Use and Governance of Non-Wood Forest Products in Market and Transition Economies:

Case Studies from Sweden, Ukraine and the Russian Federation

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Abstract

Forests have provided non-wood forest products (NWFPs) that sustain local communities for Millennia. Today, the role of NWFPs for local livelihoods differs in time and space. International policies highlight the importance of NWFPs globally and in European countries. Using a case study approach I studied use and governance of NWFPs in three rural areas that represent a gradient in economic development, i.e., Småland (Sweden), Roztochya (Ukraine), and Kortkeros (Komi Republic in Russia). This thesis is based on 307 semi-structured interviews, analysis of global, national and regional legal documents and systematic literature analysis. In forest-dependent rural areas NWFPs continue to be an important part of livelihoods by ensuring food security both directly, and by providing additional income (Ukraine and Russia). In wealthy rural communities it is a cultural tradition and a part of recreational activities (Sweden). Governance of NWFPs differed among the case studies and the countries they represent. In Sweden there are on-going debates between different actors, stakeholders and organizations on how to govern NWFPs due to increasing commercial harvest of plant origin NWFPs. In Ukraine, there is a top-down government regime related to NWFPs, which actually exists only de-jury, not de-facto. In the Russian case study there has been a shift from government to governance due to the conflict between traditional use of NWFPs and commercial forest logging that led to legitimization of local communities' rights in NWFPs use and governance. In order to establish new forms of NWFP governance, there is a need for developing landscape approach initiatives that aim at establishing place-based stakeholder partnerships that represent different sectors at multiple levels of governance. Sustainable use, management and governance of NWFPs are an integral part of sustainable forest management (SFM). The multifunctional value of NWFPs provided by forest landscapes is important for rural communities, but often is neither supported by national policy and management regulations nor appropriate governance. To promote sustainable use of NWFPs new policy instruments should be developed in all three countries.

Keywords: sustainable forest management, rural development, livelihood, forest products, wild food, medicinal herbs, landscape approach initiatives.

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Dedication

To my family, that always inspires me

В любых делах при максимуме сложностей, подход к проблеме все-таки один: желанье — это множество возможностей, а нежеланье — множество причин. Едуард Асадов

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List of Publications

This thesis is based on the work contained in the following papers, referred to by Roman numerals in the text:

I Stryamets, N., Elbakidze, M. & Angelstam, P. (2012). Role of non-wood forest products for local livelihoods in countries with transition and market economies: case studies in Ukraine and Sweden. *Scandinavian Journal of Forest Research* 27(1), 74-87.

II Stryamets, N., Elbakidze, M., Ceuterick, M., Angelstam, P. & Axelsson, R. (2015). From economic survival to recreation: contemporary uses of wild food and medicine in rural Sweden, Ukraine and NW Russia. *Journal of Ethnobiology and Ethnomedicine*, 11 (53), 1-18.

III Stryamets, N., Elbakidze, M., Angelstam, P. Governance of non-wood forest products? Case studies in Ukraine and the Russian Federation. *Manuscript.*

IV Axelsson, R., Angelstam, P., Elbakidze, M., Stryamets, N. & Johansson, K-E. (2011). Landscape approach for sustainable development and sustainability: a practical interpretation of principles and implementation concepts. *The Journal of Landscape Ecology*, 14 (3), 5-30.

V Elbakidze, M., Angelstam, P., Sandström, C., Stryamets, N., Crow, S., Axelsson, R., Stryamets, G. & Yamelynets, T. (2013). Biosphere reserves for conservation and development in Ukraine? Policy analysis and a case study of establishment. *Environmental Conservation* 40 (2), 157–166.

The contribution of Nataliya Stryamets to the papers included in this thesis was as follows:

I Planned the study together with supervisors. Collected field data. Analysed the data and wrote the manuscript together with co-authors.

II Planned the study together with supervisors. Collected field data. Analysed the data and wrote the manuscript together with co-authors.

III Planned the study together with supervisors. Collected field data. Analysed the data and wrote the manuscript together with co-authors.

IV Wrote the parts of the manuscript and commented on all stages.

V Together with co-authors collected interviews and wrote the manuscript.

Abbreviations

BR	Biosphere Reserve
ES	Ecosystem services
EU	European Union
FAO	Food and agriculture organization of the United Nations
NGO	Non-Governmental Organisation
NTFPs	Non-timber forest products
NWFPs	Non-wood forest products
NWGs	Non-wood goods
MA	Millennium Ecosystem Assessment
MAB	Man and the Biosphere program
MCPFE	Ministerial conference on the protection of forests of Europe (now named Forest Europe)
MF	Model Forest
SEPA	Swedish Environment Protection Agency
SD	Sustainable development
SFM	Sustainable forest management

1 Introduction

Globally forests have a huge ecological, social, cultural and economic importance. Wood and non-wood forest resources and products are fundamental for the livelihoods of a large part of the world's human population (MDG, 2014; FAO, 1999). More than 2 billion people depend on the use of non-wood and wood forest resources for food, medicine and fibre for subsistence and income (FAO, 2015; Gupta, 2015; World Bank, 2014; FAO, 1999). Although there is a clear definition of what wood products are, there nevertheless have been numerous of discussions on how to define and name non-timber forest products (Belcher, 2003; De Beer & McDermott, 1989). This debate is still on-going (Shackleton & Pandey, 2014; Delang, 2006; Belcher *et al*., 2005; Belcher, 2003). Depending on economic or cultural contexts, different terms are used, e.g., non-wood forest products (NWFPs) (FAO, 1999), non-timber forest products (NTFPs) (CIFOR, 2011), secondary products (Forest Code of the Russian Federation, 2008; Forest Code of Ukraine, 2006; Ros-Tonen, 2000), non-wood forest goods (NWGs) (FOREST EUROPE, 2011a), and other than timber goods and services (Turner *et al.*, 2003). Some scholars include (Ros-Tonen, 2000) or do not include (Heubach et al., 2011) products of animal origin in the definition (Delang, 2006), while others include (Croitoru, 2007) or do not include (Belcher *et al*., 2005) products of plant origin from plantations or grasslands. The most commonly used definitions are NWFPs and NTFPs, and the main difference between those two terms is the exclusion of firewood in NWFPs. In this thesis I use the term "non-wood forest products" (NWFPs) as it was defined by the Food and Agriculture Organisation (FAO) (1999). NWFPs are goods of biological origin other than wood (i.e., products of plants and animal origin), derived from forests, forest landscapes and trees in woodlands outside forests (FAO, 1999).

Intensification of forest management, deforestation in the tropics, increasing poverty of rural residents in remote forested regions in developing

countries have raised concerns among scientists and decision-makers regarding how to diversify benefits from forests in addition to wood production (Kar & Jacobson, 2012; Delang, 2006; Belcher et al., 2005). It has been recognized that NWFPs are more important for local communities than wood production (Shackleton & Gumbo, 2010), and in addition have a great potential to improve rural livelihoods in many countries (Croitoru, 2007; Dovie, 2003). NWFP products bring income to local residents and have been used as wild food and medicine (Stryamets *et al.,* 2015). Even a relatively small input of NWFPs to livelihoods can be vital for rural families' subsistence (Schaafsma *et al.,* 2012). At the same time NWFPs also contribute to the livelihoods of urban residents and immigrants (Shackleton *et al*., 2015b; Jensen, 2009; Delang, 2006; Pieroni & Quave, 2006). According to Chukwuone and Okeke (2012), NWFPs contribute to food security through direct consumption of NWFPs for local diets and trading of NWFPs for generation household's income. NWFPs provide also cultural, spiritual and recreational benefits that are intangible (Sõukand *et al.*, 2013; Chamberlain *et al.,* 2004).

The most recent report on the State of Europe's Forests (FOREST EUROPE, 2015) states that the total annual value of NWFPs for 2014 was 2.27 billion Euro in 28 countries. Seventy three percent of NWFPs were plant origin based products (FOREST EUROPE, 2015). NWFPs of animal origin were estimated at annual value of 618 million Euros, which is 40 million less than the amount reported in 2010 (FOREST EUROPE, 2011a). However, the total and precise values of NWFPs that are harvested and consumed in Europe are hard to determine as the reporting systems are not well developed. NWFPs have great potential to increase the total value of forest landscapes (Chamberlain & Hammett, 2002). The State of Europe Forests Report lists the main gaps for realising this potential as the promotion and improved marketing of non-wood goods and forest ecosystem services (FOREST EUROPE, 2011b). As an example, a scientific attempt to evaluate economic benefits from NWFPs in the Mediterranean region gave an average estimated benefit of €39/ha in 2005 (Croitoru, 2007).

The United Nation's Forum on Forests 2015 emphasized that forests provide a range of goods and services that create opportunities to address many of the most pressing sustainable development (SD) challenges. There is a need to manage all types of the forests sustainably (UN, 2015b). The State of Europe Forests stressed that NWFPs and their socio-economic impact on livelihoods are essential for the concept of sustainable forest management (SFM) (FOREST EUROPE, 2015). Use of NWFPs, as a crucial part of SFM policy (García-Fernández *et al*., 2008) requires access to multiple products and services by different stakeholders to satisfy their needs and interests in addition

to wood products (García-Fernández et al., 2008). According to Vantomme (2003), the socio-economic contribution of forests to local livelihoods and the environmental impact of their use are essential components of SFM.

During recent decades scientific interest towards NWFPs has increased (Figure 1). Most studies focus on the use of NWFPs in developing countries, especially in Africa (Shackleton *et al.*, 2015b; Kipkore *et al.*, 2014; Schaafsma *et al.,* 2014; Adam *et al.*, 2013; Chukwuone & Okeke, 2012; Heubach *et al*., 2011; Shackleton et al., 2011a; Paumgarten & Shackleton, 2009; Shackleton *et al*., 2007b; Dovie, 2003), Asia (Ghosal, 2014; Choudhary *et al*., 2013; Kar & Jacobson, 2012; Mahapatra & Shackleton, 2011; Gubbi & MacMillan, 2008; Gundimeda *et al*., 2007; Lacuna-Richman, 2006) and Latin America (Benz *et al*., 2000). However, only few studies have analysed use of NWFPs in developed countries, such as Sweden (Boman & Mattsson, 2012; Svanberg, 2011; Kardell, 1980), Switzerland (Kilchling *et al.,* 2009), Netherlands and Norway (Janse & Ottitsch, 2005) and Finland (Richards & Saastamoinen, 2010; Saastamoinen *et al*., 2000; Saastamoinen, 1999).

Studies from Africa focus on the role of NWFPs for livelihoods of rural and urban residents, and identify NWFPs as a key instrument for income generation (Shackleton *et al*., 2015a; Shackleton *et al*., 2015b; Shackleton & Pandey, 2014; Paumgarten & Shackleton, 2009). For example, Shackleton *et al.* (2015b) show how multifunctional use of trees for fruits, firewood, shelter and wild medicine was important for urban residents with low income in two South African towns. Adam *et al*. (2013) describes the role of NWFPs for livelihoods strategies in rural areas in Sudan, using three species of edible fruits as an example. Coulibaly-Lingani *et al.* (2009) developed logistic regression models to examine determinants of access for forest products, including NWFPs, in Burkina Faso; and the access to NWFPs was identified as a key element for poverty reduction strategy. Dahlberg (2015) highlights the importance of studying the environmental history in evaluating the sustainability of harvesting NWFPs, using Botswana as a case study. Studies in Asia have explored the importance of medicinal NWFPs, including the value chain of medicinal and aromatic plants in India, for rural residents (Choudhary *et al.*, 2013). Ghosal (2014) analysed NWFP policies in India and highlighted the challenge of policy development for the socio-economic advancement of forest-dependent deprived people. Gubbi and MacMillan (2008) assume that intensive use of NWFPs might have negative effect on biodiversity and poverty alleviation.

Studies in developed countries in Europe (Janse & Ottitsch, 2005) are showing increasing and diversifying recreational, economic, ecological and social demands on forest resources. There are studies on ethnomedicine and

ethnobotany in Sweden (Thorsell *et al*., 2006; Tunón, 2004; Svanberg & Tunón, 2000a; Tunón *et al*., 1995) and Denmark (Tunón, 2015a; Tunón, 2015b), but most of them are in native languages (Svanberg, 2011; Svanberg & Tunón, 2000b). Saastamoinen *et al*. (2000) demonstrated the importance of NWFPs for Finnish people based on country-wide questionnaires. There are studies that demonstrate the ecological effects of NWFPs extraction from plant species and describe its sustainable use (Ticktin, 2004; Wynberg *et al*., 2003; Sinha & Bawa, 2002; Ticktin *et al*., 2002). Schaafsma *et al*. (2014) illustrate that economic valuation, modelling and mapping of NWFPs extraction across a wide spatial scale is possible. Schulp *et al*. (2014) showed the use of wild food in 17 European countries, including a wide variety of game species (38), mushrooms (27 species) and vascular plants (81 species) and suggest that it should be included in EU ecosystem service assessments. Evaluation or estimates of quantities of NWFPs are also rarely performed.

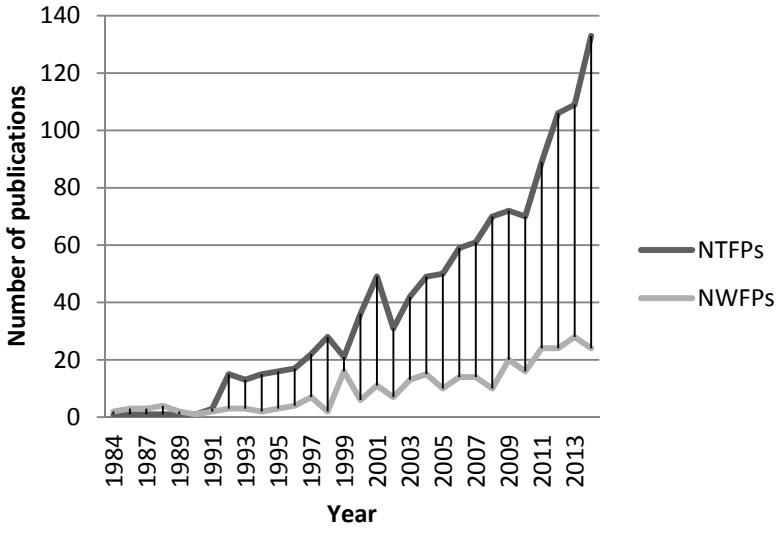


Figure 1. The number of published peer-reviewed articles related to NWFPs and NTFPs (both "non-timber forest products" and "non-wood forest products" were used for search in the Scopus database).

While there are many studies on NWFPs in European post-socialistic countries, they are mostly written in native languages (Ryabchuk, 1996; Petrova, 1986; Telishevskyy, 1972). There are studies on the use of wild food (Łuczaj *et al*., 2013; Sõukand et al., 2013; Kalle & Sõukand, 2012; Łuczaj,

2012b; Łuczaj *et al*., 2012; Svanberg *et al*., 2012; Sõukand & Kalle, 2011; Łuczaj & Szymanski, 2007). An exception is the mapping of ecosystem services in Eastern European countries (Schulp *et al.*, 2012). Therefore it is crucial to provide a comprehensive analysis of NWFPs use and governance in Eastern European countries (FOREST EUROPE, 2011a) allowing to develop a more structured knowledge base about NWFPs on the European continent (Vacik *et al.*, 2014).

Governance of NWFPs is part of the broader concept of forest governance. The number of publications on forest governance is growing rapidly (Giessen & Buttoud, 2014; Art & Visseren-Hamdkers, 2012; Arts & Buizer, 2009). According to Giessen and Buttoud (2014), '*forest governance is a social science inquiry into forest related decisions, their implementation and resulting affects within a given institutional setting*' (p.1), According to Agrawal *et al*. (2008), forest governance in the 21st century has three global trends. The first one is decentralization of forest governance, especially in developing countries where these resources are vital for rural residents. Secondly, it is concession and private market influence on forest governance. Thirdly, it is growing certification efforts, especially in the temperate zone. There are studies that highlighted the importance of transforming the top-down approach of forest governance to more effective decentralized forest governance (Andersson *et al*., 2006). Effective governance aims to increase the benefits from the forests (Agrawal *et al.*, 2008). NWFPs governance is complex as it includes governance of animal and plant origin products. Most of the studies on governance of NWFPs are connected with India, South Africa and Cameroon (Steele *et al*., 2015; Wynberg & van Niekerk, 2014; Ingram & Tieguhong, 2013; Shackleton & Gumbo, 2010; Brown et al., 2008; Wynberg & Laird, 2007). In Europe, the governance of NWFPs is studied in Serbia (Keča *et al*., 2013), Finland (Cai *et al.*, 2011) and Sweden (Sténs & Sandström, 2013; Sandström *et al*., 2011; Sandström & Widmark, 2007). However, the studies have mostly been focused on one component of NWFPs, e.g., hunting (Boman & Mattsson, 2012), fungi (Martínez de Aragón *et al.,* 2011) or medical herbs (Buenz, 2005). Studies on governance of NWFPs in East European countries are scarce and are published in native languages (Malyk, 2001). Thus, still there is a need for more studies on NWFPs governance, especially in developing counties.

In order to understand a role of NWFPs in different social contexts as a part of the SFM paradigm in the European continent, it is critical to perform a comparative analysis of the use of these resources in the countries with different socio-economic, cultural and governance conditions (e.g., Angelstam *et al.* 2013). Additionally, the use of NWFPs should be connected with the

analysis of formal and informal institutions that regulate this process, including decision-making processes.

Aims and objectives

The aim of my thesis is to contribute to holistic understanding of NWFPs as an integral component of the SFM paradigm by analysing and comparing the use and governance of NWFPs in transitional and market economies, respectively. This thesis employs a case study approach, focusing on Ukraine, Russia and Sweden. I test two hypotheses:

1. NWFPs are important for local livelihoods in countries with transition and market economies; however, their tangible and intangible roles depend on the socio-economic and cultural context.
2. Commercial use of plant origin NWFPs provokes conflicts among diverse stakeholders in different contexts; therefore, the governance of plant origin NWFPs is as important as the governance of animal origin NWFPs.

The main research questions are as follows:

- What is the role of NWFPs in rural livelihoods in countries with transition and market economies?
- How is traditional knowledge related to NWFPs used in different contexts?
- What are the rights and roles of different stakeholders in the decision-making process related to governance of both plant and animal origin NWFPs?
- Is the governance of both plant and animal origin NWFPs needed in order to provide sustainable use of these resources in different contexts?

The objectives of the thesis are:

1. To explore the use of NWFPs by local rural residents in different social-ecological contexts.
2. To analyse current uses of NWFPs as wild food and medicine in three case studies representing different socio-economic, governance and cultural contexts.
3. To analyse governance of NWFPs in two post-Soviet countries.
4. To explore international concepts and initiatives to achieve sustainability on the ground.

5. To identify role and rights of different stakeholders in the decision-making process when new initiatives towards sustainability like a Biosphere Reserve (BR) arise.

The overall aims are explored in five Papers (I-V). The objectives of the Papers are as follows:

I) To analyse the role of NWFPs for different groups of forest stakeholders in rural landscapes in Ukraine and Sweden in order to define the contribution of these forest resources to local livelihoods in countries with different economic and social-cultural conditions.

II) To analyse present and traditional use of NWFPs as wild food and medicine in countries on the European continent, using case studies in Sweden, Ukraine and NW Russia, which represent a gradient in economic development from modern to traditional use of forest landscapes.

III) To analyse and compare the governance of NWFPs in Russia and Ukraine using a case study approach, focusing on different approaches and schemes that work in Post-Soviet countries.

IV) To review landscape approach concepts towards achieving sustainability by Sustainable development such as Biosphere Reserve, Model Forest and others

V) To document governance of a forest landscape in order to understand the roles and rights of different local stakeholders in the decision-making process concerning the use of natural forest resources, including NWFPs, when new initiatives towards sustainability on the ground are appearing, such as the emerging implementation of the BR concept in the Ukrainian case study.

Thesis outline

Following this introduction, this thesis consists of four main chapters, conclusions, references and appendices. Chapter I presents the research context, including the SFM paradigm, governance of NWFPs and the sustainable livelihood framework. Chapter II explains the methodological framework that I used for data collection and analysis of the collected data. Methods used in my thesis are qualitative interviews, policy analysis and systematic literature review. Chapter III (Results) has two sub-chapters: NWFPs use and governance of NWFPs. Chapter IV (Discussion) includes analysis of importance of NWFPs for sustainable local livelihoods in different contexts, and discusses use and governance of NWFPs as a part of SFM in different social-ecological contexts.

2 Research context

"*Forests are more than trees and are fundamental for food security and improved livelihoods", Vision 1 of Durban Declaration, World Forestry Congress 2015, Durban, South Africa.*

2.1 Sustainable forest management

The term "sustainable forest management" has its roots in early German forest literature on sustained yield forestry, introduced by for example Hans Carl von Carlowitz (Grober, 2007). The concept of sustainable forest management (SFM) involving economic, ecological and social dimensions emerged in the early 1990s with emerging the sustainable development (SD) concept. The Forest Principles of the United Nations Conference on Environment and Development (UNCED) (UNCED, 1992) declared that forests provide goods and services, and sustainable management of all related resources needs to be undertaken. The Forest Principles of UNCED emphasized that the comprehensive assessment of economic and non-economic values of forest goods and services is needed (UNCED, 1992). After the UNCED conference in Rio de Janeiro in 1992, different processes and organizations started developing SFM policies.

At the United Nations Forum on Forests 2004 (UN, 2004), seven elements of SFM were recognized: (1) extent of forest resources, (2) biological diversity, (3) forest health and vitality, (4) productive functions of forest resources, (5) protective functions of forest resources, (6) socio-economic functions, (7) legal, policy and institutional frameworks, which are basic for monitoring and reporting of SFM. The principles, criteria and indicators for SFM were developed taking into account the specific conditions of the forests. For

example, the International Tropical Timber Organization drives the development of SFM policies for tropical forests (Siry *et al.*, 2005). The Montréal Process (2015) develops SFM principles for the temperate and boreal forests of non-European countries; and the Ministerial Conference on Protection of Forest in Europe (Pan-European process or Forests of Europe) focuses on development of Pan-European criteria and indicators for SFM for European countries (FOREST EUROPE *et al*., 2011a). In the Pan-European context SFM is defined as: '*the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, international and global levels, and that does not cause damage to non-forest ecosystems*' (MCPFE 1993). The Pan-European criteria and indicators provide guidelines for SFM at the national and sub-national levels and operationalize and complement the existing definition of SFM (MCPFE, 1998a; MCPFE, 1998b; MCPFE, 1993). It develops a common strategy for 46 European countries on how to sustainable manage their forests (FOREST EUROPE, 2015).

I use the SFM concept to outline the research context of my doctoral thesis because sustainable management of NWFPs is a component of SFM policy in Europe, and globally (Fig. 2).According to the Helsinki resolution (1993), use of NWFPs has to be encouraged (MCPFE, 1993). In the Resolution L2 (MCPFE, 1998b), criterion 3 aims to maintain and encourage different productive functions of forests, which include both wood and non-wood products. The descriptive indicators of criterion 3 require the development of management plans for NWFPs (MCPFE, 1998a; MCPFE, 1998b). At the 4th Ministerial conference in Vienna some criteria and indicators were added with the aim to increase benefits of rural livelihoods from forests (MCPFE, 2003a; Rametsteiner & Mayer, 2004; (MCPFE, 2003). The Vienna Resolution 2 highlighted the importance of promoting the use of both wood and NWFPs (MCPFE, 2003). It is required to improve market-based provisions of range of NWFPs from sustainable managed forests. The number of new entrepreneurs for use of non-wood goods and services should be enhanced. The support of research and new produced knowledge is needed. In Vienna Resolution 3 the cultural and social dimensions of SFM were described. It was recognized that traditional knowledge and practices were related to the use of forest resources, especially NWFPs. The resolution stressed a need to promote the social and cultural dimensions of SFM, including the NWFPs component. The new quantitative indicator 3.3 includes the requirement to value and quantify non-wood goods from forests and other woodlands (MCPFE, 2003). At the Madrid

Ministerial conference in 2015 the indicators for SFM were updated and now it includes 45 indicators.

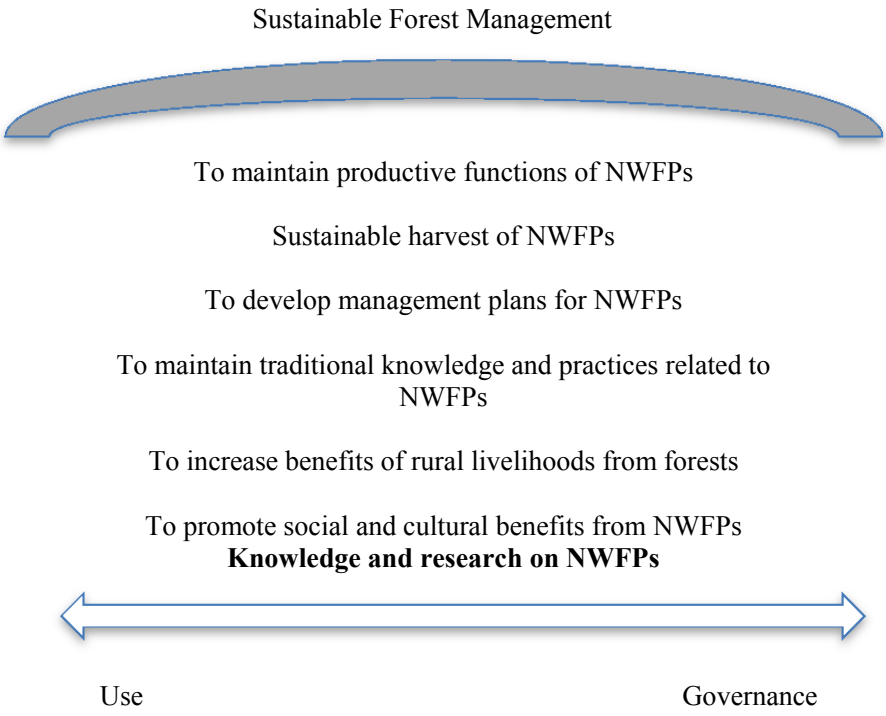


Figure 2. SFM policy requirements related to NWFPs: examples of indicators that highlight the importance of research on the use and governance of NWFPs in different contexts.

The Montreal process, which was launched in 1994, brings together 12 countries: Argentina, Australia, Canada, Chile, China, Japan, Republic of Korea, Mexico, New Zealand, Russian Federation, United States of America, and Uruguay. The Montreal process has seven criteria and 67 associated indicators as guidelines for policy-makers to use in assessing national forest trends and progress toward SFM (The Montréal Process, 2015). The Montreal process criteria and indicators for the conservation and sustainable management of the temperate and boreal forests describe NWFPs as important parts of SFM. Criterion 2 includes the maintenance of productive capacity of forest ecosystems, which emphasizing that many communities depend on forests directly or indirectly for a wide range of forest-based goods and

services. The supportive indicator 2.e is reporting on the sustainability of the harvest of NWFPs. The criterion 6 focuses on the maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of societies. This criterion requires the information on the production and consumption of forest products, investment and employment in the forest sector, forest-based recreation and tourism and other social and cultural forest values and illustrates the numerous benefits forests provide. The indicator 6.1b provides information on the value of NWFPs. The indicator 6.1e gives information on the consumption of NWFPs and 6.1g – on the value of a country's exports and imports of NWFPs. The indicator 6.2a quantifies investment and expenditure in developing, maintaining and obtaining goods and services (both wood and non-wood) from forests.

In 2011, Forests Europe presented "European forests 2020 Goals and targets" (FOREST EUROPE, 2011). The first goal requires sustainable management of all European forests, including multiple forest functions and enhanced use of forest goods and services. Goal seven underlines the need for the optimization of benefits for local rural livelihoods from forests, including cultural benefits. The Global Goals, or Sustainable Development Goals (SDGs) by 2020, promote the implementation of sustainable management of all types of forests. This requires mobilizing significant resources from all sources and at all levels to finance SFM and provide adequate incentives to developing countries to advance such management, including conservation and reforestation (UN, 2015a). By 2020, ecosystem (including NWFPs) and biodiversity values should be integrated into national and local planning (UN, 2015a). The New York Declaration on Forests (2014) stressed that forests can contribute to economic growth, poverty alleviation, food security and many other issues. Forest dependent indigenous people have rights to participate in the decision-making process towards forest management. The forest governance should be strengthened; transparent and indigenous people have rights to use their lands and resources. At the World Forestry Congress (2015) in Durban, South Africa, a declaration was made stating that forests are particularly important for the hundreds of millions people in rural areas, including many of the world's poorest people, who depend on them for food, wood energy, shelter, fibre and livelihoods. The key message is that forests cover one-third of the earth's land surface and their conservation and sustainable management are essential for the achievement of the SDGs.

To summarize, international policies highlight the importance of NWFPs globally, and in European countries. Sustainable use, management and governance of NWFPs are an integral part of SFM (Fig. 2), and my thesis focuses on the use and governance of NWFPs in different contexts. To cover

the variation of contexts among regions in Europe's East and West, I selected three case studies that represent diversity of landscape histories, socio-economic conditions and system of governance on the European continent (see Angelstam *et al.* 2013).

2.2 Governance of NWFPs

According to Howlett *et al.* (2009), governing is '*what governments do, that is controlling the allocation of resources between social actors; providing a set of rules and operating a set of institutions setting out 'who gets what, where, when and how' in society'* (p.385). Forest government is based mainly on command control regulations using the top-down decision making process that govern the state forest resources (Arts *et al*., 2014; Secco *et al.,* 2011; Agrawal & Gupta, 2005). Scholars, decision makers and policy makers across the globe have put many efforts into the governance of forest resources in a sustainable way, although it has not been easy because of the complexity of resources that are delivered from forest (Andersson, 2013; Andersson *et al.,* 2006).

Decentralisation of power from state authority to stakeholders from public, private and civil sectors at different levels of society has become a widespread phenomenon globally (Hackett, 2013). This shift implies a transition from government to governance. One of the reasons of shifting from forest government to forest governance is that management, regulation and control of forest as a public good by governmental authorities has lost its credibility (Art & Visseren-Hamdkers, 2012; Agrawal *et al.,* 2008). The governance theory is a broad umbrella term that covers almost any non-hierarchical mode of policy formation exercised by formal governmental bodies interacting with each other and with organizations in civil society (e.g., Rhodes, 1997, Mayntz, 2003). In principle, the reduced relative role of states in a globalize world has provided room for increased decentralisation, participation and empowerment, but also the role of large international businesses. However, globalisation has also made the links between some actors' gains of unsustainable use and other actors' losses less transparent. The appearance of multi-level governance has clear relevance to the analyses of natural resource management and the way in which they need to be carried out. There are many forms of governance arrangements, and the governance idea has been interpreted in quite different and not often consistent ways (Howlett *et al*., 2009). In general forest governance is characterised by increased participation of diverse stakeholders in policy discourse and resource management (Dhital *et al.,* 2015), and by the decision-making process at multiple levels related to forests.

The changes in forest government are subject of active discussions among scholars (Secco *et al.,* 2011). There are many arguments that government with a top-down approach cannot manage forest resources in an effective way, and new non-state-centred civil society and market-oriented means of decision-making are emerging (Hackett, 2013). Many studies describe new ways of governance that go beyond the centralised state (Arts, 2014; Hackett, 2013). Arts (2014) defined four forest governance concepts: (1) governance in a broad sense – governing resources with or without state; (2) 'strict' governance – governance beyond the confidence of the state; (3) multilevel governance – governance at different levels from local to global ones and (4) good governance – improving governance for better results.

Governance of NWFPs has emerged as an integrated part of the broader concept of forest governance (Wiersum *et al*., 2014; Art & Visseren-Hamdkers, 2012; Lemos & Agrawal, 2006). NWFP governance concerns rules, including management regulations, the decision-making process, and access to the resources (Shackleton *et al.*, 2015b; Wiersum *et al.,* 2014; Sandström *et al.,* 2011). According to Wiersum *et al.* (2014), governance of NWFPs is a '*multi-stakeholder and multilevel process of interactive decision-making and creation of institutional frameworks for the allocation, use and trade of NWFPs'*. It requires that different stakeholders have access to participate in the decision-making process. Ostrom (2009) shows different examples of how local communities can effectively govern common resources. Shackleton and Pandey (2014) propose eight steps of integrating NWFPs into national or international development agendas. Those eight steps include inventory of NWFPs, sustainable harvesting of NWFPs, inclusion of NWFPs into management plans and policies on health, cultural and economic development, commercialisation of NWFPs with regards for the demands of poorest residents, secure governance of NWFPs, and examination of drivers for NWFPs decline.

However, there is a lack of studies on NWFP governance, particularly on how decisions are made, who is responsible for them and how power is distributed and handled (Secco *et al*., 2011). First I reviewed the studies on the governance of NWFPs. My thesis elaborates on a set of features that can be used to assess the governance of NWFPs. I use a two-dimensional analysis of existing government/governance systems of NWFPs in Ukraine and the Russian Federation. The first is an institutional dimension, or formal and informal institutions in the governance of NWFPs (Howlett *et al.*, 2009). Both formal and informal institutions outline the structure of the decision-making process, including power distribution among different stakeholders and their responsibilities. The second dimension is the role of stakeholders from public,

private and civil sectors at different governance levels in the decision-making process related to NWFPs. I show that the governance of NWFPs is realized if the formal and informal institutions address the interests, values and needs of different stakeholders and stakeholders from different sectors of society at multiple levels that are involved in the decision-making process (Elbakidze *et al*., 2010).The governance of NWFPs in Sweden was studied based on available literature, policy documents and the Swedish FSC standard. I analysed peer-reviewed articles related to the governance of NWFPs in Sweden (Boman *et al*., 2013; Sténs & Sandström, 2013; Boman & Mattsson, 2012; Sandström *et al*., 2011; Holmgren *et al.*, 2010; Sandström & Widmark, 2007).

Recent studies demonstrate that NWFPs play a significant role as a component of SFM, and can be used for sustainable rural development and sustainability on the ground (Kar & Jacobson, 2012). Different landscape approach concepts and initiatives could be used to improve or establish new forms of governance of forest resources, including NWFPs. Model Forests (MFs) and Biosphere Reserves (BRs) are examples of such initiatives. In my thesis I analyse different landscape approach concepts and initiatives and the role of local stakeholders in the decision-making process concerning NWFP governance using BR initiative in Ukraine as an example.

2.3 Sustainable livelihoods as a concept and role of NWFPs

The sustainable livelihoods concept emerged with the aim to escalate the issues of poverty reduction and increasing human well-being (Ashley & Carney, 1999). The definition of the sustainable livelihoods concept was given by Chambers and Conway (1992), and later developed by many scholars (Toner, 2003; Ashley & Carney, 1999; Carney, 1998). According to Chambers and Conway (1992), a livelihood '*comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term*' (p. 6).

Nowadays many international policies and processes address poverty reduction. The Sustainable Development Goal number one is to eradicate extreme poverty by 2030. NWFPs can greatly contribute to poverty alleviation, but the total influence of forest products for sustainable livelihoods is difficult to quantify (Warner, 2000; Arnold 1998). FAO (2000) stressed that there is a

need to develop the concept of livelihoods, particularly in relation to people who depend on the forest for food, employment, income or subsistence.

The sustainable livelihoods approach has a set of principles followed by Ashley & Carney (1999) and Tonner (2003): (1) sustainable – the balance between the social, economic, political and ecological components of sustainability must be found; (2) people-centred – the people's needs towards poverty elimination and with a focus on different group's needs, (3) multi-level- from micro level or local activities to macro level or national level of policies; (4) dynamic – must recognize the dynamic nature of livelihoods strategies; (5) participatory – people themselves have to identify the livelihoods priorities; (6) conducted in partnership – both public and private sector have to interact. A number of scholars (Ros-Tonen & Wiersum, 2005; Ros-Tonen *et al.,* 2005; Kaushal & Kala, 2004) distinguish five forms of capital for sustainable livelihoods: 1) natural, 2) physical, or produced, 3) human, 4) financial and 5) social capital. The availability of these five types of capital determines the prospects of sustainable livelihoods. The households or individuals will improve their livelihoods by combining those capitals (Ros-Tonen *et al.,* 2005; Kaushal & Kala, 2004). Natural capital includes the availability of land, forest and other resources. The physical or produced capital includes basic infrastructure (transport, roads, schools, hospitals, affordable building and energy etc.). The human capital includes the knowledge, skills, education, ability to work and health. The financial capital includes savings and availability of credits, jobs and pension. The social capital includes the relations in the families, communities and social networks. Those five capitals are used to illustrate the importance of each of them for livelihoods (Ros-Tonen *et al*., 2005; DFID, 1999). I use the sustainable livelihoods approach and a set of its principles in my thesis to analyse the role of NWFPs for livelihoods of rural communities, especially forest-dependent communities. Following Kusel (1996) I understand forest-dependent communities as '*those immediately adjacent to forestland or those with a high economic dependence on forest-based industries, including tourism as well as timber*' (p. 367). Forest-depended communities rely on forest resources, e.g., working in forest industry, including NWFPs, which have seasonal and cyclical yields; critically depend on access to forest resources; and use and maintain traditional ecological knowledge (Yeo-Chang 2009). The sustainable livelihoods approach seeks to improve rural development policy and practice by recognizing the seasonal and cyclical complexity of livelihood strategies (Allison & Ellis, 2001).

3 Methodology

3.1 Case study research

Case study research as a scientific method is widely applied in different fields of social, political, business and natural resource use (Yin, 2013). According to Oxford dictionary (2012), a case study is (1) a process or record of research into the development of a particular person, group, or situation over a period of time; (2) a particular instance of something used or analysed in order to illustrate a thesis or principle. Case study research is an appropriate research strategy where a contemporary phenomenon is to be studied in its context (Yin, 2003; Darke *et al.*, 1998; Benbasat *et al.*, 1987). It focuses on understanding the dynamics present within a single setting (Eisenhardt, 1989). This research can be used with different aims, such as to develop a theory, to test a hypothesis or to provide description of a phenomenon (Darke *et al.* (1998), p.275.). According to Yin (2003), case study research can be exploratory, descriptive and explanatory. Exploratory case study research aims at identifying and defining the hypothesis and research questions; descriptive case studies intend to provide an exhaustive description of the phenomenon; and, finally, explanatory aims at explaining how the events happened (Yin, 2003; Yin, 1994). Case study research methods can be based on a single case study or multiple case studies, and different types of analysis. It includes qualitative or quantitative data collection, or both at the same time (Eisenhardt, 1989) by using different instruments of data collection, including interviews, literature review, observations, and questionnaires. Both Yin (1994) and Eisenhardt (1989) stressed that an investigator is an important tool in the case study research.

I used exploratory, descriptive and explanatory multiple case study approach to collect data in three countries, Ukraine, Sweden and the Russian Federation (Table 1). The advantage of using case studies research is

production of evidence-based knowledge for understanding of a phenomenon or process in a specific context (Ritchie *et al.*, 2003). All studies in my thesis describe a specific phenomenon in a concrete context. By applying the same methods for data collection and the same variable in each case study (Ruiz-Perez and Byron 1999) I was able to make a comparative analysis of a role of NWFPs in local livelihoods in different contexts.

Table 1. *Case studies presented in the thesis, classified according to Yin (2003) and Eisenhardt (1989)*

Paper	Type of case study	Case studies	Methods
I	Exploratory and descriptive case study Multiple case studies	Two countries: Ukraine and Sweden. Two landscapes: Roztochya (Ukraine) and Småland (Sweden)	Policy analysis In-depth qualitative interviews Field observations
II	Exploratory and descriptive case study Multiple case studies	Three countries: The Russian Federation, Ukraine and Sweden. Three landscapes: Kortkeros, Roztochya and Småland	Literature review In-depth qualitative interviews
III	Exploratory, explanatory and descriptive case study Multiple case studies	Two countries: Ukraine and the Russian Federation Two landscapes: Kortkeros (Russian Federation) and Roztochya (Ukraine)	Policy analysis In-depth qualitative interviews
V	Descriptive and explanatory case study Single case study	Biosphere reserve initiative in Roztochya(Ukraine)	In-depth qualitative interviews Policy analysis Literature review

3.2 Study areas

The Roztochya upland region (hereafter Roztochya) in Ukraine, the Småland high plain (hereafter Småland) in Sweden, and the Kortkeros municipality (rayon) (hereafter Kortkeros) in the Komi Republic in NW Russia were selected as case study areas. The selected study areas have similar characteristics including all being dominated by rural residency, having a high percentage of forest coverage, and free access to plant NWFPs. In all three case study areas NWFPs have traditionally been important sources of wild food and

medicine for centuries (Stryamets *et al*., 2015; Sõukand *et al*., 2013; Svanberg *et al*., 2012; Stryamets *et al*., 2010; Pearson *et al*., 2007; Ryabchuk *et al*., 2006; Encyklopediya lekarstvennyh rastenyi, 1992; Kotelina, 1990; Kardell, 1980; Komendar, 1971). Hunting historically was crucial important for Komi Republic (Pearson *et al*., 2007). In Sweden hunting was important recreational activity (Boman & Mattsson, 2012). In Roztochya hunting was historically source of wild food and medicine (Ryabchuk, 1996). At the same time these study areas represent different socio-economic and governance contexts that exist in Europe (Table 2).

Table 2. *Socio-economic and governance contexts in the study areas*

	Roztochya (Ukraine)	Småland (Sweden)	Kortkeros (Russian Federation)
Forest cover (%)	44	51	90
Population (number of inhabitants)	59922	35092 (95969 incl. Växjö)	19200
Population density (persons/sq.km)	80	25	1
Average salary in 2012 (Euro)	214	2790	516
Average pension in 2012 (Euro)	103	1038	205
Forests ownership (%)	State (100)	Non-industrial private forest owners (88), Sveaskog Co (3.3), Swedish Church (2)	State (100)
Unemployment (%)	8.5	7.3	50

3.2.1 Roztochya (Ukraine)

Roztochya (50°06´N - 49°06´N and 23°20´ E - 23°54´E) is located in the westernmost part of Ukraine and easternmost Poland, and forms the watershed between the Baltic and Black Sea catchments. The Ukrainian part of Roztochya is situated in the temperate lowland forest ecoregion in western Ukraine, and covers 992 sq. km (Figure 2). It is an important green infrastructure that forms a corridor for biodiversity and cultural heritage across the Eastern European Union border. The Roztochya landscape holds high natural and cultural values (Stryamets & Ferenc, 1999). Forests cover about 44% of the total area, and the rest is made up by agricultural land, cultural woodlands and villages. The forest types are very diverse ranging from dry

sites with Scots pine [*Pinus sylvestris* L.] to mesic sites with beech [*Fagus silvatica* L.], and wet sites with ash [*Fraxinus excelsior* L.] and black alder [*Alnus glutinosa* L.] (Stryamets & Ferenc, 1999). Villages are generally traditional with a gradient from houses with gardens, in-fields used for growing food or as orchards, agricultural crops and hay production, and out-field pastures and grazed forests (e.g., Elbakidze and Angelstam (2007).

The Roztochya area hosts many different stakeholders, which have the right to use forest and woodland resources for commercial, nature conservation and domestic purposes. The population density is about 80 persons per sq. km (Anon., 2008). There are 120 settlements in Roztochya with 59,922 inhabitants (Yavorivskiy and Zhovkivskiy rayons). There are also 8 state forest management units, which are under the management of different governmental organizations, including the State Forestry Committee, Ministry of Defence and Ministry of Agriculture, Ministry of Education and Science. In addition, there are two protected areas, Yavoriv National Nature Park and Roztochya Strict Protected Reserve, which are under the management of the Ministry of Environmental Protection and the Ministry of Education and Science, respectively.

During the Soviet period (1917-1991), sulphur mining formed the base for the economy in the Roztochya region, and more than 20,000 people, locals and incomers, were employed by the mining industry. In the villages within the region, collective agricultural farms were the main employers for local people. After the collapse of the Soviet Union in 1991, the mining industry ceased to exist and, as a result, people lost employment. The collective farms that were created during the Soviet period were reorganized into small-scale farms or were abandoned due to the new political and economic development towards market economy. Unemployment is still the main problem in the area.

To support the process of SD toward sustainability, there are on-going efforts to develop the Roztochya BR. Different types of landscape actors in the area are developing partnerships to integrate their efforts to use forest and woodland landscapes in a sustainable way. The BR consists of three management zones with different regulations and restrictions concerning nature conservation and use of forest landscapes. There is a core zone (3.9% of the BR area) with strict restrictions to any human activities; a buffer zone (5.4%) with protective functions, and where tourism and recreation activities are allowed by following strict regulations; and finally a transition zone (90.7%), which provides a smooth transition to the surrounding and where adapted economic and socio-economic development functions are planned to take place

3.2.2 Småland (Sweden)

Småland (56°52´- 57°26´ N and 14°43´-15°04´ E) is located in the central part of an upland area in southern Sweden (Figure 2), the core of which forms the southernmost larger island of boreal forest in Sweden dominated by Scots pine and Norway spruce [*Picea abies* (L.) Karst.]. Towards the south there is a gradual transition to hemiboreal forests and the northernmost part of the temperate lowland deciduous with beech. Today's forest-dominated landscapes have a very long history of animal husbandry and farming (Lagerås, 2007; Lagerås, 1996). Forests were grazed, and near villages there were dry and wet meadows, fields and gardens. The best soils were cleared for agricultural use, a process that started 6200-3800 BC in this part of Sweden (Johansson, 1999). Already more than 2000 years ago (Johansson, 1999), human use developed to a traditional village system that shaped over the years with high natural and cultural values (Berglund *et al*., 2002). During the second half of the 20th century, grazed mixed deciduous and coniferous forests were transformed into production forests by the introduction of Norway spruce plantations and gradual development of sustained yield forestry (Bradshaw *et al*., 2000; Björkman, 1996). Private landowners are key local stakeholders in the social system governing the economic use of forest resources. Non-industrial private forest owners own 80-88% of the forests in the study area (The Swedish Forest Agency, 2010). The other main forest owners are the state forest company Sveaskog, municipalities, and the Swedish Church. The Småland encompassed 22 parishes (Norra Sandsjö, Sävsjö, Vrigstad, Hjälmseryd, Stockaryd, Vetlanda, Ramkvilla, Södra Solberga, Korsberga, Lanna-Skede, Nottebäck, Växjö tätort, Sjösås, Drev, Tjureda, Söraby, Tolg, Asa, Aneboda, Berg, Ormesberga, Ör) with a total area of 1792 sq. km, and an average population density is 25 persons per sq.km (53 persons per sq. km including towns, but with only 13 per sq. km in rural parishes without towns). The population trend is negative, especially in rural areas which host 26% of the population (Statistics Sweden, 2011). Nevertheless, unemployment rates are lower than the Swedish average.

3.2.3 Kortkeros (Russian Federation)

The Kortkeros rayon, Komi Republic (hereafter Kortkeros) (60°45' N – 62° 50' N and 50° 45' E – 53° 30' E) is located at the eastern edge of the European part of the Russian Federation. It is situated in the south of the Komi Republic (Figure 2).The total area of Kortkeros is 19,7 thousand sq. km., with the 90% of the area covered by forest (Shestyukova, 2012).

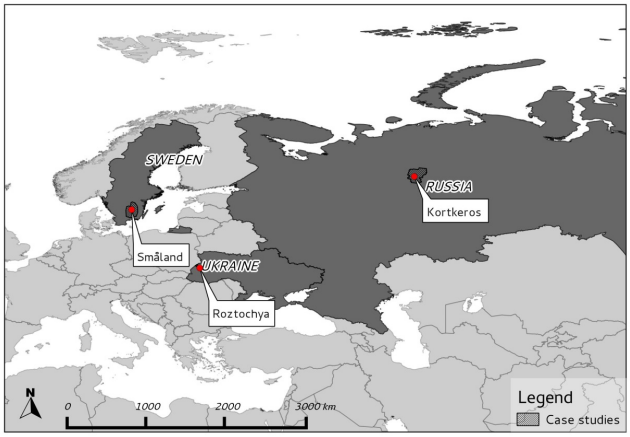


Figure 2. Location of case studies in Sweden, Ukraine and the Russian Federation.

The boreal forest in the area is formed by Scots pine and Norway spruce often with a supplement of birch [*Betula* spp.] and aspen [*Populus tremula* L.] (Shestyukova, 2012). The population density is low, less than a person per square kilometre, and the rural population is dominating. There are no towns in the Kortkeros region. There are 60 villages; including forest villages, and traditional indigenous villages which are grouped into 18 settlements, with 19200 inhabitants(Anon., 2013). The depopulation process is characterized both by low birth and emigration rate. High unemployment is the main problem in the region.

During the Soviet regime, the state forestry enterprises in the Komi Republic played an important socio-economic role (Matilainen, 2013; Nordberg *et al*., 2013) by providing local jobs and maintaining rural infrastructure (schools, kindergartens, healthcare, and shops and houses for workers) in the so called "forest villages" (Matilainen, 2013; Nordberg *et al*., 2013). Since the Soviet Union collapsed, the country has been in transition from planned socialist to market economy. The number of employed in the forestry sector has decreased dramatically due to the modernization of forest operations (Nordberg *et al*., 2013), and currently the official level of unemployment is more than 50% (Anon., 2013). There are 12 private forest companies, including Mondi Syktyvkar OJSC as a the biggest forest company, and a number of small private entrepreneurs that have leased forests and are responsible for forest management (Anon., 2013).

4 Methods

4.1 Interviews

Data for papers I-IV were collected by qualitative research interviews (Bryman, 2008; Kvale & Brikman, 2008; Kvale, 2007). The interviews were conducted using a semi-structured interview manual with open questions. All interviewees were given full freedom to talk openly about each question and the interview manual was used as a tool to guide the interviewee's story towards areas of interest. As an interviewer, I aimed to talk as little as possible and used the questions merely to stimulate the informants to talk. The interview manual provided a structure, like a map to follow through the interview, by including questions about all parts of interest for this study. For each question there were a few follow-up questions to check if all area of interests were touched upon. When doing the interviews, I took on the role of a data miner (Kvale & Brikman, 2008) searching for new information and thus following up the information that could lead to new insights even if it was not included in the follow-up questions. In total, 307 qualitative interviews were carried out in 3 countries (Table 3). All informants were interviewed in their native languages. In Småland, the interviews were conducted with the help of an interpreter. The interviews lasted between 15 and 110 minutes and were digitally recorded and transcribed. The interview transcripts were analysed for emergent themes related to NWFP utilization and governance practices (Table 3) (Bryman, 2008).

For paper I, 114 interviews in total were conducted. Fifty-four interviews were taken in 26 settlements and towns in Roztochya and 60 interviews in 36 settlements and towns in Småland. The interviewees were chosen randomly in the streets of the villages and towns, near the houses or gardens. For these interviews I used an interview manual that included both open-ended and closed questions. The collected data contained information about: (1) the type

of harvested NWFPs; (2) the volume of collected NWFPs and methods, (3) ways of its utilization, including traditional practices, and (4) information about the collector (age, gender and community background).

For paper II, in total 234 qualitative semi-structured interviews were conducted with local stakeholders in the three study areas (60 in Småland, 104 in Roztochya and 70 in Kortkeros) during a total of six months of field work from 2010 to 2013. Local inhabitants were randomly chosen for interviews. The interview manual included a mixture of open and more specific questions about NWFPs, including (1) species that are harvested; (2) the amount harvested, (3) current uses and practices, (4) changes of over time, and (5) other issues (see Annex 1). Due to the application of the qualitative approach with open-ended questions, the interviewees had full freedom to talk about NWFPs from their perspective. Respondents were asked to divide NWFPs they used into wild food and medicine. The interviews lasted between 15 and 110 minutes. Verbal consent to participate in the study was obtained from the informant before each interview. The project followed ethical guidelines outlined by the American anthropological association (2012) and the International Society of Ethnobiology (2006).

For paper III, 48 interviews with main forest users were conducted. Interviews in Roztochya were carried out together with Marine Elbakidze. The interviews were conducted with (1) managers of forest enterprises, (2) heads of the village councils, (3) representatives of forest companies, and (4) regional authorities. The interview manual contained a mixture of open and more specific questions about NWFPs use and governance, including (1) importance of NWFPs for local livelihoods, (2) management and regulation rules related to extraction of NWFPs and, finally, (3) participation in the decision-making process related to NWFPs (see Annex 2). The qualitative semi-structured interviews allow free discussion of the subject of study. Interviews, which lasted from 40 minutes up to 2 hours, were digitally recorded and then transcribed.

For paper V, 25 interviews in total with the main stakeholders and focus group discussions were conducted together with Sarah Crow and Marine Elbakidze. Interviews were carried out with key respondents in the study area. The respondents represented the following groups: (1) promoters of the BR initiative, (2) heads of the ten village communities within the BR's boundaries, and (3) forest managers from the state forest enterprises located in the BR and managers of protected areas located in the BR.

Interviews are good research technique to know people's opinion or feelings about phenomenon (Esterberg, 2002). Two main ethical issues were

discussed before each interview. First one was maintaining confidentiality and second one was obtaining informed consent.

Table 3. *Number of qualitative interviews in each case study*

	Roztochya (Ukraine)		Småland (Sweden)		Kortkeros (Russian Federation)	
Paper I	54	April-May 2010	60	June-July 2010		
Paper II	104	July 2013	60	June-July 2010	70	October-November 2013
Paper III	32	June 2014			16	November 2013
Paper V	25	September 2009 and March-April 2010				

*Paper IV is analytical, no interviews were taken.

I used the exploratory sampling, which is used to discover new ideas or theories. For this purpose it is not needed to get the cross section of all population, as for example in questionnaires methods (Denscombe, 2014). My main goal was to reach multiple viewpoints in order to get greater accuracy. Multiple and independent interviews if they reach the same conclusions, provide the more certain portrait of the phenomenon.

4.2 Analysis of formal and informal institutions

To understand the governance of NWFPs in Ukraine and the Russian Federation I performed a qualitative analysis of 17 legal documents (eight for the Russian Federation and nine for Ukraine) with the aim to understand the ownership rights on NWFPs, beneficiaries of the NWFPs, and the decision-making process related to NWFPs' extraction in each country. The FSC standards as an informal institution, which have been used in both countries to certify forest management, were analysed concerning NWFPs and the rights of different stakeholders in the decision-making process.

4.3 Systematic literature analysis

To review the studies on the governance of NWFPs in general and in Sweden in particularly, I selected peer-reviewed articles on the governance, management and use of NWFPs by querying Google Scholar, Web of Science

and Science Direct. First, using the terms "forest governance", "governance NWFPs", "governance non-wood forest products", "governance NTFPs", "hunting, governance" I extracted all peer-reviewed publications in English. Second, the abstracts of the extracted articles were read and classified as relevant or not. The articles were classified as relevant if the abstract discussed the governance of forest resources, focusing on NWFPs, or non-timber forest products, or specific part of forest product (hunting, mushrooms, berries, medicinal herbs, etc.). At the first stage, the abstracts of 68 articles from the Web of Science, 12 from Science Direct and 17 from Google Scholar were read. During this stage, 51 papers were rejected as not meeting the abovementioned criteria. The remaining 46 articles were selected; all of them were read and analysed. The studies were classified using the Suich *et al*. (2015) approach. A list of variables was created (Table 4) and each paper was analysed and coded in an Excel file. Next, the set of literature was filtered by the connection to Sweden. All studies were filtered towards the analysis of the governance of NWFPs in Sweden (if Sweden was a spatial scale of the study). The six studies out of 46 met these criteria.

Table 4. *Variables coded during the classification process (followed Suich et al. (2015)*

Variable	Definition
Location	Location of the study area
Spatial scale of the study	Local
	Regional
	National
Non-wood forest product type	Animal or plant origin
Governance type	(1) governance in broad sense – governing resources with or without state; (2) 'strict' governance – governance beyond the confidence of the state; (3) multilevel governance – governance at different levels from local to global levels; (4) good governance – improving governance for better results (Arts (2014)
Time scale of the study	Historic studies (changes over time), future impact
Impact/outcome	Short description of the results

5 Results

5.1 NWFP use in transition and market economies (Paper I and Paper II)

NWFPs is a diverse and complex category, which includes both plant and animal origin products. NWFPs are grouped into 16 categories (FAO, 1999) (Figure 3). NWFPs of plant origin are classified into 8 categories: (1) food; (2) fodder; (3) raw material for medicine and aromatic products; (4) colorants and dyes; (5) utensils, handicrafts and construction; (6) ornamental plants; (7) exudates and (8) other plants products. NWFPs of animal origin are grouped into the remaining 8 categories: (9) living animals; (10) hides, skins and trophies; (11) wild honey and bee-wax; (12) bush meat; (13) raw material for medicines; (14) raw material for colorants; (15) other edible animal products and (16) other non-edible animal products. I use these categories to analyse the use of NWFPs in three case studies (Figure 3).

5.1.1 NWFPs as wild food in different contexts

Respondents in all three case studies reported that they used a wide range of NWFPs as wild food. All respondents collected wild berries, mushrooms and herbs, however, the number of collected species differed among the case study areas (Figure 4). In the Swedish study area the maximum number of collected species per respondent was three, while in the Ukrainian and Russian study areas it was eight and six, respectively. Respondents in Roztochya and Kortkeros reported that amount harvested depends on the year yield, e.g., if there are more berries and mushrooms in the forests, they collect more. For example respondents pointed '*During the past two years the amount of mushrooms was low in the forests, so we collected less*'. The gender distribution of the collectors was reported as equal; both sexes were named as

collectors of NWFPs. Generally, the NWFPs were collected by all age classes. The respondents in Kortkeros stressed that kids, young people, middle-age and elder people were collecting NWFPs for additional income. In Roztochya respondents pointed out that kids and older people were the main NWFPs collectors, while young and middle-age people were working.

The annual amount of collected berries in Småland was 2-5 litres of blueberries [*Vaccinium myrtillus* L.] and lingonberries [*Vaccinium vitis-idaea* L.] on average per family. In both the Ukrainian and Russian study areas, the amount of collected berries was higher than in the Swedish study area.

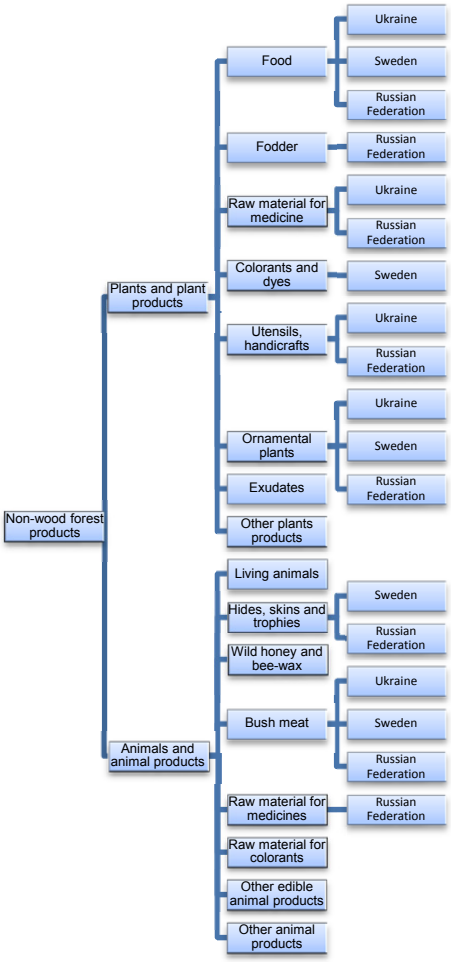
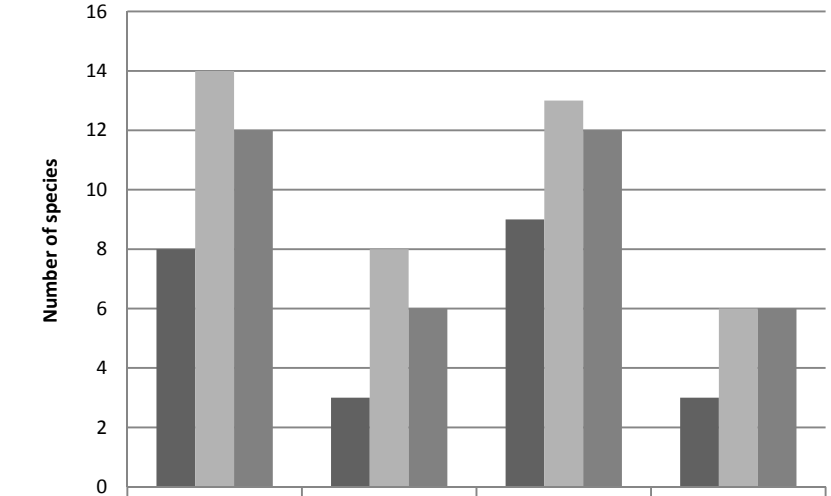


Figure 3. Differences in the use of NWFPs by categories in three case studies

According to the interviewees, 10 litres of blueberries, 10 litres of blackberries [*Rubus* sp.], 6 litres of raspberries [*Rubus idaeus* L.] and 1-2 litres of wild strawberries [*Fragaria vesca* L.] on average were harvested annually per household for domestic purposes in Roztochya. In Kortkeros, locals gathered 12 litres of lingonberries, 20 litres of blueberries and 15 litres of cranberries [*Vaccinium oxycoccos* L.] on average for household consumption. Cloudberry [*Rubus chamaemorus* L.] was consumed in small quantities ranging from 1 to 20 litres (on average 5 litres). In the last two study areas, the respondents stated that it was hard to collect berries, and quantities therefore greatly depended on the year yield. In the Russian and the Ukrainian study areas the respondents collected birch [*Betula pendula* Roth. and *B. pubescens* Ehrh.] sap (from three to ten litres per household) for personal consumption, as '*a healthy and tasty drink*'.



	Maximum number of collected berry species per person	Average number of collected berryspecies per person	Maximum number of collected fungi species per person	Average number of collected fungi species per person
Småland	8	3	9	3
Roztochya	14	8	13	6
Kortkeros	12	6	12	6

Figure 4. Use of NWFPs for wild food in three case studies

5.1.2 NWFPs as wild medicine

In all three study areas local people had a long history of medicinal herb consumption, but nowadays these practices have changed. In Småland, local people no longer collect medicinal herbs for curative treatments of ailments. The respondents often mentioned that they did not have enough knowledge about medicinal plants and fungi species and their use. Instead, they used forest for recreational activities with the aim of recovery, energizing and stress relief. Wild berries were mentioned by respondents as food rich in vitamins (hence these are considered functional foods).

It was often hard to draw a line between the use of NWFPs as wild food or for medicinal purposes. Some species in the three study areas were used only as food, while all other species were used as wild food and medicine in the Ukrainian and Russian sites. This illustrates a thin line between food and medicine. Some species, however, where exclusively used as medicine (such as *Arctium lappa* L., *Tussilago farfara* L., *Plantago major* L., *Chamomilla recutita* (L.) Rauschert, *Elymus repens* (L.) Gould).

Unlike in Sweden, in the Ukrainian and Russian study areas collecting medicinal herbs was as popular as collecting wild food. The total list of medicinal herbs used in Roztochya and Kortkeros is presented in Paper II. In Sweden we found that 11 species of wild food (plant and fungi species) were used, while no medicinal plant species were collected. The table 5, 6 and 7 describes the varieties of mushroom collected in case study areas. In Ukraine the present use of NWFPs include 26 wild foods and 60 medicinal species, while in Russia 36 food and 44 medicinal species were reported. On average, six species of medicinal herbs were collected in the forests by each household in Roztochya, e.g., raspberries, guelder rose [*Viburnum opulus* L.], common hawthorn [*Crataegus monogyna* Jacq.] and rowan [*Sorbus aucuparia* L.], wild strawberries, common nettle [*Urtica dioica* L.] and dog rose [*Rosa canina* L.]. In one village, people collected more than 12 species of medicinal plants. Respondents collected different parts of the plants, such as the flowers of linden [*Tilia cordata* Mill.], the buds of birch [*Betula pendula* Roth.] or leaves of common nettle. The most used medicinal herbs in Kortkeros were cloudberries, lingonberries, blueberries, raspberries [*Rubus idaeus* L.], St John's wort [*Hypericum perforatum* L.] and greater plantain [*Plantago major* L.]. The Russian respondents believed that it was important to use medicinal herb during winter to prevent flu and cold. Fat from brown bear [*Ursus arctos*, Linnaeus, 1758] was also mentioned as a medicinal treatment for many different ailments. Fat from European badger [*Meles meles*, Linnaeus, 1758] and marmot [*Marmot* sp.] were used for tuberculosis therapy. People in all

study areas considered berries as a rich source of vitamins and good for one's health.

Generally, respondents in the Ukrainian and Russian study areas used medicinal herbs either in teas (infusions) or prepared different kinds of tinctures for '*promoting health*'. The collected plants were dried in a shadowy or dark place, and used afterwards for making tea. As a rule the tea from dried herbs had to be infused for one hour before drinking. To make tinctures, additional ingredients were used, such as alcohol, sugar or honey. In general, the respondents in the Ukrainian and Russian study areas preferred to use medicinal herbs against certain illnesses rather than medicine from the pharmacy or shops. They also considered herbal remedies to be more environmentally friendly than pharmaceuticals. The most common ailments cured with herbal remedies in Roztochya were flu, cough, and gastrointestinal problems. In addition, herbal remedies were used as vitamins, immuno-stimulants and cosmetics. Medicinal herbs were also used to treat chronic diseases like diabetes and hypertension (high blood pressure). Most herbal remedies in the Russian study area were used to treat rheumatism and arthritis, upper respiratory tract infections (cough and common cold), kidney and urinary tract problems, high blood pressure, blood coagulation and different gastrointestinal problems (stomach ailments, inflammation, gastritis).

Several respondents in the Russian and Ukrainian study areas claimed that a tincture of *Amanita muscaria* contains anti-carcinogenic properties. Interviewees also stated that their income was low and, accordingly, pharmaceuticals were considered to be extremely expensive, while the cost associated with collecting medicinal herbs was much lower. As a result, the active use of medicinal herbs had increased (since the 1990s after the collapse of the USSR). Respondents in both the Ukrainian and Russian study areas collected berries for their kids because they considered it as a natural and healthy product. For respondents in Roztochya, cultural traditions and knowledge were also said to be important reasons for collecting wild food.

5.1.3 Private vs commercial use of NWFPs

The local rural communities use NWFPs as goods (food, medicine, handicrafts), to generate income and as means of employment (Ros-Tonen & Wiersum, 2005). Based on the interviews in the three case studies, I analysed the benefits that NWFPs provide to rural livelihoods of locals. Figure 6 shows the differences in benefits from NWFPs. The NWFPs as goods were used in all three case studies. NWFPs for income generation were used in the Ukrainian and Russian case studies. NWFPs as a source of employment was recorded in few cases in Roztochya and dominated in Kortkeros (Figure 6). Local people in

all case studies collected NWFPs for own needs. The amount and content of NWFPs considerably varied across the case study areas. Sale of wild food and medicine was very rare in Småland, while in Roztochya and Kortkeros this was a widespread activity. In Småland, local people harvested NWFPs of plant origin only for personal use.

The majority of interviewees in the Ukrainian and Russian study areas collected berries and mushrooms to sell. In Roztochya, people mainly sold NWFPs on local markets to different consumers, mostly from urban areas. The berries collected for sale were wild strawberries, blueberries, blackberries and raspberries. The main types of commercial mushrooms included penny bun or cep [*Boletus edulis* Bull.], red-capped scaber stalk [*Leccinum aurantiacum* (Bull. ex St. Amans)] and honey fungus [*Armillaria mellea* (Vahl) P. Kumm.]. The distance to markets varied from two to 60 km. In the villages located close to the border with Poland, local people often sold berries (mostly blueberries) to the Polish companies, which transported the berries to Poland for production of value-added products. Respondents mentioned that they found it easy to sell to the Polish companies, as these tended to buy all collected berries at once (in bulk). Respondents complained that there were not enough local companies that would buy berries and mushrooms from them. Some interviewees reported they earned more than 3,000 UAH (approximately 300 EUR, equivalent to two monthly salaries in rural areas) per season from selling berries. The price for one litre of blueberries (in 2013) was on average 15-20 UAH, which means that people collected and sold approximately 200 litres of berries. The price for one litre of wild strawberries was around 50 UAH (approx. 5 EUR) (2013 year). Interviewees mentioned that one could easily earn 100 UAH (approx. 10 EUR) per day, which was more than the average daily labour payment in rural areas. The average price for one litre of blueberries was 14 UAH (approx. 1.2 EUR) and for one kilogram of penny bun was 50-60 UAH (approx. 5 EUR) in 2013.

In Kortkeros, local people sold harvested NWFPs mainly to companies that froze berries and mushrooms for further transportation. Additionally, as the nearest town with a market ranged from 60 to 120 km away, in each village there were places where people sold their NWFPs to each other and rare tourists. The main commercial NWFPs were blueberries, lingonberries, cloudberries and cranberries, chanterelle and penny bun. Locally collected *Boletus edulis* and chanterelle were bought from the local people at collecting stations by the company representatives. The amount of berries that was sold during the season in Kortkeros significantly varied, depending on the annual yield and people's employment. Respondents pointed out that they collected as much as possible. Several respondents stated that they used their vacation time

to pick berries and mushrooms for sale. The minimum reported sold amount of berries was 100 kg of lingonberries. The maximum was 6 tons of blueberries and lingonberries that were sold by one family per one season. The prices for one kilogram of berries in 2013 varied from 60 to 80 rubles (approx. 1.2 – 1.5 EUR). The prices for *Boletus edulis* in 2013 were from 70 to 80 rubles per kilogram (approx. 1.3 – 1.5 EUR) and for *Chanterel cantharellus* 40-50 rubles per kilogram (approx. 0.9 – 1.0 EUR). People earned up to 250 000 rubles (approx. 5336.14 EUR) per season (the maximum sum that was mentioned). Commercial sale of medical herbs was not observed in any of the three case studies.

Table 5. *Use of mushrooms in Roztochya (Ukraine)*

Family	Species	Eng. name	Local names	Food use
Agaricaceae	*Macrolepiota* spp.	Parasol mushroom	Гриб-парасолька, парасолька, гриб-зонтик	Whole mushroom
Agaricaceae	*Agaricus campestris* L.	Field mushroom	Печериця, шампіньйон	Whole mushroom
Boletaceae	*Boletus edulis* Bull.	Penny bun	Білий гриб, боровик, білий, справжній гриб	Whole mushroom
Boletaceae	*Leccinum aurantiacum* (Bull.) Gray	Red-capped scaber stalk	Підосиковик, червоноголовець, червнонюх, підосичник	Whole mushroom
Boletaceae	*Leccinum scabrum* (Bull.) Gray	Scaber stalk	Підберезовик, козар, козарик, бабка	Whole mushroom
Boletaceae	*Boletus badius* (Fr.) Fr.	Bay bolete	Польський гриб	Whole mushroom
Boletaceae	*Boletus chrysenteron Bull.*	Red cracking bolete	Моховик, решітка	Whole mushroom
Cantharellaceae	*Cantharellus cibarius* Fr.	Chanterelle	Лисичка	whole mushroom
Meripilaceae	*Grifola frondosa* (Dicks.) Gray	Sheep's head	Бараняча голова, баранячка, бараньоха	Whole mushroom
Polyporaceae	*Polyporus umbellatus* (Pers.) Fr.	Sheep's head	Бараняча голова, баранячка, бараньоха	Whole mushroom
Morchellaceae	*Morchella esculenta* (L.) Pers.	Common morel	Зморшок, сморшок	Whole mushroom
Physalacriaceae	*Armillaria mellea* (Vahl) P. Kumm.	Honey fungus	Опеньок	Whole mushroom
Russulaceae	*Lactarius resimus* (Fr.) Fr.		Груздь	Whole mushroom
Russulaceae	*Russula* spp.	Russula	Сироїжки	Whole mushroom
Suillaceae	*Suillus luteus* (L.) Roussel	Slippery jack	Маслюк	Whole mushroom

Table 6. *Use of mushrooms in Kortkeros (Russian Federation)*

Family	Species	English name	Local names	Food use
Agaricaceae	*Macrolepiota* spp.	Parasol mushroom	Гриб-зонтик, зонтик	Whole mushroom
Boletaceae	*Boletus edulis* Bull.	Penny bun	Белый гриб, боровик	Whole mushroom
Boletaceae	*Leccinum aurantiacum* (Bull.) Gray	Red-capped scaber stalk	Подосиновик красный, подосиновик, красноголовик	Whole mushroom
Boletaceae	*Leccinum scabrum* (Bull.) Gray	Scaber stalk	Подберёзовик обыкновенный, подберёзовик, чёрный	Whole mushroom
Boletaceae	*Boletus chrysenteron Bull.*	Red cracking bolete	Моховик	Whole mushroom
Cantharellaceae	*Cantharellus cibarius* Fr.	Chanterelle	Лисичка обыкновенная, лисичка	Whole mushroom
Discinaceae	*Gyromitra esc ulenta* (Pers.) Fr.	False morels	Строчок	Whole mushroom
Morchellaceae	*Morchella esculenta* (L.) Pers.	Common morel	Сморчок	Whole mushroom
Physalacriaceae	*Armillaria mellea* (Vahl) P. Kumm.	Honey fungus	Опёнок, собачий гриб	Whole mushroom
Russulaceae	*Lactarius pube scens* Fr.	Downy milk cap	Волнушка белая, волнушка	Whole mushroom
Russulaceae	*Lactarius resi mus* (Fr.) Fr.		Груздь настоящий, груздь	Whole mushroom
Russulaceae	*Lactarius torm inosus* (Schaef f.) Gray	Woolly milkcap	Волнушка розовая	Whole mushroom
Russulaceae	*Russula* spp.	Russula	Сироежки	Whole mushroom
Suillaceae	*Suillus luteus* (L.) Roussel	Slippery jack	Маслёнок обыкновенный, маслята, маслёнок	Whole mushroom
Suillaceae	*Suillus bovinus* (L.) Roussel	Jersey cow mushroom	Козляк	Whole mushroom
Tricholomataceae	*Tricholoma eq uestre* (L.) P. Kumm.	Yellow knight	Зеленушка	Whole mushroom

Commercial sale of game meat and hunting in the Ukrainian case study was not popular among respondents. The tradition to hunt and use meat for traditional food like game meat with wild mushrooms was popular in the Swedish and Russian case study areas.

Table 7. *Use of mushrooms in Småland (Sweden)*

Family	Species	English name	Local names	Food use
Agaricaceae	*Macrolepiota* spp.	Parasol mushroom	Fnasig fjällskivling	Whole mushroom
Boletaceae	*Boletus edulis* Bull.	Penny bun	Karljohan	Whole mushroom
Boletaceae	*Leccinum aurantiacum* (Bull.) Gray	Red-capped scaber stalk	Aspsopp	Whole mushroom
Boletaceae	*Leccinum scabrum* (Bull.) Gray	Scaber stalk	Brun aspsopp	Whole mushroom
Cantharellaceae	*Cantharellus cibarius* Fr.	Chanterelle	Kantarell	Whole mushroom
Cantharellaceae	*Craterellus tubaeformis* (Fr.) Quel	Yellowfoot	Trattkantarell	Whole mushroom

The hunters mentioned that they got good ecological meat for free. In Småland the meat was used for domestic consumption and only one respondent mentioned selling small amounts of meat. In the Russian case study area, hunting was mentioned as an important food and income generation activity. The commercial sale of game meat was not popular, but the meat was used as substantial food.

5.1.4 Collection of NWFPs past vs. present

The changes of NWFPs consumption in time and space were mentioned by interviewees in all three case studies. In the Ukrainian and Russian case studies the use of NWFPs increased, and in the Swedish case study decreased compared to the past. Middle-aged and older people according to interviewee's were more interested in NWFPs.

The majority of respondents in the Ukrainian and Russian study areas mentioned that the collection of NWFPs had become more intensive compared to 20-25 years ago, prior to the collapse of the Soviet Union. One of the reasons was that during the Soviet period, people had jobs at the collective farms or in the industry and there was neither time nor need to collect NWFPs to get additional income. However, collective farms and many industries were closed in 1990s after the Soviet Union had collapsed. At the time of this study, unemployment was high and the forest provided an opportunity to support often scarce local livelihoods. The majority of respondents pointed out that the quantity of mushrooms and berries had decreased in the forest. However, one respondent in Roztochya said: '*In the forests there has not been any silvicultural activity after the harvesting, and the shrubs are all around. There are only a few places to collect berries and mushrooms*'.

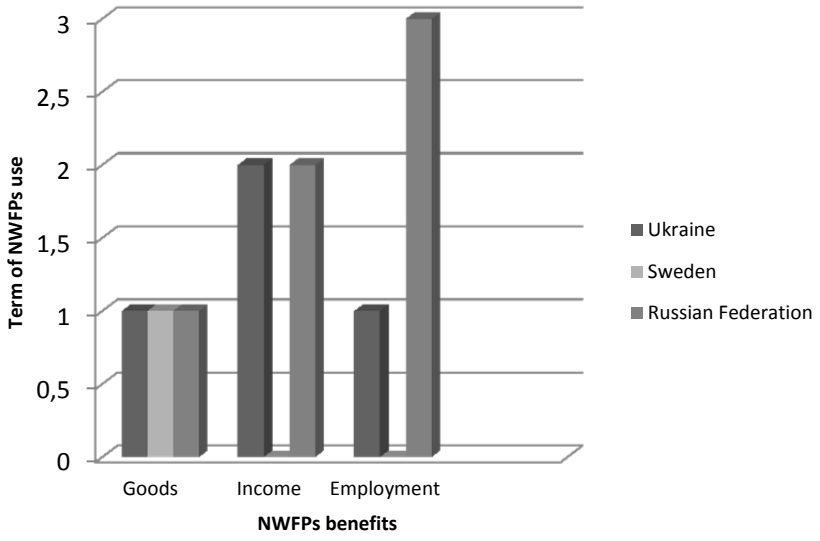


Figure 6. NWFPs benefits provided to rural communities in three case studies

In Småland many respondents stated that the collection of berries and mushrooms for selling used to be important for rural livelihoods in the region 60-70 years ago. Even 20 years ago, it was more common to pick different berries and mushrooms for food. The respondents pointed out that, nowadays, one could buy everything in the stores and '*at present, other things are more important than picking berries and mushrooms*'. Among the respondents, people of middle age and older were most interested in harvesting NWFPs, especially if the practice was a tradition in their families and they had lived permanently in the countryside. '*My husband's father taught him to hunt. My parents taught me to go to the forest when I was just a couple of years old*'. Respondents claimed that, as a result, the berry and mushroom yields had reduced during the recent years. Intensive forest management was also mentioned by the respondents as a reason for decreasing quantities of berries and mushrooms in the forests. Also, the respondents mentioned the present-day organized commercial collection of berries, mainly by the workers from Thailand and Eastern Europe.

5.1.5 Hunting

Hunting was not reported as being popular among the Ukrainian stakeholders. The respondents mentioned that the license prices were too high, and there was not much wild game to hunt. The average price of a hunting license was 300 UAH, or approximately 30 Euros, for one hunting season. The respondents stated that no more than 10 % of local people in the region hunted regularly. Most hunters came from the larger towns and cities near Roztochya. These hunters typically hunted duck [*Anas platyrhynchos* L.], hare [*Lepus timidus* L.], fox [*Vulpes vulpes* L.], roe deer [*Capreolus capreolus* L.] and wild boar [*Sus scrofa* L.].

In the Swedish case study area, hunting was a very popular traditional activity among the villagers. More than 40 % of the respondents stated that at least one member of their family was an active hunter. The hunting rights in Sweden always follow land ownership – the land owner, after passing a national hunter's course, has the sole right to make a decision about hunting on his/her territory. Land owners often merge their hunting territory with that of their neighbours to form larger management units or lease out the hunting rights to other hunters. In areas with a large proportion of private forest owners, such as Småland, hunting is the NWFPs use with the highest economic turn-over (Boman & Mattsson, 2012). Hunters without their own forest can lease hunting rights from private or corporate forest owners either by themselves or by joining a hunting club. There were about 30 000 registered hunters in all Småland (Naturvårdsverket, 2011), and they paid an annual registration fee. There were also hunting management associations which managed the species populations, infrastructure for hunting and the development and performance of the hunting teams (Boman & Mattsson, 2012). Some respondents said that if they would own the forest, they would definitely use it for hunting. The reasons for hunting were both traditional and enjoyment. The most popular species to hunt in the study area were moose, roe deer, wild boar, hare and ducks.

In Kortkeros, hunting was reported as an important and popular activity. Hunting was named as a traditional and historically important way of using forest resources. People typically hunted different species of boreal forest birds and animals like hare, roe deer, moose, wild boar and bear. The people mostly hunted because it was addition for everyday cuisine. As many respondents in Kortkeros stated, they '*have to hunt to survive'*. Expansive equipment and licenses were named as obstacles for hunting.

5.2 Governance of non-wood forest products (Paper III)

5.2.1 A review of the empirical links

Among 44 peer-reviewed articles, only one article gave a definition of the NWFPs governance (Wiersum *et al*., 2014). Figure 7 showed the countries where NWFPs governance was studied. The majority of publications on the governance of NWFPs were about India, Cameroon, South Africa and Sweden (Figure 7). The distribution of articles concerning the spatial level of a specific study showed that the country level was the most common (Figure 8). About 87% of the reviewed articles describe governance of the NWFPs of plant origin; however, different terms were used to describe this type of forest resources, e.g., 64% of reviewed articles used term NTFPs, 20% – NWFPs, 8% –wild medicinal plants and 8% – mushrooms.

Following Arts (2014), I divided all selected peer-reviewed articles into the (1) governance of NWFPs in a broad sense – governing resources with or without state; (2) 'strict' governance – governance beyond the confidence of the state; (3) multilevel governance of NWFPs – governance at different levels from local to global levels, (4) good governance – improving governance for better results. The majority of studies (59%) were on the governance of NWFPs in a broad sense (Figure 9). The multilevel governance was addressed in 36% of the studies. The strict and good governance of NWFPs was represented only in 2 and 3% of the articles, respectively. Table 5 provides short descriptions of the types of governance and specific types of NWFPs.

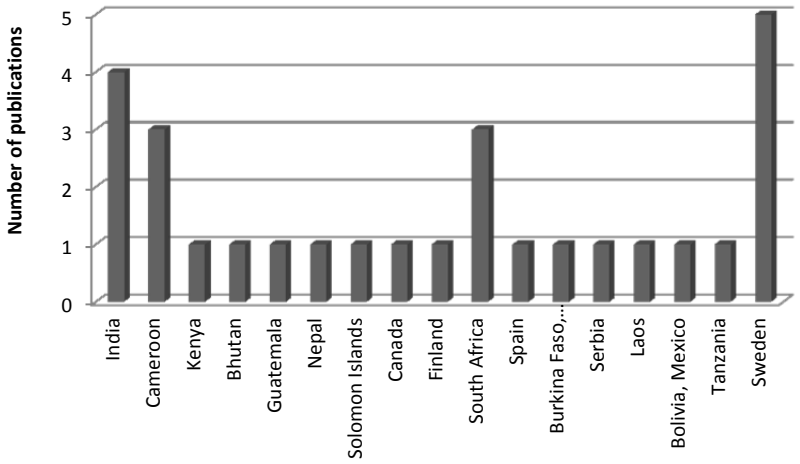


Figure 7. Number of publications based on the case study countries

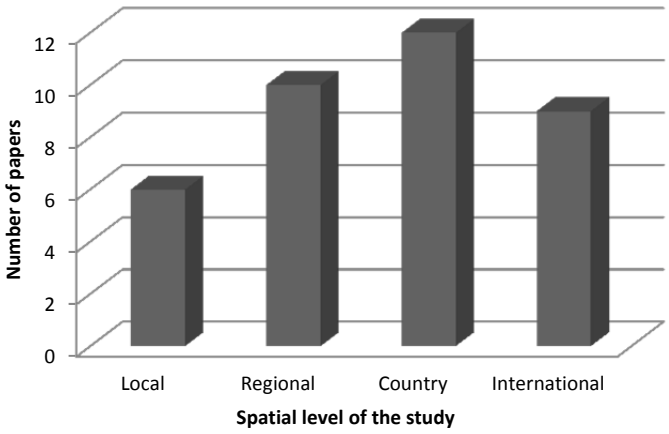


Figure 8. Number of peer-reviewed articles with different spatial levels of presented studies

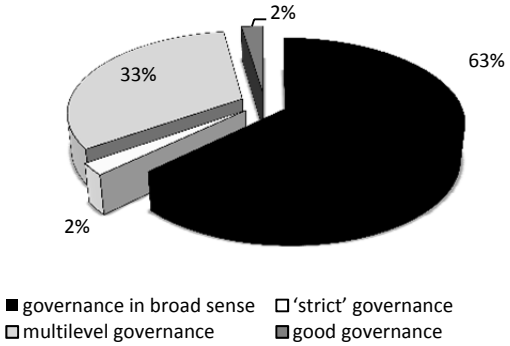


Figure 9. Peer-reviewed articles on the governance of NWFPs (governance in broad sense, multilevel governance, good governance and strict governance)

The review of the articles on the governance of NWFPs in Sweden identified six studies (Boman *et al*., 2013; Sténs & Sandström, 2013; Boman & Mattsson, 2012; Sandström *et al*., 2011; Holmgren *et al*., 2010; Sandström & Widmark, 2007). Boman and Mattsson (2012) described the changes over time

in values of hunting, comparing two surveys with 2500 hunters in 1987 and 2006.

Table 8. *Review of the studies on the governance of NWFPs*

	Location of the study area	Non-wood forest product type	Description on governance type
Shackleton *et al*. (2007a)	Amazonia, Cameroon and South Africa	NTFPs	Global markets
Brooks and Tshering (2010)	Bhutan	Mushroom	Governance of mushrooms
Stoian (2005)	Bolivia	NTFPs	Value chain NTFPs
te Velde *et al*. (2006)	Bolivia, Mexico	NTFPs	Governance of NTFPs value chains, description of governance types
Coulibaly-Lingani *et al*. (2009)	Burkina Faso	NTFPs	Policies, governance and access to the forest
Shackleton *et al.* (2011a)	Burkina Faso, Ethiopia, Zambia	NTFPs	Value chain
Brown *et al*. (2008)	Cameroon	NWFPs	Good governance
Brown and Lassoie (2010)	Cameroon	NTFPs	Governance of commercially valuable NWFPs
Ingram and Tieguhong (2013)	Cameroon	Bamboo	Value chain governance
Cai et al. (2011)	Finland	Mushrooms	Value chain governance
Wiersum *et al*. (2014)	General, analytical	NTFPs	Governance of NWFPs
Radachowsky *et al*. (2012)	Guatemala	NTFPs	Central government and community-based management
Choudhary *et al.* (2013)	India	Medicinal herbs and aromatic plants	Value chain governance
Mahapatra and Shackleton (2011)	India	NTFPs	State regulations and governance for NTFPs
Ghosal (2014)	India	NTFPs	Sustainable NTFPs policy
Saha and Sundriyal (2012)	India	NTFPs	Role of NTFPs for livelihoods
Buenz (2005))	International	Medicinal herbs	Governance in broad sense
García-Fernández *et al.* (2008)	International	NTFPs	Multiple-use forest management
(Belcher *et al*., 2005)	International	NTFPs	Use and management of NTFPs
Marx and Cuypers (2010)	International	NWFPs	Governance and FSC certification
Bouriaud *et al.* (2013)	International		Forest resource governance
(Mbuvi & Boon, 2008)	Kenia	NWFPs	SFM and NWFPs

Boissière *et al*. (2013)	Laos	NTFPs	Local governance and multi-level governance
Jensen (2009)	Laos	NTFPs	Value chain governance
Yadav *et al*. (2015)	Nepal	Fodder	Community forest governance
Heubach *et al.* (2011)	Northern Benin	NTFPs	NTFPs dependency model
Ticktin (2004)	Review	NTFPs	Governance and management
Albers and Robinson (2013)	Review	NTFPs	Policies and governance
Guariguata *et al.* (2010)	Review	NTFPs	Local governance
	Review (Sub-Sahara Africa)	NWFPs	Regulations at local level
Ruiz Pérez and Byron (1999)	Review: Indonesia, India, Sudan, Zimbabwe, Botswana, Brazil, Guatemala, Cameroon, China	NTFPs	Politic-policy framework in different cases
Gupta (2012)	Review: Vietnam, Indonesia, Cameroon and Peru	Food	Forest governance in developing countries
Keča et al. (2013)	Serbia	NWFPs	Value chains
Furusawa *et al.* (2014)	Solomon Islands	Food, medicinal herbs	Local governance
Wynberg and Laird (2007)	South Africa	NTFPs	Governance of NTFPs
Steele *et al*. (2015)	South Africa	NTFPs	Local governance
Wynberg and van Niekerk (2014)	South Africa	NTFPs	Regional governance
Martínez de Aragón et al. (2011)	Spain	Mushrooms	Value chains, policy analysis
Sandell and Fredman (2010)	Sweden	NTFPs	right of public access, people's participation
Boman and Mattsson (2012)	Sweden	Hunting	Adaptive game management
Holmgren *et al.* (2010)	Sweden	Hunting	Governance of forests commons
Sandström *et al.* (2011)	Sweden	Reindeer herding	Governance of multi functionality
Sténs and Sandström (2013)	Sweden	Berries, NTFPs	Governance of berries, right of public access
Sandström and Widmark (2007)	Sweden	Reindeer herding	Co-management as a part of decentralized governance
Schaafsma *et al.* (2014)	Tanzania	NTFPs	Policy recommendations
Dovie (2003)	Zimbabwe, South Africa	NTFPs	Sustainable harvesting and trade

The study discussed the adaptive game management in practice. Sandström and Widmark (2007) focused on reindeer herding and co-management as a tool for the governance of those common pool resources. They stressed the need for decentralized governance. The distribution of power among partners in co-management was discussed as n important condition for successful co-management.

The Right of public access, as the customary right of the Swedish people was discussed by Sandell and Fredman (2010). The national survey with 4700 people was conducted, and the role of the Right of public access in nature tourism was discussed. Sténs and Sandström (2013) illustrate the conflict of foreign professional berry pickers and contradictory concepts concerning property (ownership and the right of public access).

The study discusses if those NWFPs should be regulated by government or governance. Sténs and Sandström (2013) highlighted that wild berries as NWFPs were very difficult to govern. Different models of governance were proposed. There was no careful governing system of NWFPs in Sweden. Sténs and Sandström (2013) propose the certification as one of the instruments for governing NWFPs use. Sandström *et al*. (2011) discussed the governance challenge to manage the different forest resource, like timber and protection of biodiversity and social and cultural benefits that forests provide. The paper showed how multi-functionality is currently governed in Sweden. *Holmgren et al*. (2010) discussed the governance of Swedish forest commons. The paper examined how forest commons are currently governed, comparing it to the trends in the forest governance.

5.2.2 Institutional frameworks of governing NWFP extraction in two post-Soviet countries

Formal institutions

In both the Russian Federation and Ukraine, formal institutions regulate extraction of NWFPs (Table 1). The regulations for extraction of NWFPs of plant origin for personal consumption were similar in the Russian Federation and Ukraine. For example, extraction of nuts, mushrooms, berries and other fruit and plant parts are free of charge, and are allowed in the quantities to ensure timely recovery of plants and reproduction of stocks of raw materials (Forest Code of the Russian Federation 2008; Forest Code of Ukraine 2006). However, there are differences in the regulations related to commercial harvest of NWFPs (Table 2). In the Russian Federation the commercial use of NWFPs has to be based on the lease of forest land for specific purposes that are clearly defined by state forest management units or by forest lease, usually by a private forest company. There are also special rules that allow having

plantation of wild medicinal herbs and wild berries in the forests (Forest Code of the Russian Federation 2008). Individuals and private/public/civil organisations have the right to lease forest lands from the state for growing wild herbs and berries. Harvested wild food and medicinal plants are the property of the forest area lease (Forest Code of the Russian Federation 2008).

In Ukraine the collection of NWFPs for sale is called 'special use of NWFPs' (Forest Code of Ukraine 2006). Commercial collection of NWFPs by a private person or a company requires a special permit from the state forest enterprises that are the permanent users of forests and a collector has to purchase a permit from the state (Forest Code of Ukraine 2006). The money generated from licensing goes to local community's budgets. According to the Forest Code of Ukraine (2006), local people have to obtain a permit for harvesting of NWFPs from the owner in privately owned forests. However, even though the process of forest privatization has begun in Ukraine, the private forest ownership on forests has not yet been developed.

In the Russian Federation and Ukraine there are a number of laws and rules concerning hunting in general and the specific species in particular (Table 1). In both countries hunting organizations are responsible for the conservation of game resources and for organising hunting according to the law (Anon. 2000, 2009). These organizations are responsible for protecting animals from illegal hunting and for taking care of game during winter. In both countries poaching is illegal.

There is also regional legislation that regulates the extraction of NWFPs. In the Russian Federation there are 84 Federal Subjects with different level of autonomy. Our study area is located in the Komi Republic, one of the Federal Subjects, and has its own constitution and parliament. Each Federal subject/Republic may also have its own legislation, which does not confront the federal legislation. For example, the Law on the Regulation of Forest Relations in the Komi Republic (2006) defines the power of public authorities of the Komi Republic in the field of forest relations. The Law on the Red Book of the Komi Republic (2009) includes specific rare species for the Republic (Table 2). The Department of Natural Resources and Environmental Protection the Republic of Komi together with Silver Taiga non-governmental organisation (NGO) developed recommendations on public hearings related to forest management and use in the Komi Republic (Recommendations on Public hearings, 2004). Public hearings have a recommendatory character, and the final decision is made by business. The recommendations were developed after a couple of conflict situations between the local people and forest leasers in the Komi Republic. There is no direct information about the use of NWFPs,

but these recommendations provide an opportunity for the local population to raise questions regarding the natural resource use in their communities.

In Ukraine only the Republic of Crimea has a certain level of autonomy in the government of forest resources, other administrative regions (Oblast') have to follow the national legislation. Our Ukrainian study area is situated in Lviv region, which is one of 24 regions in Ukraine.

Table 9. *Formal and informal institutions in NWFPs government in the Russian Federation and Ukraine*

Institutions/Country	Komi Republic, the Russian Federation	Ukraine
Formal institutions on the national level	Forest Code (2006) Resolution of the Government of the Russian Federation on Red Book (1996) Federal Law on Nature Protection (2002) Recommendations on Public Hearing in the Komi Republic (2009) Federal Law on Hunting and Protecting of Game Species 2009, Federal law on Animal world The Red Book of the Komi Republic (2009) The Law On Regulation of Forest Relations in the Komi Republic (2006)	Forest Code (2006) Law on Red Book (2002) Law on nature protection (1991) Law on Nature-protected Fond (1992) Law on the Animal World of Ukraine (2001) Law on the Plant World of Ukraine (1999) Law on Hunting Organizations and Hunting (2000) Resolutions of the Cabinet Ministers (1996) Criminal Code of Ukraine (2002)
Informal institutions	National FCS standards	Interim FSC standard

Informal institutions

The analysis of the Russian national FSC standard shows that there are 11 criteria and 14 indicators that require special forest management related to the access, use, maintenance and extraction of NWFPs. For example, forest management shall not diminish the accessibility of NWFPs by local communities (5.5.9). The indicators also require that a company shall not violate legal or customary tenure or use rights of local communities for forest resources, including NWFPs, when managing the forest (indicator 2.2.3). The certified organization is responsible for the protection of main game species, their key habitat, and the protection of rare species (indicators 6.2.9 and 6.2.10). In certified forests, it is required to allow the picking of mushrooms and berries, hunting and recreation activities. Forest management should allow the sustained collection of berries and mushrooms, hunting and fishing as socio-economic benefits for people (indicator 7.1.1).

Table 10. *Comparison of most important regulations on NWFPs use*

Definition	Kortkeros, Komi Republic, Russian Federation	Roztochya, Ukraine
NWFPs	(1) resin tapping, (2) harvesting and collection of NWFPs (moss, birch bark, including stumps, bark of trees and shrubs, twigs, twig food, spruce, fir, spruce trees and other conifers for the Christmas holidays, litter, reed, cane, and similar forest resources) and (3) harvesting of food and medicinal NWFPs.	(1) use of side forest products including resin tapping, stumps, bast and bark, saps (2)secondary forest products, harvesting of wild fruits, nuts, mushrooms, berries, medicinal plants, forest litter picking, harvesting of cane, hay, placement of apiaries
Collection of Red Listed Collecting endangered species	Forbidden	Forbidden May be collected under strict guidelines in each region. For these, a special ticket for picking must be purchased from the forestry enterprise. There are strict regulation rules on the amount to be harvested.
Collection of plant and mushroom species that contain the narcotic drug substances	Forbidden	No information
Harvesting of wild food	Be conducted without harm to forest resources	Be conducted without harm to forest resources
Harvesting medical plants	Herbs of the annual plants is allowed to collect once in a 2 year period, roots once in a 15-20 years period, and above-ground organs of perennials once in 4-6 years period. Recollection of raw medicinal plants in the same area is permitted only after full recovery of plant species. It is forbidden to pull plants with roots, to damage the leaves (buds) and rhizomes.	Harvesting of plant parts and berries is allowed if berries comprise more than 10% of the ground cover in the forest and the ground cover of medical herbs is more than 5% Less than 10% of roots and 40% of leaves from each plant are allowed to harvest
Hunting	The Law on Hunting and Protecting of Game Species has 68 articles which describe the main statements of the Hunting Law.	The Law on Hunting and Protecting of Game species has 43 articles which describe the main statements of the Hunting Law.

The places where local communities traditionally collect berries and mushrooms, hunt and fish are recognised as areas of a special value, or high conservation value forests. In the FSC standard, the traditional use of nature

resources is explained as a specific integrated system for the management of natural resources, which includes, in different combinations, animal husbandry, agriculture, hunting and wildlife trapping and the use of NWFPs, which are still of cultural importance for indigenous communities.

In Ukraine, in the absence of a national FSC standard, the generic FSC standard is used in forest management certification. There are only three criteria and three indicators concerning the use of NWFPs of plant origin. The criteria require that rights of local people to collect NWFPs have to be secured; the information on the use of NWFPs should be available; and the multifunctional use of forest resources including hunting and NWFPs for traditional handicrafts should be maintained. Regarding NWFPs of animal origin, the criteria require to control hunting in certified forests.

5.2.3 Decision-making process of the extraction of NWFPs

Sweden

In Sweden hunting is a popular activity, and there are more than 300 000 hunters (Sandström *et al*., 2011). Boman and Mattsson (2012) have compared the hunting value based on two surveys. Their results showed that the gross hunting value had increased over past two decades. The right to hunt in Sweden is connected to land ownership; the owner of the land has a right to hunt on the owned land, and the land can be leased for hunting purposes. Indigenous Sami people rights for reindeer herding are strengthened by international policies and forest certification schemes (Sandström & Widmark, 2007). The Sami people have immemorial land right to herd reindeer (Sandström *et al*., 2011). The rights of Sami people are highlighted within the FSC certification.

Nowadays there are debates on the governance of NWFPs of plant origin in Sweden. Historically, berry harvesting played an important role in Swedish rural areas. As a sign of the past use of lingonberry, the "red gold of the forest," and the regional trains have been called "lingonberry trains" (Swe: krösatåg) since 1985. The term stem from the time of a "lingonberry boom" (Swe: lingonruschen) in Småland, when berries were exported to Germany at the end of the 19th until 1914 when the WW1 began. There were debates in the Swedish Parliament on how to regulate the harvest of NWFPs in the private forest, and, at present, the governance of the wild berries harvesting from private forests is under hard discussion again (Sténs & Sandström, 2013). Nowadays, the growing berry industries bring foreign berry pickers to private forests for collecting wild berries. During the past decades, foreign citizens and the companies exporting berries have benefited from the "Right of Public

Access" in Sweden (Turtiainen & Nuutinen, 2011). Guest workers from the former Soviet states, China, Thailand, Vietnam and other developing countries come to Sweden to pick wild berries, in particular blueberries and lingonberries. As NWFPs belong to common pool resource, the use of wild berries is hard to govern. In some places, local people claim that tourists and intensive forest management with a high basal area, shorter rotation time, and use of fertilizers as well as high density of herbivores have led to a declining blueberry cover and damaged forest ecosystems in Sweden (Kardell, 1980; Mortazavi, 1997). The Right of Public Access is important for Swedish people that enjoy different traditional outdoors activities and have a strong support from the general public (Sandell & Fredman, 2010). To some extent, this is an obstacle for companies building their business on these activities (Sandell & Fredman, 2010). There is an opinion that the "Right of Public Access" in Sweden should be reviewed in order to differentiate the collection of NWFPs and other uses for personal and commercial purposes (Sandell & Fredman, 2010). For instance, in Ukraine regulations and rules differentiate between private and commercial collection of NWFPs, where commercial users need to pay for the right to collect (Anon., 1996). Sténs and Sandström (2013) proposed four different models of the governance of wild berry picking and suggested the prohibition of commercial use of the right of public access giving the right to landowner to sell the berry picking permits to entrepreneurs.

Sandström *et al*. (2011) describes the forest governance challenge in Sweden, when, behind timber as most important for Swedish national interest, new functions and products of forest have been recognized. Their study demonstrated the division of forest product in relation to rivalry and excludability. Hunting, reindeer husbandry and use of NWFPs are growing types of forest resource uses. Sandström *et al*. (2011) propose an approach that will help to manage multi-functionality of the forests by applying Multiple Criteria Decision Analysis. This approach is suggested to be used as a tool for participatory planning and group discussion that would help to govern multi-functionality.

Ukraine

Public sector

A number of public organisations at national, regional and local levels are supposed to regulate and control the use of NWFPs. On the national level there are two public organizations, the Ministry of Ecology and Environment of Ukraine and the State Agency of Forest Resources of Ukraine under the Ministry of Agrarian Policy and Food (Table 5 and Table 6). Regarding NWFPs the main functions of the Ministry of Ecology and Environment of

Ukraine are to (1) be responsible for management, reproduction and protection of all plant and animal species; (2) provide legal regulations related to the protection, use and reproduction of plant and animal species, (3) maintain the national cadastre of game animals, (4) define limits on the use of wild animals, the collection of technical, medicinal, aromatic, food raw materials from wild plants, and (5) develop the Red List of plant and animal species(Red Data Book of Ukraine 2009). The main responsibilities of the State Agency of Forest Resources of Ukraine are to develop a procedure of providing special permits on the use of forest resources, including NWFPs, and to control the compliance of the legislation on hunting (State Agency of Forest Resources of Ukraine, 2015).

On the regional level three public organisations are responsible for government of NWFPs. The Regional Department of the Ministry Ecology and Environment of Ukraine approves limits on the use of NWFPs, and controls the compliance to the Law on Nature Protection (Anon., 2014). The Regional Agency of Forest Resources and Hunting controls the use of NWFPs (Table 5). The Regional State Administration in each region is responsible for the approval of limits on the special use of NWFPs and issues prices for each specific type of NWFP. The latter public organisation is also responsible for the assignment of hunting areas that are proposed by the Regional Agency of Forest Resources and Hunting. If a private person or business wants to extract NWFPs of plant origin, their representatives should contact the state forestry enterprises in order to get the permit, called a "ticket for special use of NWFPs". Each ticket is issued for a specific type and for a certain amount of NWFPs. The payment is required to control and provide a fair use of forest resources, which goes to the budgets of local communities. The prices for tickets are relatively low, for example, in 2013 a ticket for one kg of blueberries was 0.5 UAH (less than 0.02 USD) and the market price for 1 kg of blueberries was 25-28 UAH (approximate 1 USD). The full use of the limits might provide revenues of around one million UAH to the local budgets.

The practice of getting permits for NWFP extraction almost did not exist, and according to the interviews with the representatives of the Regional Agency of Forest Resources and Hunting, NWFPs of plant origin did not provide any economic interest for them. '*This year we have got only one entrepreneur who wanted to buy tickets for collecting of blueberries. Local people collect NWFPs for personal needs, and even if they sell their NWFPs they do not buy tickets for NWFP extraction. The enterprises get permits for NWFPs only if they export NWFPs abroad*', the interviewee explained. At the same time, the respondents see the potential of NWFPs for economic development in the future, especially as a valuable export product. '*I believe*

that the use of wild berries and mushrooms has a great potential, because they are organic products and demand on those products will increase' as it was explained. Regarding the extraction NWFPs of animal origin, the hunting areas are leased for at least 15 years, and the size of hunting areas have to be at least 3000 hectares (Anon. 2000). Hunting organizations within their hunting areas have to allocate at least 20% of the area for the protection and reproduction of game animals. The hunting areas were leased for free by the end of 2014. Beginning with 2015 a new law requires payment for hunting to be made to landowner (Anon. 2000). However, according to the interviews, the mechanism for payment has not yet been developed, and the prices have not been decided. '*To establish of hunting area within 3000 ha, many landowners and land users have to be interviewed and this decision has to be approved, which makes it impossible from the beginning,'* the representative of the Military Hunters and Fishermen Association in Western Region of Ukraine explained.

On the local level, the state forestry enterprises, as permanent users of forests, are responsible for the protection of NWFPs from illegal or harmful consumption. However, the respondents claimed that these functions were hard to fulfil. '*We do not even have enough staff to protect the forest against illegal logging, so we are definitely not able to control the use of NWFPs. People can harvest as much as they like, and these resources are renewable so they will grow again'*, commented the representative of the state forest enterprise. According to the interviews, at present state forestry enterprises are not interested in extraction of NWFPs due to low market prices, lack of demand on the national and regional levels, and a short seasonal market for NWFPs. The interviews with the representatives of local administrations show that NWFPs of plant origin were important for local people both for income and as wild food and medicine. However, the interviewees complained that there were not enough local points to sell these wild products. As one local interviewee explained, '*If we would have places for selling wild berries and mushroom as was the case during the Soviet time, our village life would be much easier. Nowadays we have to spend our time to bring NWFPs to markets in the closest cities. There are no entrepreneurs in the villages who are able to organize collecting points'.*

Regarding the government of NWFPs of animal origin, there are two state hunter organizations under the state forestry enterprises (Rava-Ruskiy state forestry enterprise and Zhovkivskyi state forestry enterprise). A forestry enterprise director commented *'Hunting is very cheap in Ukraine, compared to Poland where you have to pay 156 euro for one hunting day with a licence. In Ukraine people are poor, that is why poaching is so widespread. But I think*

that forestry enterprises have to do only forestry and never hunting and other activities'. There were no conflicts, but poaching was mentioned as a big problem in the area.

In Roztochya there are also several protected areas. According to the Nature Protection Law (Anon. 1992), the collection of any kind of NWFPs is forbidden in strict protected reserves and in the core areas of national nature parks; it is allowed only in buffer and transition zones of national nature parks. The administration of the Yavorivskyi National Nature Park obtained a permit for the collection of NWFPs from a number of public organizations, including the Ministry of Ecology and Environment of Ukraine, State Agency of Forest Resources of Ukraine, Permit Department of Lviv City Council and Regional State Administration. This procedure was obligatory and had to be done every year. However, according to the interviews, NWFPs were not considered as economically valuable resources by the National Nature Park administration.. '*We collected medical herbs for production of herbal tea last year. But the demand for those products is low, so we stopped doing it. If collecting points for NWFPs were organised, we would collect and sell NWFPs as free of charge resource'* as the representative of the national nature park's administration explained. According to the interviewees the main problem was poaching. Both the strict protected reserve and National Nature Park have a security service but often it did not help to protect against poachers. '*We have a security service in the Reserve, but sometimes we found poachers' traps, The poachers with the traps is the worth, because it is hard to catch them'*, explained the Director of strict protected reserve.

Private sector

The stakeholders from private sector that were involved in the extraction and use of NWFPs were from local and regional levels. Private stakeholders at both levels were not interested in been involved in the decision-making process related to the extraction of plant NWFPs. '*I am using medical herbs for my patients, but I do not buying any tickets, this resource is free,*' commented the representative of the private company that collected medical herbs. The respondents from the private companies explained that they were buying NWFPs from local people; therefore, they were not involved directly into the extraction of NWFPs from the forest. Regarding NWFPs of animal origin, there were two private hunting organizations in Roztochya. The key problem according to the interviewees was poachers. A respondent from a hunting association commented that, *'The only way to combat poaching is to increase environmental awareness of people, to make them understand that poaching damages nature. However there are poachers that generate their main income*

from selling game meat to fancy restaurants in the cities'. The member of the private hunting organization explained that '*One issue is that fees for poaching are too small. I would propose to confiscate the weapon from poachers then it would be more effective.'* At the same time, wild animals damaged gardens and crops of the local households, causing conflicts between the local people and the hunting organisations. A respondent from the Military Hunters and Fishermen Association in the Western Region of Ukraine explained that there was no mechanism to provide compensation to local households for the damages caused by wild animals.

Civil sector

Civil sector stakeholders were only found at the local level. They acknowledged the importance of NWFPs for local rural livelihoods. A representative of the Roztochya Biosphere Reserve (BR) commented that '*Berries and mushrooms are vitally important for locals in the forested villages. The demand for these products is increasing because people now think more about healthy products, and wild food is one of these. Especially young mothers want to have wild berries for their kids. So we believe that the BR will set up a good example in sustainable use of NWFPs'*. The establishment of this BR was accompanied by the conflicts with local people who were afraid to lose their right to collect NWFPs in the area of the BR. '*Today the administration of BR is trying to maintain and protect traditional knowledge related to the use of NWFPs as wild food and medicine and to increase public awareness about these forest products*,' commented the manager of Roztochya BR. The interviewees from the civil sector discussed the role of NWFPs for the local livelihoods, although no action has been done. Managers of the BR explained that poaching was the main problem for NWFPs of animal origin. '*There is illegal hunting, that is why we cannot see the wildlife in the forest*', the respondent explained. Both representatives of the civil sector in Roztochya emphasized that the punishment for poaching should be increased and that environmental awareness of local people needs to be enhanced. '*We need to increase the ecological or environmental awareness of the people, and then the poaching would stop*' as the respondent from the civil sector explained.

Russian Federation

Public sector

On the national level, a number of governmental organisations are responsible for NWFPs in the Russian Federation. The Ministry of Natural Resources and Ecology of the Russian Federation develops public policy and regulations

related to natural resources, including NWFPs. The Federal Agency of Forest Resources is responsible for the development and implementation of legislation related to the use of NWFPs, including wild food and medicine. NWFPs of animal origin, such as wild game, is a state resource, and the Federal Hunting Department under the Ministry of Agriculture of the Russian Federation is responsible for game management. Besides the Ministry of Agriculture of the Russian Federation, the control of game management is performed by the Ministry of Natural Resources and Ecology of the Russian Federation, the Federal Agency of Forest Resources and Federal Border Service of the Russian Federation and their regional representatives.

On the regional level, the Forest Committee of the Komi Republic is responsible for sustainable use of forest resources. The Public Council under the Forest Committee is supposed to ensure the interaction between citizens, civil organizations and the Forest Committee in order to take into account the needs and interests of different stakeholders, to protect their rights and freedoms and the rights of public associations in the development and implementation of state forest policy. Regarding the NWFPs of animal origin the Republican Society of Hunters and Fishermen is the biggest hunting association.

On the local level, the state forest management units represent the interests of the state in forest resource use. According to interviews with the heads of state forest management units in Kortkeros, the use of NWFPs was vital only for rural residents. During the Soviet time collection of NWFPs was an important part of state forest enterprises' economy, which included collection of the medical herbs, berries and mushrooms. A respondent from one of the state forestry enterprises explained that 20 years ago the enterprise dried and sold several tons of mushrooms, lingonberries and bilberries per year. '*During Soviet times we were collecting a lot of different kinds of medical herbs, and we even had plantations of four different species of medical herbs'* the director of Storozevsk forestry enterprise pointed out. '*Nowadays we are not allowed to do anything concerning NWFPs, there are private companies that buy berries and mushrooms from local people*'.

A respondent from the regional administration explained '*Forestry sector is still very important for our region, as 40% of employments are provided by the forest industry. At the same time, NWFPs are a source of income of more than 20% of the local population. There are private companies that buy berries and mushrooms from the locals'*. According to the Regulations of the allocation of areas of mass gathering of mushrooms and berries by local population in the territory of the State Forest Fund (Anon. 2004), the places that are important for local population as collection sites of NWFPs are marked and regulated

forest management is provided there . '*It is the so called "people's forests", which people use for timber, firewood and for the NWFPs collection. There are no so many villages; therefore this social forest only comprises up to 5% of our territory. It is a very good way to prevent conflicts in the area,*' expressed the main forester of the Kortkeros forestry enterprise. '*NWFPs use is essential for a social sphere in the Kortkeros region,*' highlighted the Vice head of the Kortkeros region.

Private sector

In Kortkeros the Mondi Syktyvkar OJSC, an international and dominating forest industry company and thus the largest consumer of wood in the Komi Republic, 12 private forest companies, and two private companies that focus on the trade of NWFPs, represented the private sector. The respondents from the private company that collected NWFPs from local people explained that NWFPs were very important both for their business and for locals. Mostly they exported NWFPs to Germany, Latvia and Lithuania. '*NWFPs are the only way to earn something in the area. There are 12000 people that live here and all of them are collecting NWFPs*' stated a state forestry enterprise director. People use different types of NWFPs, including moss for insulation in buildings, medical herbs for personal consumption and birch bark for different handicrafts. Contrary to the Soviet period, no medical herbs are harvested in industrial volumes. However, according to the interviews, the prices on NWFPs were unfair, because locals could not sell NWFPs only to local companies, and thus private companies were the monopolists who lowered the prices on NWFPs as much as they could.

There were conflicts between the logging companies and the Komi people. For example, there were cases when logging activities destroyed opportunities for the traditional collection of NWFPs, especially traditional hunting places. However, the representatives of forest companies explained that the conflict has deeper roots '*The conflict with MONDI is due to high unemployment and there is growing dissatisfaction with the economic situation in the region. During Soviet times there was a lot of timber harvesting in the area, and people were employed by the forest sector and were less dependent, so there were no conflicts*'. According to a representative of the Mondi Syktyvkar OJSC Company, forest certification made them work with local stakeholders and negotiate conflict issues. The result of negotiations was that any company that leases forests has to send the planned logging activities to local community councils. '*We are sending to each village council a map of the proposed forestry activity*' the representative of Mondi Syktyvkar OJSC Company explained. '*During the deputy meetings the maps have to be discussed and*

approved by village councils. Only after the approval a forest company is able to harvest the forest', the respondent from the Mondi Syktyvkar OJSC Company told. A respondent from the regional administration pointed out that '*Only large, certified companies hold the discussion with village councils, not all forest enterprises'*.

There was a local company that used berries and mushrooms collected by locals for baking. '*We bought 3 tons of mushrooms and 15 tons of berries last year. We use it for baking different kinds of buns and pizza. Our enterprise obtained help from the state to develop local businesses'*, explained the director of the Bakery Company explained.

Hunting was a popular activity in Kortkeros. Almost 90% of locals were hunters according to interviews with representatives of all sectors. The main forester of one state forestry enterprise explained that the forestry enterprises did not control hunting in the area; instead the Komi Prom Hunting was the main responsible body for controlling hunting. '*Hunting organizations have to lease forests from us, but because of the discordance in the legislation they don't do it*' highlighted the main forester at a forestry enterprise. People hunted mostly for meat. *'There are villages that live from hunting and berries*' explained of the director of a state forestry enterprise. During the Soviet times hunting for different skins (hare, squirrel, fox, beaver, etc.) was popular. '*During the weekends and vacations I earned 5 thousand roubles by selling skins and fur of wild game, when average salary was 120 roubles*' respondent explained. '*Now hunting on bear is popular, because one can sell a bear skin for 1000 USD, which corresponds to the amount of several months' salary'*, the representative of a hunting organization stressed. The Komi people have very long traditions of protectioning their hunting areas. '*Komi people have very old traditional ways of hunting, they know a lot of special secrets for a good hunting. They hunt with traps and with weapons*', the representative of hunting organization explained.

Civil sector

The civil sector was represented by two NGOs (Silver Taiga and Komi Voityr) that played a key role in conflict resolution related to use and governance of NWFPs. *'Silver Taiga NGO was used as an independent platform for a dialogue with local people and our company'*, the representative of Mondi Syktyvkar OJSC Company explained. The Komi Voityr NGO represented the Komi people's interests. '*Local Komi people have very long traditions of forest resource use, especially hunting. Some families have traps that they have been using for several centuries. But officially they have no documents*', the founder of Komi Voityr NGO explained. In order to solve different conflicts in nature

resource use, management and governance, the Komi Model Forest was established in 2006, with Silver Taiga NGO as a facilitating organisation. As a pilot project, aimed at protecting the rights of local communities in the use of NWFPs, ten villages were chosen to map all traditional hunting areas and traps. '*We interviewed each hunter in the local villages. It was difficult because the hunting areas and traps were family secrets and we have to had a helper from the local communities. Then all traditional hunting areas were mapped and Mondi agreed not to harvest in those areas. So the conflict was solved,'* clarified a representative of Silver taiga NGO. In case there is a common interest in forest use, villagers' interests have priority. As a result of the conflict solution process, the Komi Model Forest developed the "Recommendations on public hearings" and "Recommendations on the use of berries and mushrooms", which were legitimized at the level of Komi Republic. These two legal documents are used by local communities in the decision-making process towards forest management in the area.

5.3 Landscape approach initiatives towards sustainability (Paper IV)

Globally there are different concepts aiming to achieve sustainability on the ground. There are at least five concepts such a Model Forest, a Biosphere Reserve (BR), the Ramsar wetland, the World Heritage Site and the EU Leader. The Model Forest is a concept to achieve the SFM on the ground. BRs are learning sites for sustainable development that are based on a multi-stakeholder approach with particular emphasis on the involvement of local communities in landscape management and governance (MAB UNESCO, 2008). The Ramsar wetland is a framework for local and national initiatives to conserve and restore important wetlands. The World Heritage Site is given to special places with natural or man-made structures considered to be of outstanding value to mankind. LEADER can be described as a concept that is used to support a local level SD process aiming at sustainability in European Union rural areas. Some of those concepts are aiming on conservation (Ramsar wetland), some on development (LEADER) and some on both conservation and development (BR, MF).

The comparative analysis of these five concepts has shown that they had similar core attributes that can be used for a practical operationalization of SD concept. The core attributes are: (1) Area - a sufficiently large area that matches management requirements and challenges to deliver desired goods, services and values, (2) Collaboration - multi-level and multi-sector stakeholder collaboration that promotes sustainable development as a social

process, (3) Sustainability - commitment to and understanding of sustainability as an aim among stakeholders, (4) Knowledge - integrative knowledge production, and (5) Sharing - sharing of experience, results and information, to develop local or tacit to general or explicit knowledge.

There is a study showing that Model Forest initiatives in Sweden and the Russian Federation contain a rich pool of experiences that can be used to gain needed knowledge to support the implementation of SFM on the ground (Elbakidze et al. 2010). MF initiatives are is intended to encourage all dimensions of SFM through collaboration among stakeholders of forest resources in a geographical area. Because the MF approach encompasses both social and ecological systems, it can be seen as a process aimed at improving adaptive capacity to deal with uncertainty and change. My study also show that Komi Model Forest in the Russian Federation developed a new forest governance based on multi-stakeholder collaboration that helped to legitimize the traditional rights of local people on NWFP use. In Paper V explored the role of a BR in development of new form of governance using a BR establishment in the Ukrainian case study as an example.

5.4 Role and rights of different stakeholders in landscape approach decision-making (Paper V)

The aim of paper V was to identify the role and rights of different local rural stakeholders in the decision-making process when BR as a landscape approach initiative emerged. The Roztochya BR (Figure 10) was established in 2011 after eight years of negotiation with local communities. Based on the analysis of the interviews with respondents who were directly involved into the BR planning and promotion, it was concluded that the initial main goals for the establishment of a BR were the following: (i) nature conservation to protect biodiversity in the Baltic-Black Sea European watershed (Parchuk *et al*., 2010); (ii) to address ecological issues associated with the local "heritage" of sulphur mining industry; and (iii) to promote regional economic development driven by regional and international tourism (Parchuk *et al*., 2010).

According to Ukrainian legislation, there are some restrictions on land use that could negatively affect natural, historical or cultural values within different kinds of protected areas, including BRs. However, harvesting of wood and NWFPs, hunting, fishing and some other types of natural resource use could be conducted if they do not conflict with the aims of the specific protected area, including BRs.

The analysis of interviews identified the following perceptions of creation of a BR in the Ukrainian Roztochya: (1) as an instrument for nature

conservation with restrictions in the use of natural resources; (2) as a tool for concurrent nature conservation and tourism development; (3) as the establishment of an additional regional governing state body to control the use of natural resources.

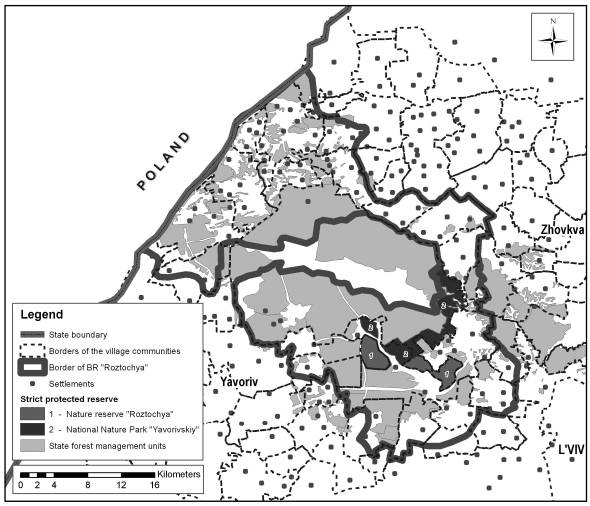


Figure 10. Area of the Roztochya Biosphere Reserve in Ukraine

The complexity of the BR establishment situation was caused by the fact that regional ecological authority had decided to organize a regional landscape park in the same area. The local village communities had to vote for the landscape park, and some of the respondents did not recognize the difference between the BR and landscape park. As a result the process took so long and caused a conflict. The perception of the BR as an instrument for nature conservation with restrictions on nature resource use and land management was very common among both villagers and foresters. Local peoples' livelihoods depended directly on the goods provided by forest and cultural landscapes of Roztochya. The informants perceived that the creation of a BR would limit their access to the forests and bring new restrictions on land management practices, including use of chemicals in farming, construction of buildings, and collection of NWFPs. Some villagers expressed fear that their private land would be seized and incorporated into the BR. In response to the promoter's explanations stressing that the creation of a BR would not change their land use practices or ownership rights, the most common statements were similar to the following quote '*We received many such promises during the Soviet time, and everything later on showed to be the opposite*'. As one

informant explained, '*People do not trust the state, even if it is written in the documents that there will be no restrictions, they are not sure whether this will indeed happen* '. Many local landowners refused to accept the idea of the BR creation from the very beginning (Figure 11).

The perception of a BR as an instrument to bring restrictions precipitated numerous village council meetings to discuss the location of village within the border of a BR (Fig. 11). One village community voted eight times against the BR creation over a 3-year period. The remaining village councils gathered at least twice, eventually generating a positive decision; some villages gathered 5 or 6 times to discuss the issue. Only village communities located close to the national park and the strict protected reserve were positive at the beginning and had expectations that the creation of the BR would contribute to their livelihoods. In total, the process of obtaining the permission from each of the local communities to include their land in the BR took almost 8 years. Forest managers had similar perceptions about the BR as limiting land and resource management practices, and were thus also strongly against the BR. The prevailing perception among forest managers was that timber harvesting would be controlled and reduced in the BR, and, in some places, logging operations would be prohibited. The foresters suggested that the BR would be similar to a strictly protected nature reserve. All interviewed foresters expressed pride in their forest management activities because they provided jobs for local people and produced value-added products for regional and local markets. The foresters' response to the proposed BR greatly influenced villagers' perceptions because the state forest enterprises were the main employees in the region. Thus, many people depended both directly and indirectly on the continued use of forests for livelihoods. Therefore, the villagers often trusted them more than the promoters of the BR.

The perception of a BR as an instrument for supporting both nature conservation and tourism development was shared by both the BR promoters and villagers. The BR promoters clearly stated that the creation of the BR would improve nature conservation, especially in the protected areas under the responsibility of regional administrations, and, at the same time, make the region more attractive for tourists. However, the researchers and managers of the protected areas complained that the local people did not understand the value of conservation. The statements to such effect included: 'people have such a low ecological awareness' and 'the ecological ignorance is such that they did not respond well to the argument that we had to protect our nature for the future'. The promoters expected that the BR development would bring additional funding from the central state budget and international organizations, both of which would be used to develop a needed infrastructure

for nature and cultural tourism and to improve roads. The villagers also believed that the creation of a BR would increase the opportunities for tourism and thus might lead to the development of the area. However, local people seemed not to perceive themselves as key stakeholders and often mentioned that '*They (the BR's promoters) said that tourism will develop and bring income to us*'. The informants stated that more than 100,000 tourists visited the region annually, most of them from abroad. However, as one informant suggested, '*all income, associated with tourist activity, went to the Polish companies that organized the tours*'. The reason for this was that local communities and villagers have '*no money to start our own businesses*'. All informants described the area as having no good tourist infrastructure; neither places for staying overnight or eating, nor good quality roads. One interviewee said: '*Although we are so close to Lviv and located in the centre of Europe, we are still very remote*'. None of the stakeholders had a clear idea of how the BR would function or how it would be financed. Finally, several informants perceived the BR as a state organizational structure that would have the power to control land and nature resource management. These informants stated that they would have to get permission from the BR administration, located many kilometres away, in Lviv, to conduct land use activities. This, they contended, would require them to spend their time and money to go there. In addition, many perceived the BR administration as '*one more body to give bribes to'*, as one informant expressed it.

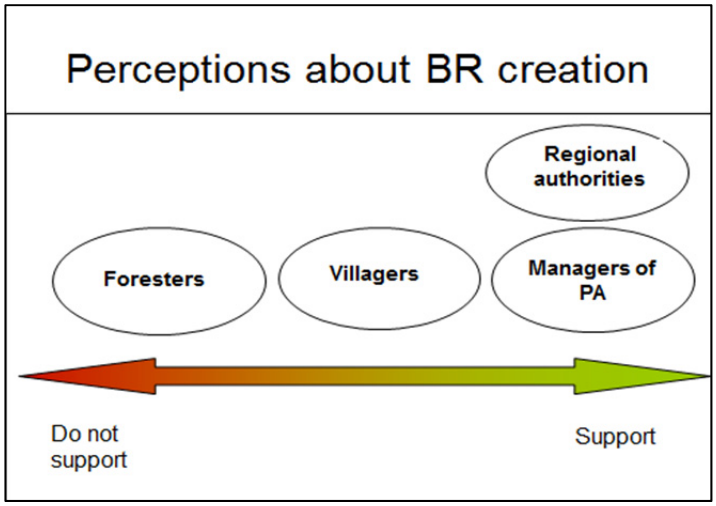


Figure 11. Support towards BR creation among different stakeholders in Roztochya.

To conclude, the study shows that the main concern among rural people regarding the BR creation was a fear to lose free access to the forests and forest resources, especially to NWFPs. Nowadays rural people in Roztochya have experienced decreased standards of living due to disintegration of the planned economy developed during socialism and ongoing transition to market economy under acute political and economic crisis in the country. Due to economic reasons local people have had to come back to their traditional land use practices and collection of NWFPs has become an important part of their traditional livelihoods. Additionally, local people had a mental model from the past (Wallner *et al*., 2007) based on the assumption that the government could freely expropriate their lands. In 1939 when the Soviet Union invaded the Western part of Ukraine, 128 villages were totally removed and a military training area was created (Stecjkovych, 2010). At the same time, those people who lived near protected areas were very friendly to the idea of creating a BR. They had another mental model, based on the belief that protected areas bring tourists and better infrastructures. Some respondents even pointed out that they were proud to live close to protected areas and were positive to the idea of a BR creation. However, in my opinion, none of them had a clear idea of what the BR would bring.

6 Discussion

6.1 Importance of NWFPs for sustainable local livelihoods

In Ukraine, Sweden and NW Russia the use of NWFPs as wild food and traditional medicine has been important for centuries (Szot-Radziszewska, 2007; de Beer & Zakharenkov, 1999; Kotelina, 1990; Komendar, 1971; Yamin-Pasternak, 2011; Svanberg *et al.*, 2012; Kardell, 1980). NWFPs were particularly important during famines in the 19th and 20th centuries in Ukraine (Ryabchuk, 1996; Komendar, 1971) and because of food scarcity during the 20th century in the Republic of Komi (Pearson *et al*., 2007; Kotelina, 1990). Livelihood strategies of rural forest dependent communities in Ukraine and the Russian Federation include the current use of NWFPs. Rural residents in both Roztochya and Kortkeros use NWFPs to supplement their diets and household income, notably during certain seasons of the year, and to help meet medical treatment needs. My results from Roztochya are consistent with other studies from Ukraine (Łuczaj, 2012a; Łuczaj, 2007; Ryabchuk, 1996). Łuczaj (2007) also describes the cultural importance of plant origin NWFPs. The spiritual, traditional cuisine and recreational uses of plant origin NWFPs were also named by Komendar (1971) and Ryabchuk (1996). In the Swedish case study the current use of wild food and medicine mainly serves recreational purposes. Rural residents use NWFPs mainly for private consumption, compared to Finland, where studies indicate commercial importance of NWFPs (Ihalainen *et al.*, 2002; Saastamoinen *et al.*, 2000). In the Swedish study area respondents reported decline of use of NWFPs in recent years. Similar results were found for a study in Finland and Sweden, where harvesting practices declined considerably due to both socio-demographic changes and a decline in productivity of some NWFPs caused by environmental changes (air pollution, resulting in soil acidification, eutrophication, peat land drainage and timber harvesting) (Richards & Saastamoinen, 2010; Saastamoinen *et al.*, 2000).

According to Shackleton and Pandey (2014), NWFPs contribute to human well-being by five mechanisms: (1) through direct household consumption as food, medicine, fibre and cultural attributes; (2) as income, which includes direct supplemental income and cash generation; (3) as a safety net where NWFPs can be used in times of food scarcity or loss of livestock or crops; (4) to maintain cultural and spiritual traditions; and (5) as cash saving for households as well as the state, which allows using those free resources for poor population. An additional mechanism proposed by Karki (2000) is NWFP use as a source of employment. Based on the results of my study I argue that the portfolio of mechanisms depend on the socio-economic context (Table 11). In both the Ukrainian and the Russian case studies all five mechanisms were important for local households, while in the Swedish study area only three mechanisms were used. The contributions from NWFPs are important for subsistence during periods of poor economic development, recession and depression connected to the transition from planned to market economy (Richards, 2005). The interviewees highlighted that NWFPs provide financial income to a large part of rural residents, the earned money were used for a year living; and there is a need to develop a year-around employment for locals based on NWFPs (Karki, 2000).

Thus, NWFPs help rural households in forest-dependent regions in economic transition to sustain their livelihoods and avoid poverty (Shackleton et al., 2015a; Albers & Robinson, 2013; Stryamets, 2012; Shackleton & Gumbo, 2010; Robinson et al., 2002) by offering supplemental income that provides a safety net or approach to risk management during economic crises (Albers & Robinson, 2013; Johnson et al., 2013; Shackleton & Gumbo, 2010; Elbakidze & Angelstam, 2007). The poverty alleviation function of NWFPs was highly appreciated by Russian respondents. Additionally, cultural and spiritual traditions played an important role in all three case studies. Using different NWFPs for cuisine, at religious holidays and as family traditions were named as components of cultural and spiritual traditions in all case studies, and in Sweden NWFPs were also part of recreational use of the forests (Hörnsten & Fredman, 2000). I suggest that use of NWFPs are part of the local cultural landscape (Plieninger *et al.,* 2014). The cultural importance of collecting NWFPs for respondents with a high income level, was named as more important than the actual nutrient value of the NWFPs (Grasser *et al*., 2012).

Table 11. *Mechanisms of NWFP's contribution to rural livelihoods in three case studies*

Mechanisms	Roztochya (Ukraine)	Småland (Sweden)	Kortkeros (Russian Federation)
Direct household consumption	Wild food, medicine (up to 60 species were used as medicinal herbs) and cultural attribute (mushrooms and wild herb used for traditional cuisine)	Wild food and cultural attributes (hunting was used as an old tradition)	Wild food, medicine (up to 44 species were used as medicinal herbs) fibre (for traditional handicrafts) and cultural attributes (wild plants were used for traditional cuisine)
Income	Direct supplemental income and cash generation	No	Direct supplemental income and cash generation
Safety net	Wild fruits and mushrooms as additional food providing resources	No	Wild fruits and mushrooms as additional food providing resources
Cultural and spiritual traditions	Traditional food "varenyky" Spiritual rituals in the churches and during the Christian holidays	Traditional food Wild meat with lingonberry jam	Traditional food "lyadzj", "shanki" Spiritual rituals for funerals
Cash saving	Free and tasty food	Free meat	Free resource for food, handicrafts
Source of employment	Partly as additional employment	No	Seasonal employment

Summarizing the results of my study related to use of NWFPs, I suggest that natural capital in all three study areas is favourable for diverse use of NWFPs, especially of plant origin. Based on the interviews I have made an attempt to analyse the five capitals of sustainable livelihoods approach that related to NWFPs use. There was lack of financial and built capitals in the Ukrainian case study. The respondents complained on bad roads, lack of markets for their home-produced or collected NWFPs, high unemployment and low pension values. In Kortkeros, respondents explained that lack of basic infrastructure forced them to rely on NWFPs. Loans were unaffordable and the low amount of pensions and salaries make people get income from NWFPs use in Kortkeros. In the Swedish case study there were no complaints on capitals. The lack of entrepreneurs and skills to run businesses was named in Roztochya as an explanation why entrepreneurs from Poland collect NWFP raw materials from locals. Expensive medicinal treatment was a reason why locals in

Roztochya use medicinal herbs. The lack of hospitals and pharmacies was named by locals from Kortkeros as a reason to use medicinal herbs to treat diseases. Social capital was considered as important and well maintained in all case studies in terms of traditions connected to NWFP consumption. The respondents in all case studies highlighted that use of NWFPs has a positive influence on their livelihoods, which is in line with the findings of Kusters *et al.* (2006).

To conclude, NWFPs are important for local communities in different ways depending on the socio-economic context. While NWFPs provide mainly tangible benefits in countries with transition economy (Ukraine and Russia), they provide intangible benefits in countries with market economies (Sweden). Thus, the first hypothesis cannot be rejected. Improving tangible and intangible benefits from use of NWFPs for local rural populations is one of the tasks of SFM. To protect their interests, NWFPs should be included into the multiple-use forest management planning, which has to ensure that timber and NWFPs are managed in a complementary manner.

6.2 Traditional ecological knowledge on NWFPs in different contexts

Birkes (1999) defined traditional ecological knowledge as 'a cumulative body of knowledge, practice and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relation of living beings (including humans) with one another and the environment' (Birkes, 1999, p.8). Traditional ecological knowledge is an attribute of natural resource use of societies (Birkes, 1999), and an integral part of cultural heritage (Hernández- Morcillo *et al*., 2013). This knowledge is considered as important aspect of implementing SFM on the ground (Yeo-Chang 2009).

Use of NWFPs has a long tradition in many forested countries and therefore reflects local knowledge and social practices that are worth conserving (Svanberg, 2012; Shackleton *et al.*, 2011b; Stryamets *et al.*, 2010; Kilchling *et al*., 2009). However, the traditional ecological knowledge on NWFPs differs among regions, and this has been associated with lifestyle changes, urbanization, large-scale farming, and lesser contact with nature (Łuczaj *et al.*, 2012; Sõukand *et al*., 2013; Łuczaj *et al.*, 2012).

My study shows that the traditional ecological knowledge about different NWFPs, collection methods, processing, storage, and use, which have been passed through generations, was deeper among local people in Ukraine and the Russian Federation than in Sweden. Nearly 90% of all respondents said that their parents had taught them to pick berries and mushrooms. Nowadays

younger generations rather spend time with computers instead of going to the forest. NWFPs collection is more typical for older people, which is also indicate by other studies (Sõukand *et al.*, 2013; Schulp *et al.*, 2012; Svanberg *et al*., 2012). In the Ukrainian and the Russian study areas knowledge about medicinal herbs was transmitted from parents and grandparents to the younger generations. This is consistent with findings on changes in patterns of wild food and medicine use in other regions (Rexhepi *et al*., 2013; Łuczaj *et al*., 2012; Menković *et al*., 2011). In all case study areas the traditional ecological knowledge is declining, with the risk to loss of such knowledge in the future (Delang, 2006). There is a need to save traditional practices, and to share traditional ecological knowledge that still exists in East European countries, but which has been lost in developed European countries (Pieroni & Privitera, 2014; Svanberg, 2012; Vandebroek *et al.*, 2011; Vitalini *et al.*, 2009; Evans, 2008). In Ukraine and the Russian Federation traditional knowledge about preserving wild berries and mushrooms for are still actively maintained. Traditional methods of preserves stem from past times when this was a useful tradition to ensure food security in harsh winter times (Łuczaj *et al*., 2012; Vandebroek *et al*., 2011). These techniques of drying, freezing, marinating and making jams all improved shelf-life considerably (Quave & Pieroni, 2014). My findings also illustrate that traditional ecological knowledge tends to 'survive' much easier where it has an important role in subsistence such as in Ukraine and Russian Federation (self-sufficiency), as opposed to Sweden (Svanberg, 2012; Svanberg *et al*., 2012).

I suggest that the traditional ecological knowledge on NWFPS should be added to the total economic values of the forests, as they could be lost if people would stop collect NWFPs (Delang, 2006). This would also increase the total value of forest landscapes (Chamberlain & Hammett, 2002).

6.3 From government to governance of NWFPs of both plant and animal origin

Forest resources are complex and to govern them in a sustainable way is a challenge (Holmgren *et al.*, 2010). There are ongoing debates among different actors, stakeholders and organizations on how to govern NWFPs (Sandström *et al.*, 2011). Regarding Ukraine and the Russian Federation, my study shows that formal institutions and public (governmental) organisations at multiple levels that are supposed to define and control harvest of NWFPs in both countries use top-down models of government. However, there was a clear difference between the government of NWFPs of plant and animal origins. Plant origin NWFPs in both countries are used freely by any person without control or

supervision from the respective governmental organisations. In spite of many existing legal documents that prescribe how the harvest of NWFPs should be controlled and regulated, there was no enforcement by responsible public organisations in any of the case study areas. The only exception was the control of NWFPs harvest in protected areas. Public organisations in both countries consider NWFPs of plant origin as an economically valuable resource that might generate a sufficient income, or as forest resources that might be in danger due to a harmful use. Thus, NWFPs of plant origin in the Russian Federation and Ukraine are public goods that are free to use by the public, and are regarded as a quantitatively unlimited resource (Janse & Ottitsch, 2005). Stakeholders from the private sector are the only ones who directly benefit from these public goods.

In the Ukrainian case study the commercial harvest of NWFPs of plant origin not has been in conflict with the interests and needs of other landscape stakeholders. Thus, passive government of NWFPs, or rather its absence, was not a problem. All interested parties were able to harvest NWFPs in desirable qualities and quantities at any time and in any place outside of the protected areas. Therefore, there were no efforts from stakeholders to shift towards the multi-stakeholder decision-making process, or towards governance. On the contrary, stakeholders from the private sector were not interested in any type of regulated and controlled use of NWFPs. Currently, the dominant mind-set among local people is to 'mine' NWFPs rather than to process the raw material and produce value-added products.

On the contrary, in the Russian study area stakeholders from private and civil sectors were into the decision-making process related to NWFPs of plant origin. Private sector stakeholders, mainly forest companies, had to address the rights and interests of local communities in the extraction of NWFPs when they perform their forest activities. This was legitimised by informal institutions, such as the FSC forest certification standard, and by formal institutions on the level of the Komi Republic. This shift from government to a multi-stakeholder form of governance happened as a result of inability of governmental organisations to solve the conflict between local communities and forest companies in forest resource use in the Komi Republic. Instead, civil sector stakeholders took this responsibility and developed instruments that are used by local communities in order to protect their rights in NWFPs harvest (Paper III).

The harvest of NWFPs of animal origin is prescribed by formal institutions and controlled and regulated by public organisations at multiple levels in both countries. In both case studies private stakeholders as forest/land leasers have responsibility to enforce the law related to NWFPs of animal origin, while the

governmental organisations have manly controlling functions. However, my study shows that the government of NWFPs of animal origin, does not work properly and poaching is the main problem in both case study areas.

The governance of NWFPs of animal origin has certain features in Sweden. The native Sami people have the right to herd reindeer on different lands (owned by the government, public companies and non-industrial private owners), but those forests are also used for wood production for the forestry industry. This is a source of conflict in Northern Sweden (Sandström & Widmark, 2007). As the development of co-management requires power sharing and partnership, a need for decentralized governance was proposed by Sandström and Widmark (2007). An informal institutional mechanism, like the FSC certification, can influence the governance of reindeer herding and help to solve the conflict. The governance of NWFPs of plant origin is also challenging in Sweden. There are debates between the landowners and berry picking industry on the governance of NWFPs. As one possible scenario of governing NWFPs of plant origin, Sténs and Sandström (2013) proposed the prohibition of commercial berry picking in the frame of Right of Public Access, unless a fee was paid to landowners.

To summarize, NWFPs are both public goods (i.e., of plant origin) that are open for free public use with many free riders (Table 12), and club goods (i.e., of animal origin) where a special fee or other restrictions limit access to these resources (Sandström *et al.*, 2011; Janse & Ottitsch, 2005; Agrawal, 2003). For resources which are rival and excludable, it is possible to market them and it is easy to set a price; for public goods, which are open for free public use it is impossible or very difficult to estimate their monetary value.

The use of NWFPs of animal origin as club goods is regulated in Sweden, Ukraine and the Russian Federation. Use of NWFPs of plan origin has been challenged in all three countries in different ways. In Sweden the main challenge is free riders such as private companies that use low paid immigrant workers for commercial collection of berries and mushrooms in privately owned forests. This creates conflicts between landowners and NWFP harvesters. This problem has resulted in discussion on the free access to berries by commercial collectors (Sandell & Fredman, 2010). In the Russian study area, the conflict between the forest companies and local communities was due to the violation of right of local communities on traditional use of NWFPs in public forests. In Ukrainian case study area, the conflict with locals emerged due to potential restrictions on the use of NWFPs in the Biosphere Reserve. The existing government of NWFPs of plan origin did not work properly, and the shift towards new forms of decision-making has happened when NWFPs are subjected to rivalry since the activity of other stakeholders could exclude

others from the harvest of NWFPs, reduce the amount of these resources (Sandström *et al.*, 2011), or create a conflict among interests and values of forest landowners and 'free riders'. The differentiation of collection of NWFPs for personal and commercial purposes could be an example of solving these issues (Martínez de Aragón *et al.*, 2011).

Commercial use of NWFPs of plant origin makes these common pool resources rival; therefore, the governance of NWFPs of plan origin is as important as the governance of NWFPs of animal origin. Therefore, the second hypothesis of my thesis cannot be rejected.

Table 12. *Economic value of the various forest goods and services. Adapted from (Sandström et al., 2011; Janse & Ottitsch, 2005)*

Non-rivalry	Club goods Horse riding, National parks with entrance fee, Biosphere Reserves status	Public goods Aesthetic, Biodiversity, Clean air provided by forests
Rivalry	Private goods Timber, Hunting	Common pool goods Berries and mushrooms Forest as a pasture Medical herbs
Economic value	Excludability	Non-excludability

To conclude, many challenges of NWFP governance may be managed through dialogue, stakeholder involvement, decreasing the role of the state and increasing civil society involvement and stakeholder partnerships, which is in line with the findings of Ros-Tonen and Kusters (2011). The landscape approach may thus be used for solving governance issues.

6.4 Role of landscape approach initiatives for NWFP governance

An 'integrated landscape approach' is needed to implement SFM policy (World Forestry Congress, 2009). The landscape approach has emerged to facilitate the development and conservation goals (Sayer et al., 2013). Sayer *et al.* (2013) highlights that one of the principles of the landscape approach is equal engagement of all stakeholders into the decision-making process. The trust building and clear division of rights are important component of the landscape approach. The landscape approach potentially could be used for governance of NWFPs. Paper IV lists five attributes of landscape approach. The first attribute is a sufficiently large area that matches challenges to deliver variety of goods and values, e.g., timber productions and variety of NWFPs. The second attribute is bottom-up governance of NWFPs, which requires multi-level and multi-sector stakeholder collaboration. The third attribute is to understand the importance of achieving sustainability in the forestry sector. Integrative transdisciplinary knowledge production is an important way to identify issues that involve SD. This includes strengthening the stakeholder involvement at the local level. The fifth attribute is sharing knowledge and positive experiences.

BR is one of several landscape approach concepts aimed at supporting sustainable development as a social process toward sustainability (Kraus *et al.*, 2014; Bridgewater, 2002). However, the results from the policy analyses and interviews with stakeholders in the emerging Roztochya BR showed that the legislative domain of the BR concept had a clear negative impact on the different perceptions of what the BR concept is by different stakeholders in the case study. I thus contend that, in Ukraine, where peoples' livelihoods depend directly on the use of natural resources (Stryamets *et al*., 2015; Elbakidze & Angelstam, 2007), the nature conservation orientation of BR management which is supported by the national legislation might also create economic constraints for the implementation of BR initiatives aimed at SD towards sustainability. For example, in my study area, local landowners and managers of state forestry enterprises perceived the plan to establish a BR only as another type of protected area that would limit nature resource use. This is likely to make BR implementation challenging and wrought with conflict among stakeholders.

This notion is also supported by studies in other countries, where promoters of BR initiatives often meet resistance from local people that recognize the BR as a pure nature conservation tool (Bosak, 2008; Phillips, 1995), which brings limitations in nature resource use and does not provide any economic benefits for local people. In post-socialist countries, there is also a legacy of private

land seizure by the state and control of natural resources that contributes to mistrust or suspicion. Such was the case under the Soviet system in western Ukraine. Later, during Ukrainian independence, after 70 years under the Soviet system, some of these lands were returned to previous owners. Land ownership is a source of pride and thus very important to people (Elbakidze & Angelstam, 2007). However, local people do not yet feel fully secure with their land ownership and are afraid that the government could take their property. This history, in combination with current social and economic insecurity, contributes to local stakeholder distrust of initiatives that originate outside of the community, such as a BR, and could potentially result in undesirable impacts on their livelihoods.

There are also a number of opportunities for the region with the BR creation (Wallner *et al.*, 2007). Among them, the economic component includes rural territories development where green tourism is thought to have a large potential (Stryamets *et al.*, 2010). New green technologies could be introduced in connection to the BR to the area as an example of sustainable resource use. Among other potentially beneficial issues for rural economic development is the transition to organic farming. The BR status might provide an opportunity to develop a labelling scheme for organic products, as done in some European BR (Kraus *et al.*, 2014). For local stakeholders the BR status could lead to new funding opportunities, related for example to the treatment of old environmental issues related to previous large scale sulphur mining in the area.

As one of the initiatives towards implementing SFM policy on the ground, the MF concept emerged in Canada in the 1990s. There are 6 key principles of the Model Forest concept (IMFN 2008); (1) Each model forest is a neutral forum that welcomes voluntary participation of representatives of all stakeholder interests and values on the landscape; (2) A large-scale biophysical area representing a broad range of forest values, including social, cultural, economic and environmental concerns; (3) Stakeholders are committed to the conservation and sustainable management of natural resources and the forested landscape; (4) The model forest management process is representative, participative, transparent and accountable, and promotes collaborative work among stakeholders; (5) A program of activities that are reflective of the model forest's vision and stakeholder needs, values and management challenges; (6) A commitment to knowledge sharing, capacity building and networking.

To strengthen contributions of landscape approach initiatives to SFM as a societal process, there is a need to integrate work among local stakeholders and develop a collaborative social learning (e.g., Leeuwis and Pyburn 2002; Green and Chambers 2006) with the aim of empowering local communities to steer

their own development rather than passively follow external directives. This requires a careful approach to collaboration and production of new knowledge.

6.5 Use and governance of NWFPs as a component of SFM

'*Sustainable forest management, as a dynamic and evolving concept, aims to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations'* (UN Forum on Forests, 2011).

International policies on SFM state that maintenance and sustainable use of NWFPs are important for rural development and nature resource conservation, especially in forest-dependent communities (MCPFE, 2003a, 2007a, b, c). From a socio-economic and cultural perspective, the use of NWFPs has a long tradition in many forested countries, and therefore reflects local knowledge and social practices that are worth conserving (Kilchling *et al*., 2009).

My thesis highlights that local rural residents in different contexts appreciate both tangible (berries, mushrooms, game meat) and intangible (traditional cuisine, medicine, rituals, traditional ecological knowledge) benefits that NWFPs provide. The multi-functional use of forest resources is a part of SFM and was highly appreciated in all three case study areas. Therefore, use of NWFPs can contribute to SFM because it provides multiple benefits to rural communities (Gubbi & MacMillan, 2008; Ticktin, 2004). The NWFP governance that is based on multi-stakeholder approach can greatly contribute to livelihoods of forest dependent communities (Hajjar *et al*., 2012) and will support implementation of SFM policy (Dovie, 2003).

In recent years the attention to NWFP use and management is addressed both as a dimension of multifunctional forest use and as an asset important for forest dependent rural communities (FOREST EUROPE, 2015; UN, 2015b; UN, 2015a). SFM can significantly contribute to poverty eradication and achievement of SD goals. After the Bruntland report (1987) and UNCED 1992, it was recognized that forest are essential not only for sustainable timber production, but also for biodiversity conservation and traditional use of forest products by local and indigenous people (Ros-Tonen *et al*., 2005). Thus, the SFM concept includes the sustainable management of NWFPs as a consistent part of forest resources (The Montréal Process, 2015; FOREST EUROPE, 2011). Sustainable management of NWFP could potentially provide resources for rural development (FOREST EUROPE, 2011). This includes socio-cultural, ecological and economic dimensions. Paper I shows that international policies related to SFM stated that maintenance and sustainable use of NWFPs are

important for rural development and nature resource conservation, especially in forest-dependent communities.

My studies show that in all three case studies NWFPs play economic and/or socio-cultural roles for rural communities (Table 9). The potential of NWFPs to generate income and jobs could increase with the orientation of society and forest management towards sustainability (Angelstam *et al*., 2004; Schmithüsen, 2004; Janse & Ottitsch, 2005). Social trends towards conserving traditions and using natural medicinal products could support the marketability and profitability of NWFPs (Kilchling *et al*., 2009). The review of NWFP use as wild food in Europe provided by Schulp *et al*. (2014) showed that over 100 million of EU citizens consume NWFPs. The importance of NWFPs as recreational, cultural services and sense of place was highlighted in all study areas, which is in line with the study done by Schulp *et al*. (2014). Meanwhile, more studies on economic importance of non-marketed NWFPs are needed (Delang, 2006), and still there are gaps in knowledge on sustainable harvesting of NWFPs (Dahlberg, 2015).

Defining what sustainable harvesting of NWFPs is needs to be studied further. Overexploitation of NWFPs by humans may lead to a number of negative effects. The decreasing rates of seeding harvested species and the decreasing of the population volume are ecological impacts of NWFPs overexploitation (Ros-Tonen & Wiersum, 2005; Ticktin, 2004). Often overexploitation occurs when NWFPs are collected for commercial purposes. For instance, the respondents in Kortkeros stated that commercial harvest of NWFPs has negative effects on forest ecosystems. A decreasing of amount of ground cover of lingonberries and cranberries as a result of trampling was mentioned by respondents in the Russian case study. In the Ukrainian case study harvesting was not mentioned as a reason for decreasing the amount of NWFPs, but the negative influence of forest management was mentioned: '*Forests are not managed properly, they do not clean forests. Forests are very dense and dark'*. Illegal hunting was named as a problem in both the Ukrainian and Russian case studies. Ultimate reasons for unsustainable use of animal origin NWFPs was caused by a number of issues, mainly because of economic problems and low ecological awareness.

In Sweden, as developed country, process of urbanization is one of the fastest in Europe (Eurostat European Commission, 2013). People spend more time indoors and in built environments. In addition, time spent in front of computers, TVs and cell phones has increased dramatically in recent years. Thus, people have been disconnected from nature, which among other trends causes more stress (Selhub & Logan, 2012; Louv, 2008). Stress-related illnesses have become a global problem (WHO, 2008). According to the World

Health Organization (WHO, 2008), nowadays the diseases caused by stress and physical inactivity nowadays are two main reasons of death in developed world.

There are studies that prove positive effect of forest environment on human health (Grahn & Stigsdotter, 2010; Morita *et al*., 2007). By promoting NWFP collection, two goals might be achieved, first more physical activity, and second reducing stress through restoring the human-nature connection. The participants of our interviews mention that a forest environment makes them calm, inspired and happy. Most respondents stated that NWFP collection had a very positive effect on their mental wellbeing. Collection of NWFPs is accompanied by physical activity, fresh air, relaxation and enjoyment of nature. The activities provided in the forest are preceding both preventive and therapeutic health benefits (Park *et al.*, 2011; Bowler *et al*., 2010). Several studies have proven the positive health benefits of outdoor activities (Stigsdotter *et al*., 2011; Grahn & Stigsdotter, 2010; Ottoson, 2007). There is a need to expand the knowledge of how to deal with stress or to relax and enjoy nature, and NWFPs collection is a good instrument for this.

Table 13. *NWFPs as a part of SFM*

	Roztochya (Ukraine)		Småland (Sweden)		Kortkeross (Russian Federation)	
Dimension of SFM	Aspects	NWFP	Aspects	NWFP	Aspect	NWFP
Socio-cultural	Traditions Recreation Medical treatment	Herbs Mushrooms Berries Medical herbs	Traditions Recreation Hunting	Mushrooms Berries Flowers Game meat	Traditions Recreation Medical treatment	Herbs Mushrooms Berries Medical herbs Game meat
Economical	Personal use Food Additional income Medical treatment Cattle hay	Berries Mushrooms Medical herbs	Personal use Food Utilization by companies Hunting	Berries Mushrooms Game meat Hunting tourism	Personal use Food Main and additional income Medical treatment Cattle hay	Berries Mushrooms Medical herbs Game meat

International policies highlight that NWFPs should be incorporated into forest management plans. The Pan-European process' descriptive indicators of criterion 3 require the development of management plans for NWFPs. My results from the Russian case study confirm that including NWFPs into forest management plans is needed. Indeed, the forest companies in the Russian case

study area have to negotiate with local people the forest management plans that potentially can influence yields and collection of NWFPs. This shift in NWFPs governance is a direct result of Komi Model Forest activities as one of landscape approach initiatives. Additionally, the Russian FSC national standard compare to Ukrainian and Swedish ones includes more criteria and indicators (11 criteria and 14 indicators) concerning NWFPs.

To conclude, the multifunctional value of NWFPs provided by forest landscapes is important for rural communities, but often is neither supported by national policy and management regulations nor appropriate governance (e.g., Laird et al., 2010). At the same time, in some European regions NWFPs and ecosystem services provide more revenue than wood sales (Arnold & Perez, 2001; MCPFE, 2007a). However, there are challenges to balance production of NWFP and wood, because wood is still economically the most important resource provided by forests. Thus, to promote sustainable use of NWFPs new policy instruments should be developed in all three countries.

7 Conclusions

This thesis contributes to holistic understanding of NWFPs as an integral component of the SFM paradigm by analysing and comparing the use and governance of NWFPs in transitional and market economies, respectively. The main conclusions are:

- NWFPs are important for local communities in different ways depending on the socio-economic context. While NWFPs provide mainly tangible benefits in countries with transition economy (Ukraine and Russia), they provide intangible benefits in countries with market economies (Sweden). Improving tangible and intangible benefits from use of NWFPs for local rural populations is one of the tasks of SFM. To protect their interests, NWFPs should be included into the multiple-use forest management planning, which has to ensure that timber and NWFPs are managed in a complementary manner.
- Traditional ecological knowledge on NWFPS should be added to the total economic values of the forests, as they could be lost if people would stop collect NWFPs. This would also increase the total value of forest landscapes.
- Many challenges of NWFPs governance may be managed through dialogue, stakeholder involvement, decreasing the role of the state and increasing civil society involvement and stakeholder partnerships. The landscape approach initiatives may be used for solving governance issues.
- To strengthen contributions of landscape approach initiatives to SFM as a societal process, there is a need to integrate work among local stakeholders and develop a collaborative social learning with the aim of empowering local communities to steer their own development rather than passively follow external directives. This

requires a careful approach to collaboration and production of new knowledge.

- The multifunctional value of NWFPs provided by forest landscapes is important for rural communities, but often is neither supported by national policy and management regulations nor appropriate governance. However, there are challenges to balance production of NWFP and wood, because wood is still economically the most important resource provided by forests. To promote sustainable use of NWFPs new policy instruments should be developed in all three countries.

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