

# Arctic Summer College 2015

*Climate Change and Tourism Adaptation in Northern Sweden*



*On the way to Arjeplog...  
Cds: Alix Varnajot, 2015*

Alix VARNAJOT

University of Versailles, France  
University of Umeå, Sweden

## **Abstract**

As a climate-dependent and nature based industry, tourism is closely linked to climate change. In Arctic and sub-Arctic regions like in northern Sweden, changing climate is synonym of both challenges and opportunities for tourism professionals. This study in and around the Jokkmokk and Arjeplog settlements, where tourism professionals were interviewed, allow us to compare scholar projections and informants field experiences. This study also aim to determine how the tourism professionals community feel, face and adapt to climate change. In northern Sweden, climate change does not represent a fatality for tourism professionals. Challenges brought by changing climate seems surmountable, and new opportunities will appear during summers. However, climate change will bring close socio-cultural, economic and physical limits for societies in the two northernmost Swedish counties of Västerbotten and Norrbotten.

## **Introduction**

The Arctic is undoubtedly the world's most vulnerable area toward climate change. However, Arctic climate is far from being homogeneous. The Arctic is characterized as « a collection of regional climates with different ecological and physical climatic characteristics » (ACIA, 2005). This justify the need for local studies in the Arctic. In parallel, Lapland is becoming the new European Eldorado for tourism, where Sweden could be the geographical epicenter, between Norway and Sweden. Tourism here, is largely nature-based and climate-dependent. Then, if changing climate has impacts on environments, tourism professionals should have notice them. Indeed, their tourism activities need a constant relation to nature. Therefore, there are two different type of knowledge concerning climate change: scholars studies and field experiences from tourism professionals. Are the changing climate indicators listed by the Intergovernmental Panel on Climate Change (IPCC) felt by tourism professionals on fields? In addition, in northern Sweden, tourism has become a large part of some municipalities incomes. Thus climate change is a direct threat for the sustainability of the tourism industry. As a consequence, tourism professionals will have to adapt to those changes, in order to keep a flourished and robust activity. How tourism professionals feel, face and adapt to climate change impacts?

## **Research methods**

This study is part of my Master thesis from the University of Versailles-Saint-Quentin-en-Yvelines, France, dealing with climate change and tourism adaptation in northern Sweden. This study is based on interviews made in both Jokkmokk and Arjeplog areas, in northern Sweden. Why Jokkmokk and Arjeplog? First of all, in order to have as much as possible of informants with different tourism activities, it was necessary to find at least two different places to investigate. Thus, Jokkmokk and Arjeplog logically seemed to good examples. Indeed, they have the same characteristics: both are local tourism clusters, where tourism incomes represent a large part of the local economy; they have the same demographic characteristics; they have the same particularities in terms of tourists amounts, touristic seasons, etc. About 20 informants were interviewed with the same questionnaire, dealing with their business activity, their relation to their environment and climate change, and with their relation to the Arctic.

## **Climate change in northern Sweden**

« It is well established from physical, ecological, and physiological studies that climate strongly influences physical and biological systems » (Smith et al., 2001). Furthermore, as precise Smit and Wandel, « there are evidences that climate change is already occurring at high latitudes » (2006). In other words, climate change impacts can already be felt in the Arctic, or at least in northern latitudes.

What are the changing climate impacts and projections in northern Sweden? The projections from the Swedish Meteorological and Hydrological Institute (SMHI, 2012) are made with a comparison to the 1961-1990 reference period. During those 29 years, studies clearly show a increase of 0,6°C of annual mean temperatures. From this comparison, two projections can be made by the end of 2100 concerning temperatures. Firstly, warming temperatures are going to be more intense during the second part of the century than the first one. Secondly, climate change affects more winter temperature than other seasons. Climate projections show an increasing of annual mean temperatures of 1 to 3°C by 2050 and 4 to 6° by 2098. During winter months (December to February), temperatures are expected to rise by 2 to 4°C by 2050 and by 5 to up to 7°C by the end of the century. Whereas in summer (June to August), temperatures are projected to rise by 1 to 3°C by 2050, and by 3 to 6°C by 2098. Globally, rising temperatures are higher along the Bothnian Gulf and the Finnish boarder, than inlands and in the far Scandinavian Mountains. A warmer winter is also synonym of a shorter winter season, leading to the lengthen of the summer season. Changing temperatures will also have impacts on precipitation

regimes. Annual mean precipitations projections show an increase by 15 to 70 mm/year by 2050, except in the Scandinavian Mountains where precipitations should increase to up to 120 mm/year, compared to the 1961-1990 reference period. By 2098, precipitation are projected to increase by 90 to 150 mm/year and up to 210 mm/year in the Scandinavian Mountains. As the temperatures, precipitations will also be affected differently according to the season. Winter seasons should also be more affected: the precipitation rate is projected to globally rise by 5 to 20% by 2050 and by 16 to 48% by 2098. Whereas in summers, the precipitation rate is projected to globally rise by 4 to 16% by 2050, and by 8 to 16% by the end of the century. From a geographic analyses, the Scandinavian Mountain Range should be more affected than other places of northern Sweden, especially due to the increase of orographic rain and snow falls. The global amount of precipitations should increase, while the proportion of snow falls should be reduced, meaning, a raise of the rain falls. Thus the snow cover period should be affected: by 2050, projections show an average reduction of 15 days per year, compared to the 1961-1990 reference period, and an average reduction of 45 days per year by 2098. There are only few local areas in the Scandinavian Mountains where the snow cover period should be longer.

Climate change will also have impacts on other indicators, such as ice and run-off conditions. Firstly, the Bothnian Gulf is used to be frozen during winter months. It represented an average of 124 days per year during the 1961-1990 reference period. SMHI projections predict a length of 116 days of frozen seas for the 2011-2040 period, 114 days for the 2041-2070 period, and 100 days for the 2071-2100 period. In addition, the ice breakup on inland lakes is predicted to occur 15 to 25 days earlier by 2050. Secondly, with increasing precipitations, the river run-off is also projected to be affected. « The average mean discharge is expected to increase by 10 to 25% in the major rivers by the end of the century » (SMHI, 2011). Today, those discharges are occurring during flood peaks in the spring. The calculations show that those peaks should decrease in force and intensity, but instead higher flows can be expected for a longer period of time.

Obviously, all those indicators affected by the on-going climate change will have serious impacts on vegetation periods, erosion and landslides, but also on societies and on tourism activities.

### **The study results and discussion: perceptions and adaptations to climate change**

The interest of this study is to determine three things. Firstly, if climate change impacts projected by scholars can be felt on the fields by tourism professionals. Secondly, it tries to determine their adaptive capacity toward climate change. Thirdly

and lastly, this study is also a reflexion on climate change as opportunities or challenges.

First of all, scholars results and projections about changing climate indicators are not all felt by tourism professionals on the fields. An interesting example would be one of the informant from Arjeplog, a manager of an car ice-driving company for 20 years. According to his experience, the lakes ice breakup does not happen earlier than 20 years ago. Since the beginning of his business, he closes his car ice-driving activity in early April. It does not support SMHI results, saying frozen lakes breakup should happen earlier, compared to the 1961-1990 reference period. However, some other indicators such as temperatures and trees going northward are well felt by tourism professionals. Nevertheless, those changing indicators are only felt by old tourism professionals, that have been working in northern Sweden for more than 30 years. Indeed, in the 1980's, there were still some days with extreme low temperatures ( $-50^{\circ}\text{C}$ ) during the winter season, whereas today, the lowest temperatures are about  $-20^{\circ}\text{C}$ . If not all the changing climate indicators are not felt by tourism professionals, it is mainly due to 2 factors. Firstly, there is a high mobility among the tourism professionals community. Most of the informant were working in northern Sweden for less than 5 years. So it has several consequences. Indeed, it means that informants do not have a sufficient long experience of their working environment. Secondly, most of the company managers do not project to pass down their business to their children. Those two lead to the reason why climate change indicators are not felt by all tourism professionals: they think and evolve in a short time scale period, whereas climate change need to be studied on a larger time-scale period.

In other words, climate change does not threat tourism professionals on a long time scale period. However, climate change also involve an increasing variability and unpredictability. Variability and unpredictability are two components of climate change that occur on short time scale period and threat tourism for booking and planning activities. Nevertheless, tourism professionals already have adaptive capacity to day-to-day variabilities. Thus, tourism professionals show a surprising serenity toward potential climate change threats. They do not worry about it. Furthermore, changing climate is more synonym of opportunities than challenges. Indeed, scholars projections show a lengthen of the summer season, meaning more tourists and incomes in June and September, knowing summer is already the first season in terms of tourists amounts.

## **Conclusion**

Climate change does not represent a real threat for northern Swedish tourism professionals for several reasons. Climate change can be felt on long time scale period of time, whereas tourism professional evolve on a shorter one. Then, the real threat could be the increasing variability and unpredictability of changing weather on a short time scale period, but they already have to face this kind of day-to-day variability. Furthermore, they also show serenity because of potential futur opportunities that climate change will bring for summer seasons. In the end, we can affirm that scholars projections are not all felt by tourism professionals because of the difference of time scale period.

## **REFERENCES**

ACIA, (2004), *Arctic climate Impact Assessment*, Cambridge University Press, Cambridge.

IPCC, (2000), *Special report on emissions scenarios*, Cambridge University Press, Cambridge.

IPCC, (2001), *Climate change 2001: synthesis report. A contribution of working groups I, II and III to the third assessment report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge.

IPCC, (2013), *Climate change 2013: the physical scientific basis*, Cambridge, Cambridge University Press, Cambridge.

IPCC, (2014), *Climate change 2014: impacts, adaptation, and vulnerability*, Cambridge University Press, Cambridge.

Smit, B. and Pilifosova, O., (2003), « From Adaptation to Adaptive Capacity and Vulnerability Reduction », in *Climate Change, Adaptive Capacity and Development*, Imperial College Press, London, pp 9-28.

Smith, B. and Wandel, J., (2006), « Adaptation, adaptive capacity and vulnerability », in *Global Change*, 16(3), pp 282-292.

Smith, J. B., Schellnhuber, H. J., Mirza, M. M. Q., et al., (2001), « Vulnerability to Climate Change and Reasons for Concern: a Synthesis », in *Climate Change*, pp 913-967.

Swedish Meteorological and Hydrological Institute, (2012), Climate change in Norrbotten county - consequences and adaptation, County Administrative Board of Norrbotten, 60 p.

Varnajot A., (2015), « Climate Change and Tourism Adaptation in Northern Sweden », Master Thesis, University of Versailles-Saint-Quentin-en-Yvelines.