mistra project as background to some of the key issues facing the region. Lize-Marie van der Watt of the Arctic Research Centre at Umeå University (Arcum) presented key messages from a review of literature on the impacts of climate change in the Barents region. It is clear that temperatures will rise,

and that precipitation patterns will change. While we often talk about the weather we experience daily, van der Watt concluded that is equally important to talk about the climate, as this will have profound impacts on weather patterns and all activities that depend on them. (See van der Watt 2015).

The second presentation, delivered by Annika Nilsson, Stockholm Environment Institute, looked at global supply and demand for minerals. The global dynamics of the supply and demand of mineral resources are influenced by a combination of geopolitical interests and climate change in different parts of the world. China and its economic development play a key role. Sustainability and geopolitical issues are likely to create conditions for continued boom and bust cycles in the global markets for base metals. It was based on an SEI Discussion Brief (Jürisoo and Nilsson 2015).

The third presentation focused on Russia's Arctic security policy. Ekatarina Klimenko, Stockholm International Peace Research Institute (SIPRI), highlighted increasing Russian interests and activities in the Arctic region, but also noted that the key priority remains maintaining circumpolar political cooperation. (See Klimenko 2015.)

## 5. IDENTIFYING AND PRIORITIZING DRIVERS OF CHANGE

Drivers of change are developments that are likely to have some kind of impact on how the future unfolds in a specific context. The term is often applied to issues and developments external to the particular context, and thus beyond the direct influence of those involved – even if the ways in which a specific driver of change evolves can have both local and global aspects. Global climate change is often listed as a driver of change. There are also numerous socio-economic drivers of change that have been identified in global scenario work, such as economic and technological development and demographic change.

The report *Socio-Economic Drivers of Change in the Arctic* (Andrew 2014) focuses on drivers that are seen as relevant for the Arctic. Most lists of drivers have been generated by different communities of experts, and are often fairly generic in their focus.

The priority given to different drivers would differ by locality, depending on circumstances and current debates. At the Pajala workshop, the purpose of the first brainstorming session was to identify the issues deemed most relevant by people in the area and region.

As described in the methodology section, the participants were asked to consider the workshop focus question – What future changes may influence this region economically, environmentally and socially within one to two generations? – and then identify on sticky notes the two drivers that they considered most important. This generated a total of 80 notes, with some clustering, as participants were asked to put their own notes close to others addressing similar or related drivers. The contents of the complete set of notes is reproduced in Appendix B. A small group of researchers from MASD and AACA then clustered the drivers and proposed names for the clusters, presenting this to the participants for approval.

Following the presentations on ongoing research the next morning, the participants voted on which clusters they considered most important, and which were associated with the highest levels of uncertainty. The results are presented in Table 1.

**Table 1. Ranking of clusters of drivers of future change in the Pajala region**

<b>Cluster</b>	<b>Importance score</b>	<b>Importance ranking</b>	<b>Uncertainty score</b>	<b>Uncertainty ranking</b>
Climate change	19	1	13	5
Power relations national-local	18	2	6	10
International security	15	3	30	1
Ecosystem services	12	4	9	7
Ideology/values	11	5	14	4
Energy markets	11	5	11	6
Demography	10	7	8	8
Raw materials markets	10	7	3	11
Entrepreneurship	9	9	1	14
Transport/infrastructure	9	9	1	14
Climate impacts	7	11	25	2
Knowledge	6	12	7	9
Local job market	5	13	1	14
Economic development	5	13	3	11
Technology development	4	15	17	3
Communication	2	16	0	18
Ecosystems	1	17	1	14
Laws and regulations	1	17	2	13

Some of these clusters are similar to those that appear prominently in the literature on drivers of Arctic change. Climate change is the prime example. However, it is notable that the participants listed the *impacts* of climate change much lower than climate change itself. One possible interpretation is that they made a judgment that it will be relatively easy to adapt to climate change, although the participants ranked the uncertainty regarding impacts very high. It may also be the result of how the clusters were organized and the methodology whereby people who marked climate change high chose to give their other votes on other issues.

Other listed issues that are similar to those in the literature include resource demand (energy and raw material markets), demography and economic development. Less commonly seen in more general listings was the focus on national–local-level power relations. In general lists this may be covered under the broader heading of governance, but the way this was highlighted in the workshop points much more specifically to issues of power and control over one’s own fate. It is also worth noting that the participants did not rank national-local power relations high on the uncertainty scale, which may indicate that it is seen as an important driver for local development that is nonetheless difficult to influence.

Another aspect of governance – laws and regulations – was identified, but came relatively low in the priority list. The different ranking assigned to laws and regulations compared to power relations points to the importance of unpacking broad concepts such as governance in discussing drivers of change.

International security was also seen as important. This view may have been influenced by the current international situation, which features a range of issues that have made international politics, including relations with Russia, tenser than was the case only a few years ago. It may also have been influenced by the presentation about Russia just before the voting. The focus on ideology and values

may also have been influenced by contemporary politics, both internationally and in Sweden, but the cluster is a broad one that would also include issues related to the notion that changes from current trajectories would necessarily involve major changes in worldview.

One important lesson from this listing is that several of the clusters viewed as important by the workshop participants are not quantitative in nature, but rather require analytical tools that are specifically designed to capture their “soft” features. This includes features such as world views/ideologies and entrepreneurship. Such soft features may indeed be what determines the ability of a society to cope with and respond to change (Kofinas et al. 2013).

## 6. FUTURE WORLDS – FUTURE REGIONS: FROM DRIVERS TO NARRATIVES

### 6.1 Contexts: the global SSPs

In order to develop narratives of possible futures, we asked the participants to consider how the identified priority clusters of drivers might play out in four of the global SSPs (from O’Neill et al. 2015). These SSPs can be summarized as:

1. *Sustainability – Taking the Green Road*: This SSP is characterized by more inclusive global development and improved management of global commons, low global population growth and slower economic development, leading to relatively low resource and energy demand. Environmental technologies are favoured. Global, national and regional institutions are strong and flexible, and human well-being has improved.
2. *Fossil-fuelled Development – Taking the Highway*: This SSP is characterized by competitive markets, innovation and participatory societies that produce rapid technological progress and development of human capital as a way to achieve sustainable development. It is a world of intensive fossil fuel development, high energy demand and rapid technological progress, but also characterized by a focus on health, education and institutions to enhance human and social capital.
3. *Inequality – A Road Divided*: This SSP is characterized by increasing inequalities both between and within countries, concentration of power within a small elite, and moderate economic growth in the industrialized world with a large, vulnerable population on the rest of the planet. Technological development is uneven and global markets volatile due to prevailing political uncertainties.
4. *Regional Rivalry – A Rocky Road*: This SSP is characterized by resurgent nationalism, competitiveness and security, along with weak global institutions. Other features are trade barriers, authoritarian governments and highly regulated economies. Economic development is slow but material consumption intensive.

The participants split into four groups, each discussing how the prioritized clusters of issues that had been identified earlier would play out locally and regionally in one of the SSPs, which would thus define the boundaries of local and regional development. Each of the groups had a facilitator, a rapporteur and similar instructions, but discussion dynamics naturally played out differently depending on participants’ preferences and group dynamics. For example, the group considering the Rocky Road SSP reprioritized the clusters based on what would be most relevant from the local perspective. International security was then deemed to be much less relevant than in the initial, joint prioritization, while local-national power relationships were seen as more important. This group also thought that this SSP was very similar to the contemporary world.

Another group (the Green Road) quickly concluded that this future was extremely unlikely, although highly desirable. The group felt that in all probability, such a future would only be possible in the aftermath of catastrophic event that forced a sea change in values. There was also some uncertainty

over what scale to focus on: some talked mainly about local dynamics while other groups looked at the broader picture.

Judging by the evaluations, all the groups appear to have had creative and enjoyable discussions, which naturally cannot be fully captured in this kind of report. The summary in Table 2 has been compiled from the rapporteurs' notes, with some of the key features for each cluster of drivers spelt out for each world.

**Table 2. Summary of suggested local/regional developments in prioritized drivers under the four SSPs**

	<b>Sustainability: Taking the Green Road</b>	<b>Fossil-Fueled Development: Taking the Highway</b>	<b>Inequality: A Road Divided</b>	<b>Regional Rivalry: A Rocky Road</b>
Climate change	Stabilized;	Rapid change; Amplified in Arctic ; Precipitation increase; Shorter snow season; More extreme weather events	Shorter snow season; Warm spells during winter; Freeze-thaw events	Four pronounced seasons
Local-national power relations	Strong nation state; Direct democracy and local level; Regional control over tax distribution	Strong nation state; Lowering of local taxes; Resource extraction relies on national subsidies	Strong nation state; Lack of trust and legitimacy to national government increase cross-national relations in the Barents region and informal power networks; Influential Multinationals; Weak local power and tax base	Strong nation state; Weak local power and tax base, yet major local responsibility
International security	Decreased ethnic and nation-state violence; Stability	Increased risk for resource- related terrorism; Increased civil and military security presence; Continued international cooperation in the Barents region	Lack of legitimate global governance structures; Major regional uncertainty and tension, influenced by global uncertainty; Increased military presence	Weak global and international institutions; Finland as buffer; Military presence financially and socially insignificant; Increase in refugees from international conflicts elsewhere
Ecosystem services	Increased capacity; active forestry to bind remaining excess carbon dioxide	Increased reliance on ecosystem services for tourism, popular but vulnerable winter tourism; Climate change, increased industrialization and pollution impact ecosystems: Decreased availability of clean water as an ecosystem service; Increased use of local ecosystem services for renewable energy	Increased reliance on ecosystem services for tourism, energy and food provisioning; Increased use of (forest) ecosystem services (energy and material, berries, mushrooms) and subsistence economy among low income population	Increased tensions over use of ecosystem services; Resilience of ecosystem services varies widely, relatively resilient in Pajala
Ideology/values	Strong community support values; Green ideology	Strong corporate social responsibility initiatives	Social tensions between low-income local households and incoming, non-settling rich elite; Increased importance of informal social networks	Nationalism the prime mover of ideological change
Energy market	Bio-sourced; Strong emphasis on local renewable resources	Government subsidized wind- and hydro energy	Less affected than municipalities relying in energy production; Torne River does not become exploited for hydropower; Limited wind power development; Forest as energy source (investments in bioenergy);	High prices, controlled by elite; Strong pressure from the centre on the periphery to supply energy

	<b>Sustainability: Taking the Green Road</b>	<b>Fossil-Fueled Development: Taking the Highway</b>	<b>Inequality: A Road Divided</b>	<b>Regional Rivalry: A Rocky Road</b>
			Warmer climate reduces energy demand for heating; Technologies available to richer people lessen energy demand; Mining industry energy demand may limit household access to energy	
Material market	Circular economy; Strong emphasis on recycling	Increased mining and industry as demand for raw materials from the Arctic; Increased food prices; Northern produce a lifestyle choice	Social unrest elsewhere advantageous for material production and resource extraction; Exacerbated boom and bust cycles a liability; Maritime transport possibilities increased	Strong international competition; Market for raw materials from Pajala grows
Demography	Population increase in Pajala; Decreased pace of urbanization; Global population decrease; Aging population, low mortality	Increased immigration of workers and higher educated people; Decreased elderly and Sami (indigenous) population ratio; Reliance on imported labour	Tension between locals and newcomers; Tension between genders; Female out-migration; Older population challenge welfare services and gender balance; Influx of refugees	Influx of refugees and other immigrants; Outmigration of educated Swedish-born females; Female population increasingly consists of immigrants
Technology	Sophisticated; Pervasive; Recyclable	Geo-engineering; Improved transport and communication technology	New energy technologies; Technologies for dealing with increasing runoff and storm risks	Uneven availability; Technological investment focused in urban areas
Climate impacts	Negligible	Large, but adaptation where possible through technological fixes. Impacts large on ecosystems. Highly uncertain at local level; If snow-season and hydrology changes in the region are limited, impacts on agriculture, tourism, hydrology and biodiversity would be limited	Climate refugees; Challenges to traditional reindeer herding activities; Milder climate changes conditions for the forestry sector; Trees grow faster ; Logistics of forestry more complicated due to short period of frozen ground; Increasing risks of forest fires and insect outbreaks	Milder weather created better conditions for agriculture; Agricultural market affected by adverse climate change impact elsewhere

## 7. FOUR NARRATIVES OF THE FUTURE

The facilitator or rapporteur for each group discussion was asked to write a short narrative about the future. While based on the group discussions, the narratives were also informed by other inputs received during the workshop, including presentations from local and regional actors, and researchers. The narratives' starting point was always the prioritized clusters of drivers.

These narratives, which are presented below, should not be taken as predictions, but rather as inspiration for thinking about uncertainties and trends in long-term planning.

### 7.1 Sustainability: Taking the Green Road

*Global context in short: Key phrases for the green road world include; more inclusive development and improved management of the global commons, low global population growth and slower economic development, leading to relatively low resource and energy demand. Environmental technologies are favoured. Global, national and regional institutions are strong and flexible, and human well-being is improved.*

The world shifted gradually, but comprehensively toward a more sustainable path, emphasizing inclusive development that heeds perceived environmental boundaries. A few radical upheavals triggered by extreme weather events negatively affected both elites and the general population. Mounting evidence of the social and cultural costs of environmental degradation and inequality contributed to an ideological shift towards green values. This was reinforced by a change in political regime towards a stronger focus on the role of the nation-state in enforcing green policy goals, both through incentives, such as tax breaks or capital support, and by criminalizing environmentally damaging activities. Regional and local decision-making powers are also strengthened and at the local level there are more opportunities for direct democracy.

Municipalities such as Pajala have a stronger hand in the political redistribution of income from natural resources. There is a strong movement towards circular economies, and the recycling of materials as opposed to the extraction of non-renewable raw materials. The focus shifted to renewable energy, including biofuels. Whilst still affected by climate change – given the relatively recent peak in greenhouse gas emissions – the Arctic warms only by 2°C before warming stabilizes.

In Pajala, forestry has become the major primary industry, both as energy resource (bio-production) but also to bind the excessive CO<sub>2</sub> that remains in the atmosphere from a period of high emissions. *Growing* forests are needed to bind CO<sub>2</sub>, hence forestry is also an economic rather than purely conservation activity. In addition, through careful management the ecosystem capacity of the local environment improved, bolstered by an increase in biodiversity. Other energy needs are fulfilled by small-scale local biogas, wind and hydropower plants. Current multilateral energy agreements are improved and energy markets are based on bio-geographical regions, rather than political borders.

Several pockets of society chose low salary, high self-sufficiency livelihoods, favouring rural areas. They focus on local produce or ethically sourced imports, especially food. Social and environmental sustainability are understood to be interdependent. The rate of urbanization slows down in all of northern Fennoscandia, in terms of both reduced out-migration from smaller municipalities and communities, but also more in-migration by people who seek a more rural lifestyle. Moreover, information and transportation technology with a low impact on the environment develop in tandem with education and employment opportunities in rural areas.

As a result, the population in Pajala grows. People tend to self-identify with a specific geographic locality or lifestyle, rather than ethnicity or nationality. Urbanites visit rural areas more regularly, and many choosing to resettle, a decision facilitated by improved communication and transportation infrastructure and technology.

Knowledge is a premium resource, and the basis of the green economy. Major investments in technology create the need for a labour force educated in science, technology, engineering and mathematics. The focus is also on the arts in order to better understand the vagaries of humanity. Education levels in rural areas are high, as previously labour-intensive industries such as mining and agriculture become more reliant on technology – and need professionals who can design and operate the technology needed. Knowledge also focuses on local conditions and needs specific for Pajala municipality.

A select few productive mines remain in operation, largely to supply materials for hardware, while improvements are sought in recycling technologies. It is likely that health is generally good and mortality low, which means an ageing population. Life expectancy has increased but old people are also healthier, so the caretaking burden of society remains unchanged. It is not impossible that the human population size is controlled through artificial means in order to fulfil the conditions of the green economy.



## 7.2 Fossil-fuelled Development: The Highway

*Global context in short: Key words for the global scenarios are competitive markets, innovation and participatory societies to produce rapid technological progress and development of human capital as a way to achieve sustainable development. It is a world of intensive fossil fuel development, high-energy demand and rapid technological progress, but also with a focus on health, education, and institutions as means to enhance human and social capital*

In an intensive fossil fuel world climate change is increasingly rapid, with larger changes in the Arctic than the global average. Temperatures and precipitation increase, the snow season is shorter and there are more instances of extreme weather, including icing events and storms. While the growing season is longer, increased frost and freeze-thaw events create risks for agriculture. Melt water and rainfall create challenges related to run-off and flood risks, especially in towns and cities. Some of the weather-related challenges are alleviated, however, by technology and local investments in greenhouses along with increased drainage of fields and towns. Technology is not able to solve all challenges related to the impacts of climate change, and impacts at the ecosystem scale are especially problematic.

The great global, national and local demand for resources and energy increases Arctic resource extraction and development. Some of the national investments and infrastructure developments focus on the coasts, but there are also increased investments in mines in the inland region, creating jobs and providing iron, copper and minerals to the global market. Factories for refining metals and minerals are positioned closer to the resources and take advantage of cheap renewable energy (wind- and hydropower), where savings on transport and energy costs makes these industries very competitive on the global market. Likewise, locally available renewable energy keeps energy for greenhouses relatively cheap, making production competitive at a national level. Food prices do increase, however, which means that buying produce from the North is mainly a lifestyle choice.

The increased focus on resource extraction and on wind- and hydro energy is supported by national government through lowering local taxes, which stimulates more people to move to the North. The migration of workers and higher educated people to the region changes the demography and living conditions. Local healthcare and education options grow along with an increase in jobs and services supporting growing economic activity and population. Some people also make a lifestyle choice to move from the cities to the countryside in the north, to a quieter and healthier environment with attractive natural surroundings.

In the countryside daily life is facilitated by new communication technologies that allow children and professionals to follow courses and education via the internet, without having to leave home or the town. The elderly, on the other hand, use increased mobility to move south seasonally, away from the increasingly snow-free and dark early winter. Increased industrialization and changes in nature have affected their identification with the region.

Traditional activities such as reindeer herding have to adapt. Icing events make traditional pasture-based reindeer herding difficult and there is a need for additional fodder. Even though increased local conflicts due to industrial activities in pastures may eventually be resolved, resource extraction has priority, and increased pollution creates health risks for animals and people. New generations of Sami seek different types of education and new lifestyles, and as a result reindeer herding as a livelihood declines in the region.

Tourism increases, as people increasingly look north for winter tourism when Central Europe sees less snow. This sector is, however, vulnerable: while snow *gradually* moves up the mountains in the Alps, most of the Swedish North is flat and in increasingly warm and shorter winters the snow will disappear more suddenly over the whole region.

Increased industrialization also brings increased pollution, taking its toll in the form of decreased availability of clean water as an ecosystem service. Combined with new diseases moving to higher latitudes, new health concerns arise, even if a strong national focus on health keeps impacts in check. Changes in demography and population may also lead to a reorientation in how people value the ecosystem services that have been traditionally important in the region. Berry picking, hunting, hiking, fishing and skiing nonetheless remain popular activities.

The ever-increasing need for resources and energy favours technology sharing across national borders, and continued international cooperation in the Barents region. As greater resource development is accompanied with risks related to terrorism, both the civil and military security presence increases in the North. Moreover, infrastructure and service is developed mainly in the coastal areas. Scandinavia's high costs and standard of living continue to create difficulties when companies have to compete on global energy and resource markets but demand is high, and national government takes a strong role in maintaining the welfare state and subsidizes resource extraction and energy production in the North.

In addition, companies take corporate social responsibility seriously and invest part of their revenues in local development, jobs, infrastructure and environmental and health protection issues. Increased demand for a skilled workforce in the extractive industries makes for a heavy reliance on imported labour from outside the region, however, and local gains are mostly in spin-off activities in the service industries.

Major uncertainties in this scenario relate to the interplay between technological change and mitigation of climate change. While a strong belief in and use of technology for geo-engineering may limit global climate change in the long run, it has more uncertain relevance for local impacts. If snow-season and hydrology changes in the region prove to be less dramatic than anticipated, accordingly the climate-change related consequences for agriculture, tourism, hydrology, and biodiversity would be less pronounced than otherwise expected. The societal drivers and their consequences remain, however, and will have their greatest impact over the next two generations, with a high demand for resources and energy, and a strong focus on education, development and changes in demography.

### **7.3 Inequality – A Road Divided**

*Global context in short: Key issues in this global scenario are; increasing inequalities both across and within countries, power concentration within a small elite, and moderate economic growth in the industrialized world with a large vulnerable population in the rest. Technology development is uneven and global markets volatile due to political uncertainties.*

In a divided world, global demographics combined with climate change and conflicts directly influence Pajala and similar places in northern Fennoscandia, as increasing numbers of people flee from conflict areas and hostile climate situations where they lack basic human security such as food, water and shelter. While initially challenging locally, in relation to finding housing and jobs and requiring resources for integration efforts, the new arrivals also bring diversity and new energy to the municipality, and become important as workers in the health care and social services sectors.

A major challenge is that municipalities have limited support from the national level, and have to solve most problems on their own as a consequence. A major uncertainty is how new inhabitants are perceived by those with older roots in the region, with an attendant risk of social tensions but also of opportunities for new cross-cultural creativity. An increase in average age in the population is expected, which combined with an uncertain municipal tax base may put social care for elderly people at risk, as their welfare may come to depend upon their relatives and friends. A society where welfare services are cut might also directly influence gender balance in society in general and the labour market in particular.

There are also more wealthy immigrants – from the global elite – who are looking for the quality of life offered by closeness to nature and less crowded living conditions, as well as tourists seeking wilderness experiences. Fishing tourism becomes a signature activity along with “midnight sun” and “aurora borealis” tourism. The region also attracts ski tourists in search of nature experiences and exotically peaceful surroundings. Cultural heritage becomes an aspect of tourism, as does advanced scientific research into northern ecosystems and their cultures. Tourists and wealthy immigrants bring money that supports local businesses and a new growing service economy. A good communication infrastructure along with skills and traits related to entrepreneurship become increasingly important.

The mine in Pajala re-opens as a new owner takes over the operations. The relative social stability of the region gives it a comparative advantage over mines in parts of the world where unrest affects production. New maritime transport possibilities are another plus in the equation, especially in relation to Asian markets. The long-term profitability of the mine is a constant concern, however, due to limited global demand for iron and low world market prices along with exacerbated boom and bust cycles caused by the geopolitically driven decisions of large nation states. The local municipality has little influence on decisions related to mining, as these are taken by national and international elites in companies and governments with no particular local loyalty. Moreover, the lack of legitimate global governance structures makes the elite accountable to no one, and many decisions are influenced by corruption.

Pajala and its surroundings are not as affected by the changing global energy market as municipalities that rely heavily on energy production for their tax base and jobs. Relatively low demand has ensured that Torne River does not become exploited for hydropower. There is some wind power and biofuel development but competition for land (area conflict, e.g. with reindeer pastures) limits expansion, as forest areas increase in economic importance not only for energy provision but also as a renewable resource for various types of material. Local energy prices increase and the forest (once again) also becomes an important local source of energy, especially for people with limited income. As a counterweight to higher energy prices, the warmer climate decreases heating costs. For people with money to invest, new technologies also make it possible to build houses that require much less energy than today. In situations of limited energy supply, mining companies are expected to win the “energy battle”.

Climate change becomes increasingly apparent, with increasing temperatures and a shorter snow season. Warm spells during the winter and freeze-thaw events become more common, creating major challenges for traditional reindeer herding activities. Predators remain a major issue for reindeer herders, but in general they are more accepted as part of the ecosystem. However, reindeer herders’ voices in the matter weigh light compared to those of elites far away from herding areas. In response the Sami community diversifies its economic base and becomes increasingly involved in tourism aimed at an elite looking for “exotic” experiences. The milder climate changes conditions for the forestry sector. Trees grow faster but the logistics of forestry become more complicated when the period that the ground is frozen shortens. Increasing risks of forest fires and insect outbreaks also create economic uncertainties.

Small-scale agriculture increases, aimed mainly at subsistence and the local market. Smart greenhouses with new energy technologies add new diversity to the sector. Some high-profile food products are produced for the international market, where a “wilderness label” and access to clean, cheap water creates a comparative advantage for products from Fennoscandia. In addition, people with low income may exploit provisioning ecosystem services (berries, mushrooms, game, fish) to a greater extent, revitalizing cultures and practices of subsistence economies. In addition, snow scarcity in the south may increase the region’s attractiveness, leading to increased investments in winter sports and tourism. Technologies for dealing with increasing runoff and storm risks are available. The challenge is funding, as responsibilities for investments are lodged at the local level. Even if the

population has stabilized the local tax base is weak, partly because much of the land, the forest included, is owned by people living outside the region.

Social tensions increase between a large group of low-income households that either have old roots in the region or which arrived as refugees, and a rich elite intent purely on enjoying the region, or using it for new business ventures. This group has money and power but no natural loyalty towards any specific locality, leading to different municipalities competing for their investments. Service jobs become increasingly important for lower-income households, and young people who want to get an education continue to move away from small municipalities. For those who cling to traditional gender roles, the changing character of the job market combined with the lack of jobs regarded as suitable for men creates increasing intra-gender tensions, which in turn exacerbates earlier patterns of outward female migration. For those who challenge traditional gender roles, however, the new service sector linked to tourism creates opportunities, and may also lead to shifts in the values guiding local decision-making.

The focus on elite priorities also creates tensions between governments and people, with a resulting loss of trust in formal forms of collective decision-making. Instead people rely more on informal social networks for all aspects of life, including an increasing role for the family in the care of the elderly. The lack of trust and legitimacy becomes especially prominent in relation to the national government. Entrepreneurs who ignore political boundaries, however, are able to take advantage of the weakened centre-periphery connection and serve as brokers for a wave of collaboration within the Barents region. At the same time, trust in national government may increase in the event of external threats to national interests and sovereignty.

A major uncertainty is the regional security situation. Mines, oil and gas fields, as well as potential new marine transport routes make the region strategically important, and there is a risk that conflicts caused by increasing ideological tensions elsewhere in the world will spill over into northern Fennoscandia. Security concerns also hamper cross-border cooperation in the Torne valley. From time to time there is also an increased local military presence, which disturbs the tourism industry.

#### **7.4 Regional Rivalry: A Rocky Road**

*Global context in short: Key words for this global scenario are: resurgent nationalism, competitiveness, and security, along with weak global institutions. Other features are trade barriers, authoritarian governments and highly regulated economies. Economic development is sluggish, but material consumption is intensive.*

In a global scenario characterized by increasing competition, weakening structures for international cooperation and cosmopolitan values, belonging to a particular pocket of relative wealth or poverty is crucial to quality of life, and outcomes linked to political and economic structures are beyond local control. For Pajala and comparable places there are many similarities to what their world looked like in 2015. Local communities in northern Sweden continue to be dependent on national and regional institutions for their relative success in sustaining livelihoods. In addition, resurgent nationalism, concerns about competitiveness and security, as well as regional conflicts disconnect the national and international spheres even further politically from local development issues.

From the local perspective, the relative importance of various drivers shifts in a “Rocky Road” scenario, and the centre-periphery balance of power within Swedish decision-making systems plays a central role in shaping development. Drivers related to the impacts of climate change, demography and ecosystem services are also important. Owing to the relative isolation of Pajala and its surroundings in this world, global development related to ideology, technology, energy, material markets and international security are less important for local development.

International security is perhaps the most relevant driver of change globally, with increasing inequality, armed conflict and mass migration rocking the foundations of the state and international systems; however, community life and decision making in Pajala continue to exist far from such global changes. There is no clear pocket of relative deprivation in the near vicinity of Pajala. Regional affinity with neighbouring areas in Finland is particularly strong, while Russia continues to be perceived as a country both foreign, far away and with limited influence on Pajala – short of the risk of actual war in the northern regions of Finland and/or Sweden.

Nationalism as the prime mover of ideological change in the “Rocky Road” scenario is likely to affect both technical innovation and market flows. The authority and political primacy of the nation-state is thus reinforced, to the detriment of global and international efforts and concerted measures. For Pajala, the ideological shift exacerbates some political and economic tendencies that are already visible. The central state continues to withdraw from a variety of public sector areas, gradually pushing the responsibility for welfare state functions over to municipalities.

Increasing international security concerns at the national level consume ever increasing public resources, and the process creates a financial downward spiral for the municipalities. As a result, local entrepreneurs do their utmost to achieve separate and unusual solutions to local public problems, but the state continues to address all cases on the basis of constitutional principles – that is, municipal self-government – thus forcing local government to rely on the local tax base to fund activities, with austerity measures an inevitable consequence.

In the “Rocky Road” scenario, culture in the Torne Valley region also comes under pressure. Ideological and world changes breathe new life into traditional gender roles and men electing to stay in the region generally foster a hardened outlook on life and other human beings. Many women who do not accept traditional gender roles choose to leave, and the female population is increasingly made up of immigrants, who also play a central role in public service employment.

Pajala continues to promote immigration actively. Two major factors contribute to this municipal interest. The first is related to unforeseen developments in other parts of the world that have increased the iron mine’s strategic significance. The state-owned company LKAB takes over and subsidizes iron ore production to the point of achieving economic break-even. Although mining activity is subject to periodical ups and downs, there are beneficial financial and labour-market effects for Pajala. Some mining jobs have been opened up to immigrants but, more importantly, there has been a positive overall effect on the service economy of the area, and in particular the immigrant population has adapted well to the increase in small-scale, occasionally grey-area economic activities that comes in the wake of this development.

The other major factor of change is climate. The area is much warmer, still with four pronounced seasons, but with new opportunities for spring-summer-and-fall agricultural activity in which local entrepreneurs have discovered new types of produce for the local, regional, and national markets. Opportunities for global marketing are explored, since warming in other parts of the world has adverse effects, in some places destroying what used to be arable land. Importantly, for people with immigrant backgrounds a historically defined tradition of transnational cultural expression and local multiculturalism supports their smooth transition into society. They are generally able to sustain themselves in the local economy.

Several problems, however, put pressure on planners and strategists in Pajala. For all the benefits reaped from the opening of the mine and the warmer climate, there are still the more austere national policies to work with. Pajala, like other areas in northern Sweden and Finland, is a popular place for refugees. This trend is further strengthened by the severity of climate change in other parts of the world, and the population pressure from refugees is high. Pajala still sees an opportunity in immigration, but must fight hard to alleviate its negative effects. For all the successful immigrants in

the local economy, there are still asylum seekers waiting to properly enter the labour market creating tensions.

The Swedish state has also continued to withdraw from this area—not relinquishing its right to direct flows of immigrants to different parts of the country, but significantly reducing remuneration and other forms of direct financial support for municipalities. As the warmer physical climate develops in parallel with a colder social and political climate in Sweden, Pajala municipality has major concerns about increasing risks related to social tension and crime that may come in its wake. As public monies for refugees dry up, the multiculturalism of Pajala comes under serious pressure.

Mining and natural resources remain a significant national interest in the area. Finland remains as a physical barrier to the instability of the northern regions of Russia, however, and the military presence in Pajala remains financially and socially insignificant. Although neighbouring areas in Finland and Norway experience some concrete effects of militarization in the Arctic, Pajala remains on what, even in the new, tougher security-political landscape of Northern Europe, might be regarded as a border between two friendly nation-states.

## 8. EVALUATION

Twenty of the workshop participants filled out evaluation forms directly after the event. Evaluation forms were also sent out to catch people who had already left, but this did not yield additional responses. Of the respondents, 11 identified themselves as “Researcher”, 7 as “Practitioner” and two as “Other”.

Twelve respondents said that the workshop had influenced their thinking about the future. Practitioners reported that the workshop had “increased knowledge about consequences of climate change and the security situation” and that it gave “broader perspective that things hang together”. Researchers highlighted “a wider variety of drivers of change and possible futures” and that the workshop had led to “thinking more about the future and what it might entail” and that it had “. . . opened up more extensive perspectives . . . I have realized that it is probably possible to achieve greater change than I thought.”

Fourteen respondents (five practitioners and the rest researchers) said they thought the workshop would influence their work, with the rest replying “Don’t know”. Researchers’ comments included: “I will try to learn from organizing and involving stakeholders” and “I have now new themes and priorities to add to my research agenda, and it has been confirmed that working with stakeholders is good.” Some practitioners said the workshop had given them ideas about how to organize workshops. Another respondent said the workshop had inspired them to “hopefully reflect on the surrounding world in a broader perspective”.

Generally, the interactive sessions and group discussions were valued most highly by respondents, as were the presentations from local and regional actors. Evaluations of the researchers’ presentations were more mixed, with some respondents complaining that they only repeated information that was already available.

Respondents said the method of using global scenarios to set the context for the group discussion was challenging. One researcher remarked: “It was very hard to adjust my own thinking to the limits of the given scenarios.” Another researcher said the four global scenarios took attention away from valuable local input. Practitioners’ comments were along the same lines. Another remark was that more time should have been devoted to comparison of the different worlds, rather than group discussions.

A general comment was that more local participation would have been valuable. However, the reality is that most local and regional actors are too busy to commit long periods to such activities. In addition, identifying the relevant actors and motivating them to participate also requires a lot of time

and effort from the workshop organizers. Location also plays in: holding the workshop in Pajala most probably facilitated the engagement of some of the local actors: but it may also have made it less feasible for others to attend. Ideally, an event such as this should be a joint venture with a local organizer.

The value of greater local participation can also be looked at from another angle. Researchers in a workshop might learn more by hearing from local and regional actors, but other local and regional participants might not. In future workshops we can experiment with different participant make-ups, locations and formats.

Participation also requires more preparatory work. Perhaps such a workshop should be planned in detail jointly with local actors, so that we can identify whether there is indeed a demand for exercises focusing on future scenarios.

There is also a need for dedicated follow-up. The organizers felt the workshop ended abruptly, leaving a sense of unfinished work. In particular, the actual narratives were only developed after the workshop by a small group, based on input provided during the event. Although the drafts were sent out to the participants for comment, there were no responses. We need to think further about follow-up activities: Would a differently designed process have encouraged more long-term engagement or is time-limited engagement inevitable given that people have many more pressing issues to handle in their jobs? How does one achieve a good balance between longer-term engagement from a few dedicated people and reaching a larger group of people?

## 9. DISCUSSION

The narratives that came out of the workshop reveal how local developments are connected to the surrounding world – but also how local developments in the European North are tied up in truly local and regional processes. This shows that, regardless of what happens at the global level, local context plays a critical role in people's assessments of how the future might unfold. Important global processes are linked to climate change and the impacts of resource demand on local job opportunities, in this case especially related to mining.

The narratives also highlight how local demographics both intersect with global migration patterns caused by conflicts, resource scarcity, or climate change. Refugees who resettle in the North may substantially change the recent trend towards depopulation.

The narratives are generally optimistic, despite identifying some major challenges. Moreover, all of the narratives show that “soft” capacities – such as entrepreneurship and cultural values favouring diversity – are necessary for the more optimistic future scenarios to play out. Nature plays a prominent role in the narratives as a supplier of ecosystem services such as energy, raw materials, food, aesthetic values and leisure.

From the narratives it is clear that locals are aware of the potential impacts of climate change. Part of this may have come from the presentations in the workshop, but most probably it also reflects a broadly increased public understanding of climate change adaptation in the Nordic countries as compared to even a few years ago (Nilsson, Gerger Swartling, et al. 2012).

Even narratives produced by groups that did not include municipality representatives integrate some of the issues presented by them at the start of the workshop, such as the local economy and tax base, as well as local and national-level communications and power relations. The intention of having presentations by local actors at the start was to avoid the subsequent discussions being too strongly influenced, and limited, by outside “expert” opinions. The prominence of municipal concerns in all the narratives, however, along with attention to issues raised in some of the presentations by



researchers, highlights the influence that any presenter in a workshop inevitably has. This is something to keep in mind in designing future workshops.

The narratives also show how current debate and events how we think about the future – for example, the opening and then closure of the Pajala mine, and the recent arrival of asylum seekers in Pajala. Questions around the mine and future asylum seekers would probably not have featured in narratives drawn up in Pajala a decade ago.

In this workshop we piloted a methodology linking global climate scenarios with a participatory, narrative-focused approach. We will use the same methodology in other locations for the Arctic Council project Adaptation Action for a Changing Arctic. This will generate different local narratives as well as further insights and feedback that will in turn help to improve the methodology.

It is already clear from the Pajala workshop that we need to provide a clearer explanation of the methodology as well as the role of the global narratives. Another lesson is that drafting the narratives after the workshop risks compromising their authenticity as the perspectives of local and regional actors. Even though the narratives were based on rich discussions in the workshop, they were still researchers' interpretations; as we received no feedback from the participants about the draft narratives, we cannot be entirely sure that they truly chime with local and regional perceptions of potential futures.

The methodology requires substantial commitments of time from the researchers, to identify and motivate relevant participants, and from the participants, especially for any follow-up activities.

Nevertheless, it was clear that the scenario workshop format was appreciated by both researchers and by the local and regional actors. Moreover, based on the results of this and subsequent workshops, it is also clear that methodology has the potential to bring out a more nuanced picture of future challenges than do generic lists of drivers of change.

In order to improve the analysis of dynamics in a specific locality, one important step would be to conduct similar workshops with more diverse groups of people; it would be especially relevant to involve youth. Other potential improvements are more methodological. For example, some of the factors that were identified as relevant for future challenges – especially demographic trends – could be further studied using quantitative methods.

Work is being done to develop integrated assessment models for the global scenarios. While this may be more challenging at the local level due to the resources needed for such work, future research could try to develop methods that better integrate narrative and quantitative scenario approaches.

A third line of further research is to link the future-oriented scenarios with studies of the history of the region. This could provide greater insight into both path dependencies and triggers for change in the direction of development. Both historical and scenario studies look beyond the present. Taken together in a deliberative setting they could put more emphasis on agency than can be found in more deterministic visions of the future.

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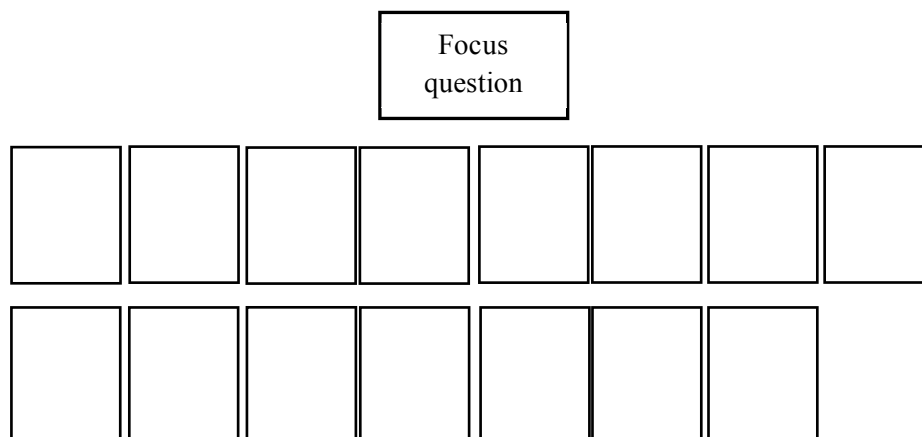
## APPENDIX A: INSTRUCTIONS FOR WORKSHOP FACILITATORS

*Henrik Carlsen, SEI*

This document gives instructions for facilitators of a “scenario building workshop”. The methodology for the workshop combines participatory approaches with information about the global context generated from on-going scenario work within the climate change research community. The methodology described here has been used in a workshop in Pajala, Swede 9-10 March 2015.

### Preparations

This should of course be done before the participants arrive. Put up flipcharts on the biggest wall. Position the charts as shown below (close together):



As indicated in the figure above a dedicated flipchart for the focus question of the workshop should be placed above the rest of the flipcharts. It is preferable to put a blank flipchart above the focus question, a chart which is removed when introducing the focus question later.

The horizontal length of the working wall (i.e. the flipcharts) should be something like 4 meters. Put a number on each of the flipcharts (for later references).

Arrange the chairs with no tables and two half circles. If the power point presentations (which usually comes before the first participatory working session) is in another direction of the room there needs to be a short rearrangement.

Prepare sets of sticky notes (four ovals; only two ideas (see below) but people sometimes need to restart writing) to each of the participants.

Prepare voting stickers for the participants. Each participant should have five voting notes in one color (called “X” below) and five in another color (“Y”) (for “Voting session”, see below). Also prepare a flipchart for voting. This chart has three columns:

No. of cluster and name	Number of votes for importance	Number of votes for uncertainty
1. Name of cluster 1		
2. Name of cluster 2		
3. . . .		
4. . . .		

Another task here is to prepare the group rooms. Each of the rooms should be assigned one scenario. Prepare approximately two flipcharts with information about the scenario in each room. These should

be based on the “bold face” versions of the SSPs. These are for reminding the participants about the global world in which they are working. For instance, the room working with Fossil-Fueled development should have flipcharts with the following:

### **Fossil-fueled Development – Taking the Highway**

Competitive markets, innovation and participatory societies

Rapid technological progress and development of human capital as the path to sustainable development.

Global markets are increasingly integrated

Strong investments in health, education, and institutions to enhance human and social capital

Exploitation of abundant fossil fuel resources

Resource and energy intensive lifestyles

Rapid growth of the global economy.

Faith in high-tech, e.g. geo-engineering

Little effort to avoid potential global environmental impacts

Global population peaks and declines

Fertility declines rapidly in developing countries, fertility levels in high income countries are relatively high

International mobility is increased

High challenges to mitigation.

Low challenges to adaptation

### **Introducing the workshop (approximately 10–15 minutes)**

This is the session in which the working process around the scenario process is introduced. Apart from the information that has been sent out before the workshop, the participants cannot be assumed to know a lot of things about scenario planning, or the reasons behind we are doing scenario planning in this project. Hence this short talk (it should be short in order to save time for actual participatory work) need to:

- Tell the stakeholders what it is all about;
- Convince them about the advantages for using scenarios; and
- Give them an overview of the scenario process in the workshop and after the workshop.

### **Interactive session: Assessing uncertainty and significance (joint work) of drivers of change (1.15–1.30 hours)**

If necessary (see above) rearrange the room for the first interactive session. Remove the chart in front of the Focus question.

Now the real participatory work starts. The lead facilitator starts with explain the working rules:

*This is an exploratory session in which we are going to try to come up with ideas for drivers in relation to the focus question. In this session all ideas are equally valid; we do not critique or discuss the ideas here. That will come later. Ideas of drivers can of course be discuss if it is about understanding the driver, but not if it is important or not. You will first get the chance to think for yourself 5 -10 minutes and write down two ideas on post-its, one idea per post-it. Please write with capital letter and write so that we all can read.*

A facilitator hand out four ovals to each of the participants. Leave the participants to think and write. After approximately 10 minutes the lead facilitator asks one person at a time to come up and position the two ideas on the working wall. If the two first ideas are close to each other (i.e. that we already now can think they belong to the same cluster later on), place them close together. Then the lead



facilitator asks the next person in line to come up and place his/her two ideas on the working wall. If any of the new ideas are close to any of the existing ideas, place them close together. In this way each participants place two ideas on the wall and the lead facilitator and the supporting facilitator tries – together with the participants – cluster on the move.

After this first round there is a wall with a lot of ideas for drivers, hopefully in some clusters. After this the lead facilitator says:

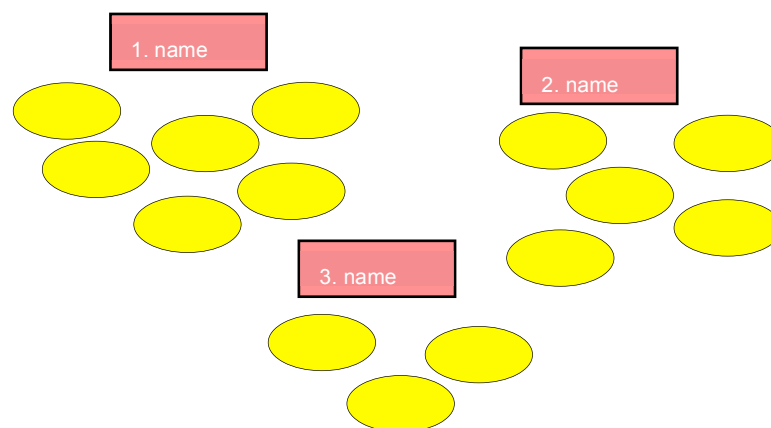
*OK, now that we have all these ideas, we might get inspired by them and probably we can generate more ideas. I will now ask you (one at a time) for more ideas and I will write them down on pots-its and position them on the wall.*

The lead facilitator asks one participant at a time. Here it is important that the supporting facilitator helps the lead with the clustering; the lead facilitator will be busy interpreting and writing down the ideas on pots-its. Of course this is done interactively with the stakeholders. The lead facilitator goes around the participants until there are no more ideas, or until run out of time.

### **Break (at least 30 minutes)**

If possible it is good to have a longer break here, e.g. lunch or extended coffee for networking. The core team need this time for some work on the drivers.

The core group (facilitators and perhaps one or two from the stakeholders group) gather for revisiting the clusters and perhaps to some changes and modifications. When the core group agree on the clusters (perhaps 10 to 20 of them) they should be named. Put also a number in front of each of the cluster names. The wall should look something like this (more than 3 clusters in reality):



### **Voting session (approximately 30-40 minutes)**

The lead facilitator starts this session with a presentation of all the clusters, their names and the reasoning behind them if there were some big changes in the work after the previous session. The lead facilitator then says:

*We cannot work with all those drivers and therefore we need to prioritise among them. This we are going to do in two dimensions. First, we would like to focus on those drivers that are important in relation to the focus question. Second, we would like to focus on those drivers that are uncertainty, i.e. those drivers for which you assess the future development is very uncertain. You will now get 10 voting stickers each, five in color X and five in color Y. Color X represent importance and color Y represent uncertainty. You should now place your stickers on the clusters (not individual drivers). You can divide your votes among more than one cluster, or put all five in any of the colors on one cluster; it's up to you.*

Participants then go up to the wall and place their stickers.

When the voting is over the facilitator sum the number of votes in the two dimensions and fill in the flipchart prepared in accordance with the description above. This gives the drivers toplist.<sup>3</sup> In the following the groups will work with the 8 most important drivers in the group work. Scenario building is also about prioritising the uncertain drivers. Therefore in this stage of the process some flexibility needs to be used: if there are some drivers which are not that important but very uncertain one could opt for including those in the list of the drivers that is going into the group work.

The supporting facilitator produces four copies of the eight drivers that are the focus of the group work.

### Introduction to group exercise: Future worlds–future regions (20 minutes)

In this session the perspective from the local to the global is introduced.

### Group work (2 hours)

Each of the four groups will work in one of the four global context scenarios:

- Regional Rivalry
- Sustainability
- Fossil-Fueled Development
- Inequality

The global scenarios here enter the work as boundary conditions for the local development. The task for group work is to interpret the regional developments for each of the prioritized drivers in relation to the scenario they are working in. The group work facilitator for group Y asks: “How could driver X play out at the regional scale in a world as the one described by scenario Y?”

The group work should be summarized like this:

	<b>Regional Rivalry</b>	<b>Sustainability</b>	<b>Fossil-Fueled Dev.</b>	<b>Inequality</b>
Driver X	Interpretation of driver X given the context described in the scenario Regional Rivalry	Interpretation of driver X given the context described in scenario Sustainability	...	...
Driver Y:	Interpretation of driver Y given the context described in the scenario Regional Rivalry	...		
Driver Z:	...			
....	...			

Note that this is the summary table; each group only works with one scenario.

The working process of the group work is as follows:

1. The group gets 15 minutes for reading the summary of the scenario they work in (print outs).
2. The group facilitator goes through the summary of the scenario on the flipcharts; short discussion about the scenario.
3. Starting with driver X, the facilitator asks the group (not each individual) about how this driver might play out given the context as described in the scenario. The facilitator takes down this on sticky notes.
4. Then take next driver, etc. for each of the eight drivers.

<sup>3</sup> If time permits the result could also be positioned in an importance/uncertainty diagram with two axes.

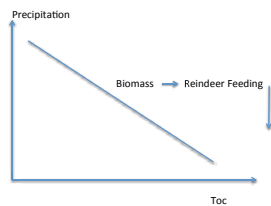
With this as a basis, the group starts to work with the interactions of the drivers as interpreted in the scenario. This is the stage when the dynamical interplay – given a global context provided by the scenario – between the locally derived drivers is starting to evolve. At this stage it could also be valuable to introduce a time line for important event from now until two generations into the future.

**Reporting and conclusion of the workshop (1 hour)**

Each group is requested to report back on the work on connecting the local to the global.

## APPENDIX B: FULL LIST AND RANKING OF DRIVERS OF CHANGE SUGGESTED BY THE PARTICIPANTS

Cluster name	Driver	Importance Score	Uncertainty score
Ecosystems		1	1
	Predators		
	New species in ecosystems uncertainty for livelihoods dependent on nature resources, fisheries, forestry, etc.		
Climate Change		19	13
	Climate change		
	Climate change		
	Climate change		
	Climate change and risks involved		
	Climate change – better forest growth – more possibilities in forest sector		
	Climate change Greater precipitation Freeze-thaw cycles Exceptional weather events Ice-on-snow event Annual temperature increase (2°, 4°, 6°) Switch: humid-arid regime Arctic desert!		
Entrepreneurship		9	1
	Investors		
	Innovation entrepreneurship		
	Entrepreneurship		
	Ability of developers in sustainable cooperation		
Local job market		5	1
	Unemployment, young people moving away		
	Job opportunities		
	Diversity work		
	Job creation = tax base		
	Local tax resources, e.g. for social welfare		
Economic development: global		5	3
	Economic forces		

Cluster name	Driver	Importance Score	Uncertainty score
Demography	Swedish/European Economic development + world market prices for mineral resources	10	8
	Economic development		
	Centralisation		
	Demographic changes		
	Immigration		
	(Im)migration		
	Population		
	Immigration		
	Demographic trends		
Impacts of climate		7	25
			
Energy market	Mining – adaptation needed because of climate change. What? We don't know	11	11
	Deficit of waters for mining industry (concentrators)		
	Hydropower – deficit of electricity		
	Global energy markets		
	Nuclear power/ energy geopolitics		
Ecosystem services	Petroleum industry	12	9
	The (global) energy market		
	Fishing		
	Ecosystem services		

Cluster name	Driver	Importance Score	Uncertainty score
	Food production security	11	14
	Tourism		
	- nature - culture		
Ideology, values	Local produce for local use – 0km	11	14
	Ideological-political trends – future visions		
	Attractive living environment		
	Different “land-use” logics		
	International relations		
	Human choice		
	Health, environment/social (human value)		
Material market		8	1
	Increasing renewable/biomaterials (e.g. wood-based) instead of oil-based and other fossil materials (e.g. plastic)		
	World market prices of iron		
	Price/ demand of raw materials		
	Global command for raw materials		
Transport Infrastructure		9	1
	Northern sea route		
	Infrastructure railroads IT/ Energy		
	Opening of the northern sea route- transportation in future		
International security		15	30
	Security police		
	Geopolitics		
	(Inter)national security problems		
	Arctic political opener		
	Political stability (cooperation)		
	Political relations between Russia and Sweden/Europe		
	Political stability (cooperation)		

Cluster name	Driver	Importance Score	Uncertainty score
Power relations – local/national		16	6
	Swedish politics		
	Who owns the future? Locally? Nationally? EU?		
	Local and regional decision making possibility		
	Politics (domestic and world)		
	Power's legitimacy locally		
Laws and regulations		0	1
	Institutional cooperation		
	Environment power regulations		
	International/national regional management instruments/policy		
Knowledge		6	7
	Level of knowledge		
Communication		2	0
	Communication		
Technological development		4	17
	Technology development		
	Technical development		
	Resource efficiency: we will not need so much natural resources – so much mining		



**APPENDIX C: WORKSHOP PROGRAMME****Uncertain Futures: The Changing Global Context of the European Arctic****Workshop programme****Monday, 9 March 2015**

14:30 – 15:00 Check-in at Hotell Smedjan (Fridhemsvägen 1B, Pajala) and coffee

Workshop starts

Danslokalen, Fridhemsvägen 1A (same building as the hotel)

15:00 – 15:20	Introduction to Mistra Arctic Sustainable Development Programme Peter Sköld (Arcum) The Changing Global Context: New Challenges – New Approaches Annika E. Nilsson (SEI)
15:20 – 15:40	Round of introduction of participants
15:40 – 15:50	Introduction to the scenario workshop Annika Nilsson on behalf of Henrik Carlsen (SEI)
15:50 – 16:50	Looking forward: What are the local and regional issues in future planning? Invited reflections: Lena Jatko, Leif Rönnbäck and Maj-Lis Ejderlöf, Pajala Municipality; Tomas Sevä, Muonio Sami community; and Tiina Elo, Regional Council of Lapland
16:50 – 17:10	Coffee break
17:10 – 19:00	Interactive brainstorming session: Drivers of change
19:30	Dinner

**Tuesday, 10 March 2015**

Danslokalen

08:30 – 09:15	Presentations of ongoing research The impacts of environmental change on the European Arctic Lize-Marié van der Watt (Arcum) Global perspectives on Arctic mineral resources Marie Jürisoo (SEI); Russia's Arctic security policy and the challenges for cooperation, Ekaterina Klimenko (SIPRI)
09:15 – 10:30	Interactive session: Prioritizing drivers of change
10:30 – 10:50	Coffee break
10:50 – 11:10	Introduction to group exercise: Future worlds – future regions
11:10 – 14:30	Group work (break-out rooms) (includes lunch at 12:30)
14:30 – 15:15	Reporting on group work (Danslokalen)
15:15 – 15:30	Coffee break
15:30 – 16:15	Lessons learned: joint reflection (Danslokalen)
16:15 – 16:30	Wrap-up (Danslokalen)
18:00 – 19:00	Dinner

**APPENDIX D: LIST OF PARTICIPANTS**

Tom	Arnbom	Världsnaturfonden WWF
Ronald	Arvidsson	Sveriges geologiska undersökning
Dag	Avango	Kungliga Tekniska Högskolan, KTH
Lars	Bäckström	Kiruna Kommun
Ingrid	Bay Larsen	Norrlandsforskning
Maj-Lis	Ejderlöf	Pajala Kommun
Niklas	Eklund	Umeå universitet
Tina	Elo	Regional Council of Lapland
Sophie	Forsberg	NENET, Norrbottens energikontor
Raunio	Jaakko	Regional Council of Lapland
Lena	Jatko	Pajala kommun
Kirsti	Jylhä	Finnish Meteorological Institute
Saari	Kauppi	Finnish Environmental Institute, SYKE
Carina	Keskitalo	Umeå universitet
Ekaterina	Klimenko	Stockholm International Peace Research Institute
Elena	Klyuchnikova	INEP, Kola Science Centre, Russian Academy of Sciences
Kirsi-Marja	Korhonen	Metsähallitus
Anders	Lundkvist	SveMin
Laura	Mannino	Pajala Kommun
Vladimir	Maslobev	Institute of Industrial Ecology Problems of the North (INEP)
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Annika E.	Nilsson	Stockholm Environment Institute
Ulrika B	Nilsson	Norrbotten läns landsting
Lena-Maria	Nilsson	Umeå universitet
Leif	Rönnbäck	Pajala kommun
Peter	Schweitzer	University of Vienna
Tomas	Sevä	Renskötare Mounio Samiby
Peter	Sköld	Umeå universitet
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## Stockholm Environment Institute

SEI is an independent, international research institute. It has been engaged in environment and development issues at local, national, regional and global policy levels for more than a quarter of a century. SEI supports decision making for sustainable development by bridging science and policy.

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Twitter: @SEIresearch, @SEIclimate