Combining Actor-Network Theory and the Concept of Ecosystem Services to Assess the Development of Arctic Shipping Routes

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ABSTRACT

Global warming alters the Arctic on different ecological and social levels, including rising resource availabilities and shifting power relations. In this geographical area, the natural sphere, which is based on the geographical spheres of the earth, and the social sphere are strongly interwoven and therefore sensitive to even small alterations, as a case study of Arctic shipping routes will highlight. The principles of Actor-Network theory enable the investigation of interdependencies, resulting in an equal treatment of both mentioned spheres. Based on this theoretical background and a qualitative literature research, mediators of Arctic actor-networks located in the overlapping zone between these spheres have been identified. An enlarged ecosystem services approach was then adopted to develop a methodology to quantify these mediators and the power relations around them. Apart from the equality of the natural and the social, crediting both higher influences over the respectively other domain, mental entities were recognized as core-elements of Arctic networks, further linking the natural and the social sphere. Moreover, global, regional and local interdependencies have been included into the analyses, contributing ultimately to a wider understanding of actor-networks of the High North, which is of importance to scientists, public and policy makers in order to cope future global challenges, like climate change.

Keywords: *Actor-Network Theory, Arctic, Ecosystem Services, Geopolitics, Resources, Shipping Routes*

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INTRODUCTION

While climate change is altering this geographic region, the Arctic resembles an area of increasing political interest, particularly due to prospering resource exploitation. However, the main requirement to further develop such activities in the High North is the establishment of profitable and secure shipping routes. Yet, their implementation depends heavily on climate change induced impacts and on the current political status of the area. Consequently, shipping lanes function as a linkage between the systems "climate change" and "geopolitics" in the High North.

Already since 325 B.C. European explorers are investigating Arctic waters and their suitability for shipping. The search for the Northwest Passage (NWP) and the Northern Sea Route (NSR), which resembles an essential part of the NWP and is regarded as being the most prospering Arctic shipping route today (Reuters, 2013), began within the 1490s. Yet, the first transition happened 400 years later, by Roald Amundsen and his vessel Goja, who completed the NWP within the years 1903 to 1906. Another 100 years later, in 2007, the NWP was ice-free in summer for the first time and has since then been glorified by global media as a shorter and cheaper alternative to traditional shipping routes from Europe to Asia, like the Suez Canal (Arctic Council, 2009; Pettersen, 2012; Winkelmann, 2009a).

The current climate change is mainly enabling an improvement of Arctic shipping, lately. The mean annual air temperature has increased up to three times stronger than the global average in vast Arctic areas (Härtling et al., 2011), leading amongst other changes, to a melting of the ice layer of the Arctic ocean, which results in an opening up of polar shipping routes (Gebhardt and Ingenfeld, 2011). The actual decline of the Arctic sea-ice extend is even faster than the projected decline of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change in 2007 (AMAP, 2012).

Consequently, climate change affects the Arctic instantly and while such shifts can have positive economic effects, they often challenge the unique (eco- and social) systems of the High North simultaneously. In order to fully understand these multidimensional interdependencies between the Arctic region and global developments, like climate change, it is therefore essential to interpret the Arctic as a puzzle of different domains, consisting of terrestrial and marine ecosystems as well as western influenced societies and communities of indigenous peoples. (AHDR, 2004) Each of these domains responses to changes differently, why the decision whether certain natural or social shifts can be regarded as positive or negative consequences depends indeed on the point of view, the given purpose or the aspired aim of the domains' components.

Besides economical, ecological and social alterations, the development of Arctic shipping routes also causes political impacts. Five states have direct access to the Arctic Ocean: the United States of America, Canada, the Russian Federation, Norway and Denmark through Greenland (Girg, 2008), which also implements a cooperation of five different political systems over an area whose territorial belongings are not completely resolved yet. Moreover, the expanding possibility to use Arctic transportation is not only of interest to the five Arctic states, but also has global impact on different scales, as has the rising possibility to exploit oil and gas fields, located in former regions of inaccessibility. (Winkelmann, 2009b) Due to the unresolved territorial belonging of these areas and the remaining questions about utilization and controlling rights of Arctic shipping routes, which are premises to resource exploitation in the Arctic Ocean (Winkelmann, 2007), this topic is of high political, economic, ecological and social interest.

Although the vanishing sea-ice is essential to enable Arctic shipping, as has been mentioned above, it is not the only crucial parameter. To guarantee a profitable and particularly a secure use of shipping lanes in the High North, the