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UNECE

DRAFT

KEY FINDINGS

FOREST SECTOR WORKFORCE IN THE UNECE REGION

OVERVIEW OF SOCIAL AND ECONOMIC TRENDS WITH IMPACT
ON THE FOREST SECTOR

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DEFINITIONS

- **Europe:** 28 countries of the European Union (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Spain, Sweden, United Kingdom), Switzerland and Norway.
- **Eastern Europe:** Belarus, Moldova, Ukraine. In principle, the Russian Federation was included as part of this sub-region, however was often mentioned separately to highlight the weight of this country in the statistics of the sub-region.
- **Balkan countries:** Albania, Bosnia and Herzegovina, Macedonia, Montenegro, Serbia. Turkey was included as part of this sub-region, however was often mentioned separately to highlight the weight of this country in the statistics of the sub-region.
- **Caucasus Central Asia:** Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan
- **Forest sector:** The forest sector accounts for forestry and logging according to the International Standard Industrial Classification of All Economic Activities (ISIC) of the United Nations statistics division (ISIC Re.4 Division 02), wood manufacture (ISIC Rev.4 Division 16) and paper manufacture (ISIC Rev.4 Division 17)
- **Forestry:** Forestry and logging (ISIC Re.4 Division 02)
- **Wood manufacture:** Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials (ISIC Rev.4 Division 16)
- **Paper manufacture:** ISIC Rev.4 Division 17 (Manufacture of paper and paper products)

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INTRODUCTION

The following study provides an overview of topics relevant to the forest sector workforce in the UNECE region, based on existing scientific literature and the views of forest experts. It also quantifies, to the extent possible, employment trends in the forest sector, through statistical data available at the regional level.

This paper is the result of the work commissioned by the Joint Section to “review and compile existing studies, data and information in order to analyse the recent trends and current situation of the forest sector workforce, identify drivers, challenges and opportunities of the forest sector workforce, and possible needs for data collection”. It is also linked to the recommendations from the UNECE/FAO workshop on “Threats to Sustainability of the Forest Sector Workforce”, held on 17 March 2015 in Geneva and the UNECE/FAO workshop on “Forest Products Markets and Forest Sector Workforce” held in Podgorica, Montenegro, on 8-10 December 2015.

Link to the implementation of the Rovaniemi Action Plan for the Forest Sector in a Green Economy

Consideration of forest workforce topics has been the focus of the Joint UNECE/FAO Forestry and Timber Section and is a key issue addressed in the Rovaniemi Action Plan for the Forest Sector in a Green Economy (RAP). Therefore, evidence gathered in this study has been used to evaluate the implementation of the RAP pillar: “Decent Green Jobs in the Forest Sector” namely the following RAP actions, which are relevant to the content of this study:

- 1) C.0.1 Review forest sector workforce issues in order to recommend priorities and communicate their importance including through wide stakeholder consultation.
- 2) C.1.2 Review and discuss at policy level the main threats to sustainability of the workforce, and possible countermeasures. The review should also include gender aspects.
- 3) C.1.3 Review and discuss the developments of the new forest jobs and rural entrepreneurship in the green economy.

The following issues are key for the development of and communication of strategies supporting the expansion of decent green jobs in the forest sector (RAP Action C.0.1):

- Demographic (age, gender, ethnic diversity):
 - Age – research indicates that the ageing workforce echoes wider global patterns. Much forest work is not suitable for older workers, but wider evidence is not available (e.g. on whether broader scope of forest work provides more options for older workforce);
 - Gender – women’s employment in forestry is low across all countries. Women’s employment needs and conditions are not well studied. Proactive attempts to diversify the workforce suggest women bring different values and are part of the transition to more ecosystem-based management, but this is not always an easy transition. Women may be better represented amongst scientists but are still under-represented in managerial and leadership roles;
 - Ethnic diversity – challenges have been experienced, in attempting to diversify the ethnicity of forestry in the USA, but proactive educational programmes report some success;
- Changing work types (mechanisation and move from timber and biomass production to a wider range of forest ecosystem management objectives):
 - Statistics on wage rates do not reflect the effect of changing work types, which may be leading to a widening gap between well-paid and poorly-paid forest work;
 - The shift to fully mechanised cut-to-length harvesting is not universal, but depends on terrain, and to some extent on economy;

- The effects of the shift to multi-functional forestry can be challenging for forest managers, but also highly rewarding; the need for more people skills is widely acknowledged. The pressures resulting from the competition among different forest functions can be acute particularly for public sector forest managers, and organisational culture is often lagging behind the demands made on staff;
 - Work conditions are shifting from remote long-term camps to more long-distance commuting. The social media and better communication tools may alleviate the challenges of working at locations in remote areas (but the effects are little-researched);
- Changing employment structures (from ‘jobs-for-life’ to entrepreneurial and self-employment):
 - The decline of unions and globalisation of corporations reflect global patterns, but there are examples of forest-dependent communities that have developed innovative models to address the insecurity which results from these changes;
 - Contractors are a significant emerging segment of the workforce and are characterised by small to medium sized businesses which are increasing in numbers. They benefit from associations, both in terms of accessing training and information, and well-being. Their particular challenges include lack of skills in business management as well as poor cash flow and cycles of debt;
 - Workers in the informal sector often suffer from insecure work and unfavourable employment conditions. Examples of specific visa schemes for workers in the south-east USA provide a model for some aspects of success;
- Safety, health and well-being:
 - The issue related to the improvement of the safety and health of the workforce appears to be one that goes beyond ‘political will’ and reflects differences in terrain, organisation, and cultural attitudes to safety. Real improvements have been achieved but these are specific to particular organisations and are not generally reflected in statistics.
 - The key factor is that change needs to be systemic; it is not enough to deliver safety equipment or even training but monitoring systems must be in place to ensure that behaviour changes. Successful outcomes are supported by team-work on safety culture, risk assessment procedures and monitoring, and organisation cultures of risk reduction. Associations may be good ways to reach contractors, and self-employed.
- Attracting and training the future forest workforce:
 - This subject is not fully treated in the scientific literature and a wider range of examples is needed. In Eastern Europe and the Balkans, active measures to address this issue are based on innovative course design, including work placements after graduation. In other countries, it appears that students are more attracted to other natural resource management degrees with a wider ecosystem and public engagement approach.

As regards the review of the main threats to sustainability of the workforce (RAP Action C.1.2) the evidence gathered suggest that to a large extent it depends on providing attractive working conditions for the current workforce, and attracting and inspiring competent, well-educated and trained workers for the future. Given the changing nature of forest work, and the developing field of application (including multi-functional, community and urban forestry), a sustainable workforce also means a diverse workforce, with capacity for innovation and leadership.

Improvements to working conditions have received little attention in the international literature. Several researchers recommend that it would be valuable to know the impact of monitoring safety practices in organisations and in the field. Given that job security and continuity, and the build-up of experience, confidence and knowledge, are important contributions to livelihood, well-being and safety, further work is also needed to research conditions of job security.

Although education was not a focus of this study, the evidence reviewed suggests that needs in forestry education include: attracting students from a wide range of socioeconomic groups, into forestry education;

addressing skill needs resulting from mechanisation, computerisation and advanced technology; multipurpose forest management; embedding safety and health cultures and practices; communication, and organisational structures and management.

These findings allow to conclude that:

- More work is needed on evaluating the impact of measures to improve safety, and to enhance work conditions more generally in the forest sector.
- More research about the experiences of minorities (women, ethnic groups, older people) is needed in order to accommodate them more fully in the forest workforce.
- The greatest threat to work continuity lies in difficulties in attracting future members of the workforce. Students are attracted to natural resource management degrees with a wider ecosystem and public engagement approach. Forestry professionals also need these skills and it may be important to emphasise this aspect to attract more students.
- More research is needed on the effect of safety culture change, and its dissemination between organisations. However, the conclusions from existing studies suggest that the focus needs to be on behaviour change rather than on training. The good practice that includes good organisational systems and monitoring needs to be promoted;
- Contractors, self-employed workers, and the informal sector need particular attention and support. The need for political will is particularly strong with regard to the informal sector, where government may need to focus on ways to enforce labour legislation and improve communication among government departments.

The developments of the new forest jobs and rural entrepreneurship in the green economy (RAP action C.1.3) has been initiated and supported by several major transformation drivers, including social, environmental and economic conditions. Transition to a green economy offers new prospects to the forest sector and leads to the creation of new jobs. While the forest sector has a long history of providing green jobs within the economy, it is recognized that many current environmental and social considerations can be addressed through forests and forestry and therefore offer new opportunities to grow the forest sector workforce.

The Rovaniemi Action Plan provides a foundation and a roadmap for continuing to advance these green job opportunities in the forest sector and for the development of skills needed for them. It is meant to inspire action and provide the basis for concrete actions so that the forest workforce is able to implement sustainable forest management and achieve social goals of the green economy by providing decent jobs.

THE MEANING OF FOREST WORKFORCE

For the needs of the study, “forest workforce” was defined as “people engaged in or available for work, either in a country or area or in a particular firm or industry.” It implies employment, but the word ‘work’ also allows for the inclusion of self-employment, and management. Within this broad definition of ‘work’ there are different types of workforce and different areas of employment within the forest workforce. Some of these are more visible and better documented than others. The sources that were analysed for this study imply that various factors are affecting at least the following categories of workers:

- Forest workers (legal and illegal, formal and informal, long term and seasonal)
- Tree planters
- Loggers or harvesters
- Foresters, forest managers, forestry professionals
- State forest organisations
- Other public organisations, including municipal forest structures
- Private forest management organisations
- Forest contractors, including machinery operators
- Sawmill employees
- Other manufacturing sector employees
- Forestry consultants, advisers and extension workers.

The list is not definitive, also some of these categories overlap, and the ways in which they are defined are sometimes specific only to some countries and local contexts.

DATA SOURCES AND METHODOLOGY

Scientific literature is the main source of information used in this paper. It is complemented with statistical data and information received through individual communication with forest sector experts.

A wide-ranging scientific literature search was conducted using standard review techniques, starting with searches in scientific bibliographic databases included the Web of Science and Google Scholar, using suitable search term sets. Relevant scientific papers and reports were used as the starting point, with citations and related papers researched as well. Authors of key papers were also contacted for further information and additional links and papers.

National and international statistics come mainly from Eurostat and the FAO Forests Resource. In some cases, national statistics were gathered directly from national statistical offices.

A comprehensive description of all forest workforce characteristics, in all sub-regions was not possible because statistical comparability could not always be ensured and because of language barriers (the authors favoured literature in English). As a result, some obvious biases will emerge because it is easier for some nationalities and professions to publish in English. In addition to the language issue, much of the research was weighted towards the USA and Canada, likely reflecting the access to research on forest work in these countries.

Nevertheless, the overview provided in this study, with recognition of possible gaps and biases, is one of the first attempts to present a regional perspective on several important characteristics of the forest sector workforce in the UNECE region.

1. KEY CHARACTERISTICS AND TRENDS

The UNECE region covers 43% of the world's forests and accounts for about 60% of the global industrial roundwood provision. **Nearly 4.3 million people work in the forest sector in the UNECE region**, of these almost 52% in the countries of

Europe, around 30% in Canada and USA, 14% in the Russian Federation, 6% in Turkey and the remaining 12% is spread across other countries of the region (Figure1).

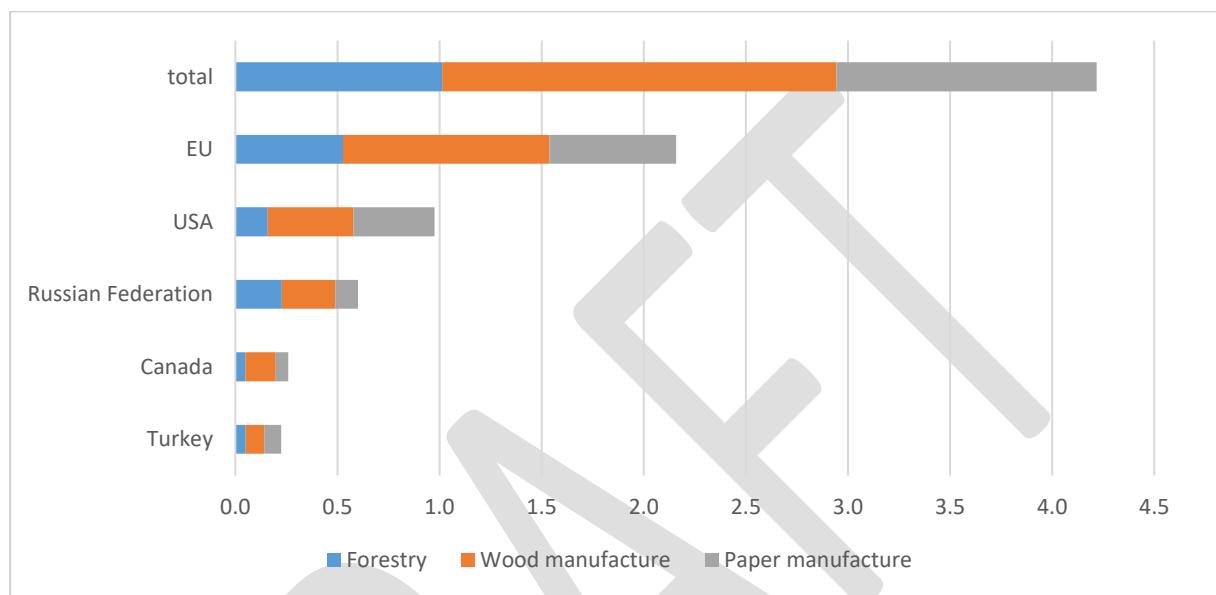


FIGURE 1 FOREST WORKFORCE IN THE UNECE REGION - SELECTED COUNTRIES & EU28+CH+NO (IN MILLION WORKERS)

Source: U.S. Bureau of labor statistics, 2016; Statistics Canada, Labour Force Survey 2015, EUROSTAT 2016, Kyiko, 2016

In the last several decades, the forest sector in the UNECE region has experienced a significant workforce reduction. Within the UNECE region, this is primarily due to various developments, such as mechanisation and increased efficiency.

However, in some areas of the UNECE region depopulation of rural areas, structural changes resulting in the downfall of large companies, privatisation and fragmentation of the supply market has contributed to the decrease of forest work. Moreover, these factors, along with outsourcing and a move to self-employed forest workers have resulted in a major change for forest workers and their employers (sometimes with difficult adjustments).

It is estimated that the USA and Canada together have lost about 600 thousand jobs (39%) in the forest sector from 2000 to 2011 (FAO, 2014).

In Europe, the number of forest workers decreased by 18% during the period of 2008 - 2016 (EUROSTAT data, 2016).

The Balkan countries, Eastern Europe, Caucasus and Central Asia experienced a transition to a market economy, which had negative consequences on the forest sector, in particular the wood manufacturing sector, which led to a workforce reduction.

1.1 Canada and the USA

In the last two decades, the forest sector employment situation in Canada and the USA have been impacted by increasing mechanisation of forestry operations. Scanners and robotics took the place of workers in many manufacturing facilities. In addition, the transition from paper towards electronic formats contributed to a decline in demand for paper products, reflected by closures and job losses in the paper manufacture industry (UNECE/FAO, 2016).

The housing market has not yet completely recovered from the decline after the 2008 economic crisis which had an important impact on wood demand and a reduction of employment in the forest sector.

A policy shift on forest management increasing harvest levels closer to its sustained yield could lead

to a greater demand for forest workers and less demand for imported forest products. Government-owned-forestlands constitute a majority in Canada and approximately 50% of the standing softwood forests in the USA. Figure 2 presents the size of the forest sector workforce in Canada and the USA.

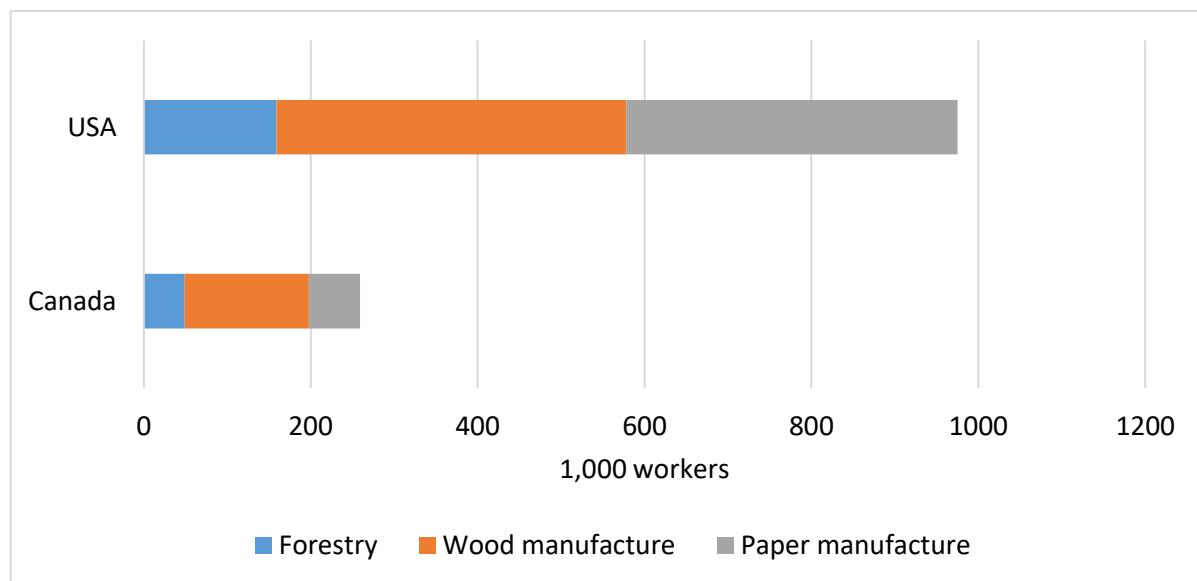


FIGURE 1: SIZE OF THE FOREST SECTOR WORKFORCE IN THE USA AND IN CANADA IN 2016 (IN THOUSAND WORKERS)

Source: U.S. Bureau of labor statistics, 2016; Statistics Canada, Labour Force Survey 2015) Canada forestry sector includes support activities for forestry industry

1.2 Europe

Wood manufacturing in Europe (EU28, Switzerland, Norway) has about twice the number of workers as forestry employs. The paper manufacturing sector (which includes pulp) employs about 20% more than the forestry one (Eurostat, 2016).

Forestry still employs a large proportion of the total workforce in countries such as Latvia, Estonia, Bulgaria, Croatia and Lithuania thanks to the relatively low labour cost in these countries compared to other areas of Europe. In several countries, such as Latvia, Croatia, Hungary and Poland, the proportion of forest workers in the total workforce has increased from 2008 to 2016. Many wood manufacturing facilities are located in these countries, including sub-contractor units for multinational companies, which produce construction elements, furniture and other wooden products.

Finland also has a relatively high proportion of the forest sector workforce, compared to other European countries as the forest sector has traditionally played an important role in this highly-forested country.

Contrary to the trends in some of the new EU countries, forest sector employment in western Europe (EU-15) is dropping.

In absolute numbers, Poland is estimated to have the largest forest sector workforce, followed by Germany and Italy (Figure 3).

Eastern Europe

In Eastern Europe, the transition to a market economy had negative consequences for the wood manufacturing. For instance, the Russian Federation and Ukraine experienced a reduction of 62% and 42% respectively in wood manufacturing. Contrary to the general trend in the sub-region, the size of Belarus' forest sector workforce increased by 33%. The Russian Federation and Belarus remain the countries with the highest percentage of the forest

sector workforce employed in wood manufacturing (around 44% each).

Balkan countries

Structural changes in the public sector in the Balkan countries resulted in a drop of 46% in the forest sector workforce and the collapse of several wood and paper manufacturing companies. Large integrated companies were replaced by smaller disaggregated companies. For instance, the introduction of the concession model, in combination with a skills mismatch of the workers vis-a-vis new technologies, led to a 94% decrease of the forestry workers in Montenegro between 1990

and 2015. Bosnia and Herzegovina, and Serbia saw a decline in pulp and paper production, which significantly contributed to the decrease in the number of forest sector jobs. In the region, only North Macedonia's workforce remained relatively constant.

Turkey

Turkey's forest sector workforce amounts to 0.17% of its total workforce. Although wood manufacturing provides the majority of jobs, employment in this sub-sector decreased by 19% since 2009. However, during the same period employment in forestry and paper manufacturing increased by 30%.

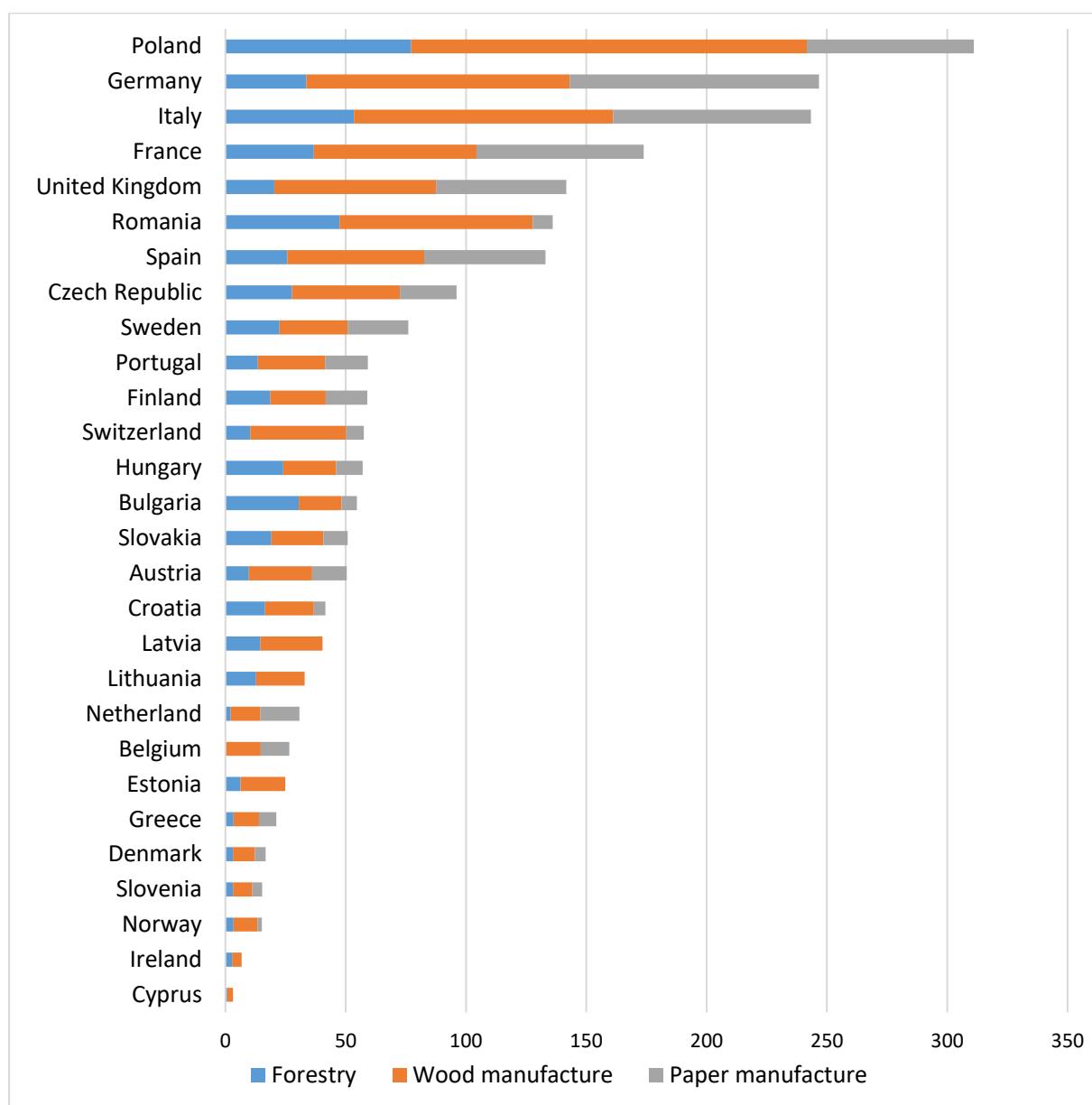


FIGURE 3: FOREST SECTOR WORKFORCE EU+CH+NO (IN THOUSAND WORKERS)

Source: Eurostat, 2016 ; Data not available for : Iceland, Malta, Luxembourg

1.3 Central Asia and Caucasus

After the collapse of the Soviet Union, the forest sector in the Caucasus and Central Asia was restructured and experienced a decline in

employment. Only Armenia, Azerbaijan, Georgia and Kazakhstan report employment in all forest sub-sectors (FAO, 2014).

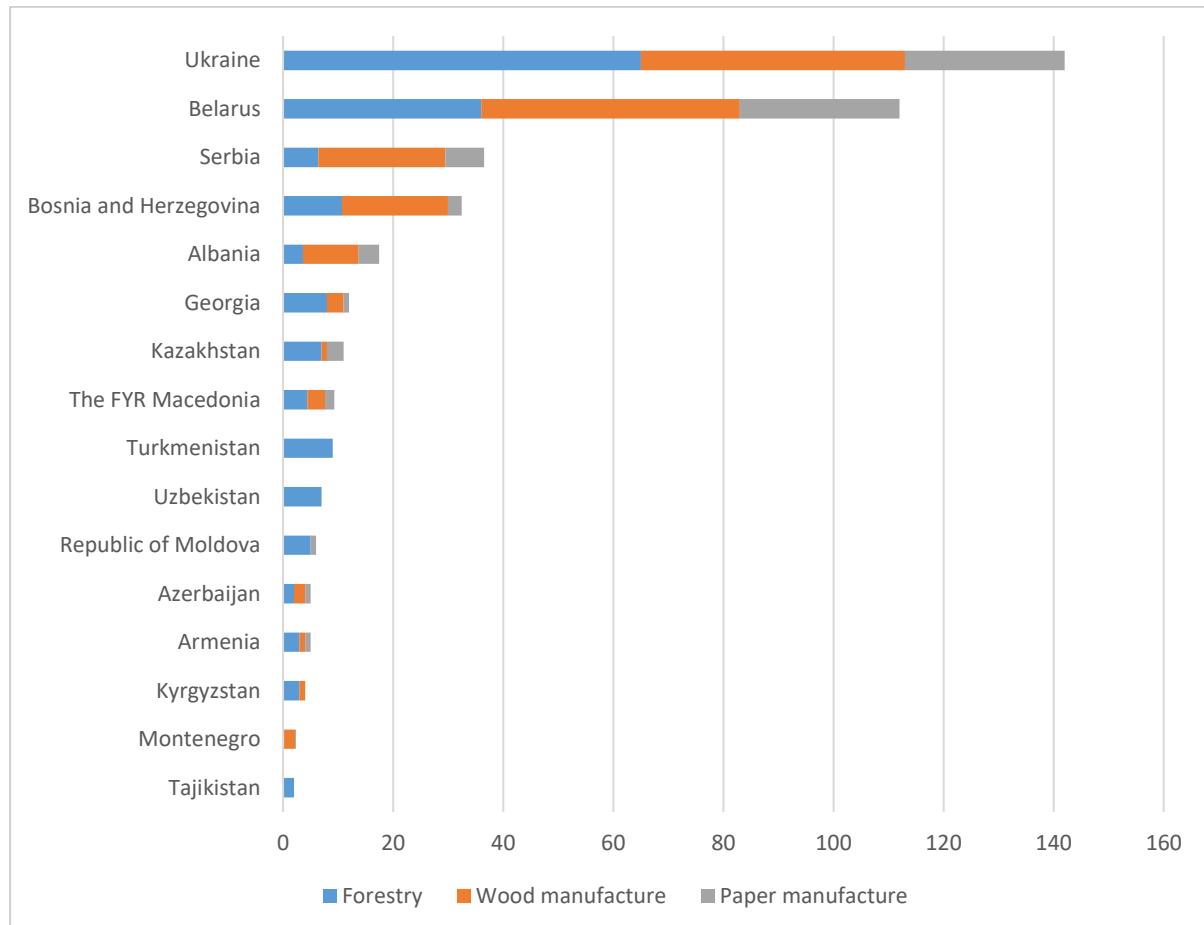


FIGURE 4: EMPLOYMENT IN THE FOREST SECTOR IN OTHER COUNTRIES OF THE UNECE REGION (IN THOUSAND WORKERS)

Source: Glavonjic 2016; Kyiko 2016; FAO, 2014

1.4 Age

In general, the population of workers aged 50 years and more in the UNECE region has increased over the last decade. This trend is also true for all sub-regions and sub-sectors of the forest sector.

Data available for Europe (Figure 5) show the proportion of forestry workers aged 50 years and more, in the years 2000 and 2010. In 2010, in 13 out of 27 countries, the percentage of this category of workers exceeded 30%, with a maximum of 51% in Sweden.

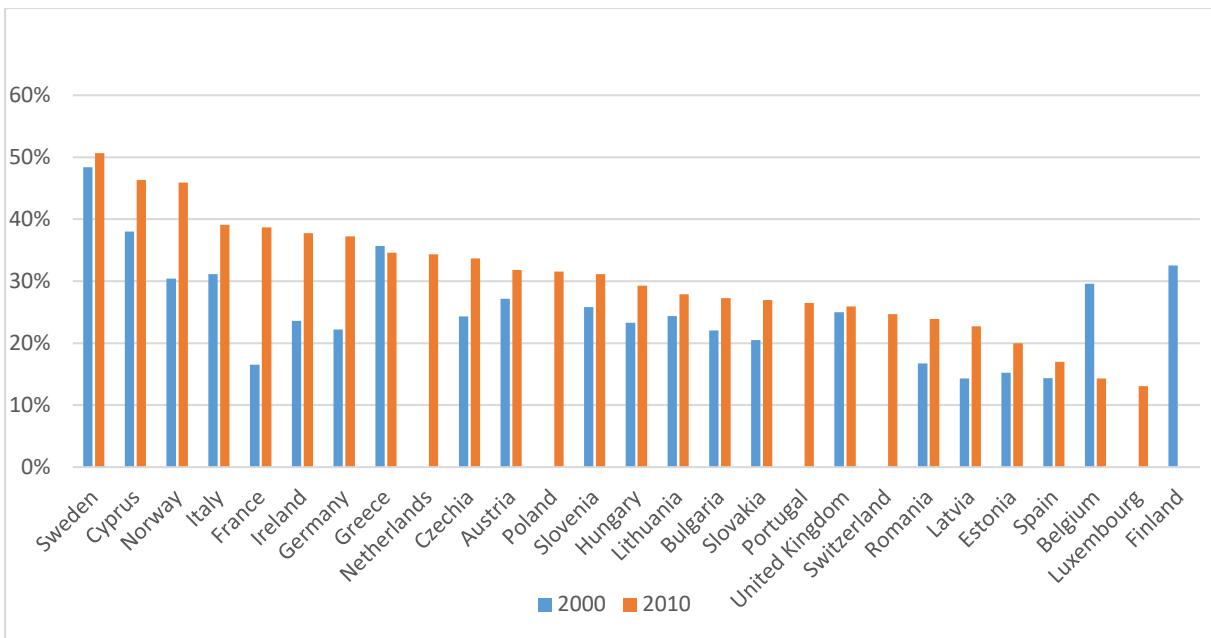


FIGURE 5: FORESTRY WORKERS AGED +50 COMPARED TO THE TOTAL FORESTRY WORKERS IN EUROPE

Source: UNECE Statistical Database

1.5 Gender and the Ethnic Diversity of the Forest Sector Workforce

Promotion of gender diversity in the forest sector has been gaining ground. International forest certification schemes include specific regulations on that topic. The Forest Stewardship Council has guidelines to facilitate the inclusion of requirements on gender equality in FSC national forest stewardship standards (Forest Stewardship Council, 2016), which promotes equality for women and men (status, opportunity, pay), a workplace free of harassment, as well as maternity/paternity leave. Likewise, the Programme for the Endorsement of Forest Certification require compliance with the International Labour Organization (ILO) Convention on non-discrimination, including women.

The data on gender in the forest sector is not comprehensive, making it difficult to draw conclusions. However, existing data (Europe, Balkan countries, Turkey) show that the proportion of women in the forest sector has been relatively stable in the last two decades and does not exceed 30% of the total workforce (e.g. Figure 6). There is a

general tendency across the UNECE region that the highest share of women (compared against other forest subsectors) is employed in paper manufacturing and the lowest in forestry.

Women tend to be employed in administrative roles and supporting services and may be less visible to statistics and researchers. That is particularly a case in small family enterprises and in positions that work directly with the forest sector but are classified outside of this context (accounting, dispatching, human relations, sales, etc.).

Statistical data and other information about ethnic groups in the forest sector workforce in the UNECE region are scarce. Therefore, in general, it is challenging to identify data related to this topic.

The UNECE and FAO statistics do not record ethnic diversity of workforce, but this topic is receiving increasing attention, particularly in the United Kingdom and the USA.

Diversification of the workforce is challenging. Some authors have suggested that a cultural shift is needed to explicitly value diversity, rather policies imposing specific behaviours (Koontz, 2007).

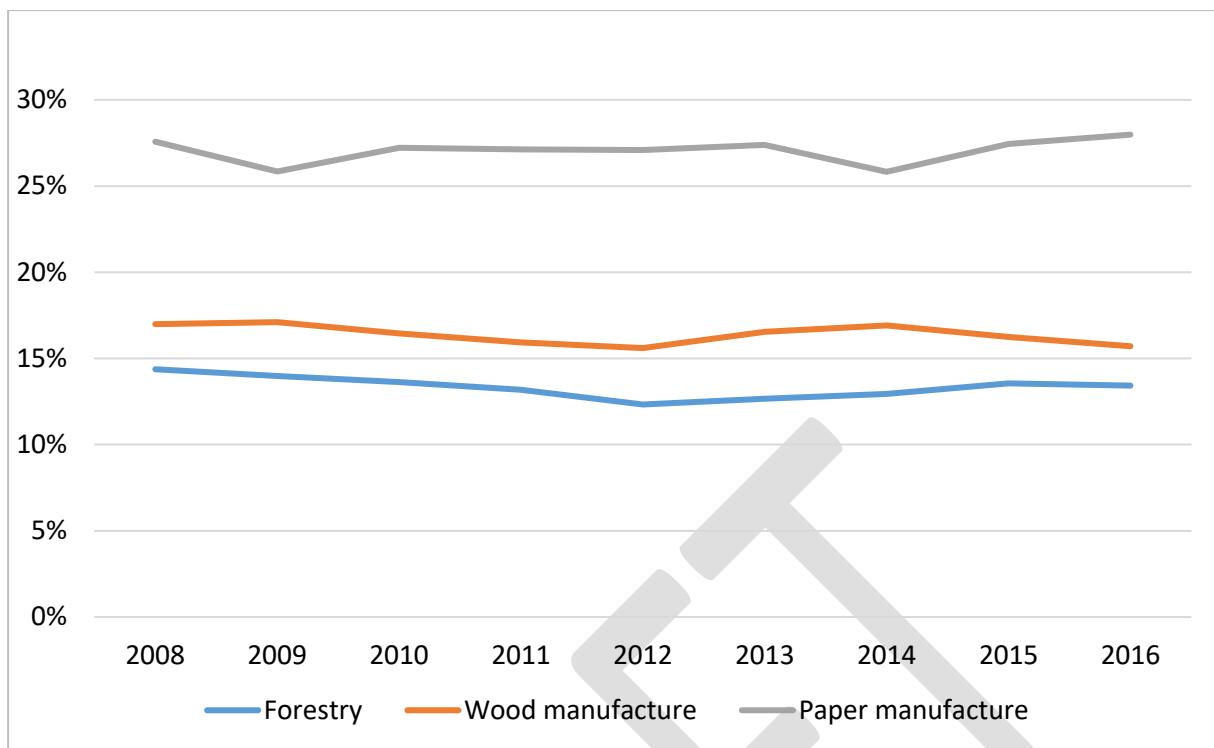


FIGURE 6: PROPORTION OF WOMEN EMPLOYED IN THE FOREST SECTOR COMPARED TO THE TOTAL WORKFORCE IN THE FOREST SECTOR IN EUROPE

Source: Eurostat, 2016

1.6 Education

Canada and the USA

Data from the USA show that student numbers nationally have shifted from forestry (traditional fields) to more interdisciplinary and ecosystem-based programs. The share of female enrolments in natural resource degrees has steadily increased, but is declining in forestry; likewise, minority enrolment has increased, but in forestry the share of minorities is below the share of the population (Sharik et al., 2015). These same trends have also been noted in Canada and have been linked to what may be a negative perception of the forestry as being: an anti-environmental, uncertain job, the mischaracterization of forestry as being low-tech and academically undemanding, and a lack of diversity in the workforce (Kan, 2012).

Europe

The forestry workforce is, in general, well-educated, with nearly three-quarters achieving vocational or professional qualification (Forest Europe 2015). Some research indicates widespread use of on-the-job training and in-house classrooms by employers that are seeking to prepare workers for green jobs (Brite 2010). These capacities can be developed in partnership with universities and other traditional educators. There is also broad recognition of the need to raise skills related to science, technology, engineering and mathematics (STEM) to support green economic growth.

The Balkan countries

Secondary vocational schools for forestry and wood processing are established in all the countries in the region and forestry faculties exist in all countries except Montenegro. In all secondary vocational schools, curricula are updated regularly to take account of new technology trends and needs of the companies.

However, although jobs for graduates from secondary vocational forestry school are easily available, enrolment levels are low, particularly for three-year courses (e.g. carpentry, upholster and wood coating and treatment). Tertiary education, joint study programmes (in cooperation with universities from EU countries) exist in most forestry faculties in the Balkans.

Eastern Europe

Forestry education in Eastern Europe is provided by a well-structured system which includes vocational training schools and institutions of higher education. The large research centres and higher education institutions have been restructured to be able to adapt to political and economic transformation in the region. The challenges include the decrease in the number of students due to competition of forestry education with other specialisations and study curricula; funding and curricula that is need of updating to better reflect societal and technological shifts.

The Russian Federation

In the Russian Federation, the demand for educated workers in the forest sector is high, and there are not enough graduates to satisfy it. The Russian government has put a priority on improving and developing education programs to make forest sector jobs more attractive. Coordinated actions include (i) the promotion of the profession through communication campaigns; (ii) the establishment of a National Forest Knowledge Day (since 2013); (iii) a contest on “best school forestry unit” (which covers 59 regions); (iv) the International Junior Forest Contest “Podrost”; as well as (v) professional forestry programmes in 47 universities of the country (Ministry of Industry and Trade of the Russian Federation, 2017).

2. HEALTH, SAFETY AND WELL-BEING OF THE FOREST WORKERS

2.1 Risks

Forest workers in the UNECE region face a number of occupational health and safety risks, as despite mechanisation the forest work is still physically demanding. Work-related negative effects on the physical and mental health of the workers can be experienced if the demands of work (e.g. skills, experience) and the work environment (e.g. isolation, instability of employment) exceed the worker's ability to deal with them. In addition, many organisational aspects, such as relationships and atmosphere at work, responsibility for work and safety of others or unclear roles, can influence the worker's health, safety and well-being.

In the forest sector, forestry operations are the most exposed to occupational risks with accident rates are the highest in the logging. Forestry workers are generally exposed to a combination of risks related to natural conditions and risks directly related to the way forestry operations are performed. Several studies analyse injuries caused in specific situations and affecting specific body parts, but official statistics are scarce. Case studies do not provide ample information to draw general conclusions about risk causes and prevention. However, an overview of studies provides a conclusion that both technology and behaviour change are necessary to improve workers' safety.

Risks related to forest work can also be associated with social factors, such as gender, age and cultural background. Studies comparing data for men and women in the workforce find that the great majority of those suffering from workplace accidents in forestry are men, but this also has the potential for bias, as the ratio of male to female workers doing the most hazardous and physically strenuous tasks is skewed towards male workers. As regards the age's impact on the rate of injuries, the evidence is inconclusive. Older workers may be a subject to increased health and safety risks, compared to younger workers, but it is also a well-known fact that they have more experience and skills about how the tasks should be executed in a professional way.

2.2 Safety

At the international level, health and safety is covered by several international labour conventions of International Labour Organisation. In the forest sector, it is also a part of major international forest certification schemes. However, the achievement of health and safety at work depends on several principles applied at the national, organizational and the worksite levels. They include compliance with laws and regulations, establishment of relevant policies and training schemes as well as existence of safety culture and appropriate equipment at worksites.

One common indicator of the state of occupational safety is the rate of occupational accidents. Several analysts concluded that fatal accident statistics are generally the most accurate of all accident statistics, and are often more available than other accident data because the law requires that they are published in official records (Thelin, 2002). However, there are many challenges around data comparability, mainly due to different methods for collecting data and different levels of transparency on accidents reporting. Although some studies suggest that the general health and safety of forest workers is improving, it is difficult to confirm that it is a general trend in the UNECE region. For instance, data from insurance companies often aggregate the forest sector with agriculture and other sectors.

Mechanization, automation and personal protective equipment innovations have made work safer. However, some research indicates that safety at work also depends on behavior and attitude towards risks. Organizational safety cultures and work ergonomics that support good practices are critical to cultivate safer working conditions. Some of the means to achieve a work safety culture include: safety training; regulations, work procedures that clearly put priority on safety, and mitigating fatigue through regular breaks and work shifts.

2.3 Health and well-being

Apart from occupational risk and safety issues, forest workers also face health problems resulting from continuous physical or mental stress.

Health conditions frequently affecting forest workers include:

- Hearing loss, resulting from noise: related to chipping (Poje et al., 2015); or use of chainsaws (Rottensteiner et al., 2012);
- Whole body vibration (WBV) syndrome caused by repetitive hand and arm movements, and distorted body postures.
- Traumatic Vasospastic Disease: affecting workers exposed to repeated jarring causing circulatory disturbances in the hands.
- Musculoskeletal symptoms and injuries to neck and shoulder among logging-machine operators, back pain, and numbness in arms and legs

- Lyme disease caused by borrelia burgdorferi bacteria transmitted by tick bites (Guy et al., 1989).

Not much research is available on maintaining the physical and mental well-being of workers.

Workers' wellbeing can be related to perceptions and experiences of health, safety and security, but also to; job status; promotion prospects; working in solitary and remote places; and working in situations of conflict and high stress.

In the last two decades, increasing attention has been given to the general condition of workers and state of their contentment at work. Discussions of well-being often focus on mental health and on emotional state. It is generally recognized that there are advantages to both employees and the employers resulting from services supporting mental health and emotional state of workers.

3. CHANGING NATURE AND ORGANISATION OF THE FOREST WORK

All sectors of the economy continuously adapt their activities to the latest global developments such as ones resulting from globalisation or technology development. This process has an impact on the workforce, especially as it related to job security and the need for workers to develop skills that will meet future requirements. The forest sector has had to cope with cyclical economic conditions and globalization of commodity markets.

3.1 Industrial reorganisation and mechanisation

Many studies report on profound changes in the structure of the forest industry throughout the 1980s and 1990s, continuing into the 2000s. Formerly, large secure workforces, with lifelong jobs, were made redundant, moved to new locations, or reorganised and restructured. This trend applies, for instance, to traditional logging activities, typical of Finland, Sweden, USA and Canada. The work formerly performed by corporations, particularly in harvesting, has been out-sourced to a rapidly growing number of contractors who have different work management and communication cultures. Unions neither have the power nor offer the security that they once did.

In UNECE region countries that once had planned economies, the industrial reorganisation had a significant impact on the forest sector. In a number of countries in this sub-region, existing structures of the forest sector were profoundly reorganised. Forest ownership, management and administration roles have been separated and some roles transferred to the private sector, while much national forest land has been re-privatised or returned to former owners or heirs.

Many authors highlight the decline in forest jobs resulting from mechanisation. In the UNECE region, forest sector employment has been declining steadily since 2000 and this is an independent fact from output (the production of forest products). In other words, the persistent declines in forest sector employment throughout the UNECE region are a sign of increased labour productivity (likely the result of mechanization) and are unlikely to increase in the future (UNECE, 2015). In fact, investment in new

technology in the forest sector, is significantly driven by the desire to reduce costly labour and the difficulties of having employees that are exposed to hazardous and difficult working conditions.

3.2 Multi-functional and multi-stakeholder forest management

A separate trend which affects the industrial organisation of the forest sector is the shift to multi-functional forest management. Objectives of forest management have evolved in response to political and social expectations since the 1990s: from traditional forestry, focusing only on natural resources, it evolved to include a much wider range of forest functions (ecosystem services). This has been reflected in shifts of management approach, from the provision of wood multipurpose management, adaptive management and – more recently – a wider focus on the green economy and bioeconomy (Kennedy and Koch, 2004; Marald and Westholm, 2016; Lawrence, 2016).

Another phenomenon which has impact on forest governance (Eckerberg and Sandström, 2013) and existing models for land use (Leys and Vanclay, 2010) is an increasing competition among users of different forest functions. Participatory forest management, addressing the concerns of various stakeholders, can be challenging for forest managers and workers, who often are not trained on reconciling the competing demands from the various forest stakeholders.

This shift in forest management objectives requires new skills among certain segments of the forest work sector, particularly in public forest management (Pugliese et al., 2015; Cheng and Mattor, 2006). This is not just about a move to multiple objectives management, but also to balancing public, political and expert input into decision-making.

3.3 Labour reorganisation – contractors and enterprises

Structural changes in the forest sector which have taken place in the last several decades resulted in changes in the forest sector workforce. Historical descriptions of the forest sector highlight times of strong corporate loyalty and lifetime job continuity.

The main shifts in the structure of employment in the forestry have been from the public to the private sector, and from large multi-purpose organisations to a multiplicity of “contractor services”. Since the 1970s, ‘this massive structural change’ in Europe and USA and Canada has been characterised by outsourcing of forest work and the emergence of contractor companies, especially in logging operations (Blombäck et al., 2003).

To save costs and gain flexibility, several companies released their workers from direct employment and reengaged them as contractors. This change frequently resulted in a deterioration of working conditions (such as increase of working hours alternating with slack periods when not enough work was available) or lack of insufficient insurance against accidents, sickness and invalidity (Strehlke, 2003).

Across Europe, since 2000, employment in the public forest sector has declined by approximately 60% whilst employment in the private forest sector has almost tripled (Robb and Cocking, 2014). The State of Europe’s Forests 2015 describes forestry and wood manufacturing as “micro-enterprise environments where at least 1 in 5 workers is self-employed or an entrepreneur” (Forest Europe, 2015).

These changes in labour organisation have made contractor companies an important stakeholder group in the future of the forest workforce. Their structures and way of operating have had a significant impact on the forest workforce and the

conditions of their work. For instance, in Germany, contractors for forestry operations collectively own about two-thirds of the total harvesting capacity. They add up to about 2700 companies with 9000 employees (nearly half being family businesses), often combining agriculture with forestry businesses (Mrosek, 2015).

Small family businesses are characterized by great practical and technical skills, but less administrative and financial competence. This has been a challenge, since such knowledge would allow them to mitigate financial risk, manage operating outlay an income more effectively and improve their negotiation position with business partners.

Moving away from unionised labour towards contractors reflects a wider trend of governance strategies which include privatisation, rescaling governance to local level, externalising costs, and seeking a more responsible corporate image (Sarkki and Rönkä, 2012). As the number of contractor businesses has grown, contractor associations and other organisations representing their interests emerge.

3.4 The informal sector

Those to whom the informal sector is central to the economic subsistence are often vulnerable groups, such as migrants, poor people and small-scale operators. The informality and the remoteness of worksites make labour inspections more difficult, therefore information is scarce. However, the lack of decent working conditions to these categories of workers impacts the productivity and sustainability of the entire sector.

In the forest sector, most of the informal workers are not enrolled in unemployment, injury or old-age insurance schemes. They find it difficult to access proper medical services, especially in remote locations.

4. GREEN JOBS – TOWARDS AN ATTRACTIVE AND ADAPTIVE FOREST SECTOR

4.1 Major transformation drivers

The concept of ‘forest workforce’ is a highly diverse one, ranging from the organised industrial workforces of the mid-20th century through seasonal and migrant labourers, to self-employed forest owners and contractors.

Until recently, forest jobs were mostly associated with traditional activities related to silviculture and timber harvesting. Today, the potential for the creation of new job opportunities is related to all forest ecosystem functions. Currently as much as 16.7 million jobs in forestry are dependent upon the provision of ecosystem services (ILO 2018).

New careers paths may result from enhanced awareness of environmental and social consequences of economic activities in the forests and from the willingness to apply sustainable development values at the workplace (UNECE/FAO 2018). For instance, data from the USA show that student numbers nationally have shifted from traditional fields such as forestry to more interdisciplinary and ecosystem-based programs (Sharik et al., 2015).

The forest sector provides conditions for effective employment generation, including low capital requirements, a multiplier effect between direct and indirect jobs, and job diversity and flexibility that ranges from tasks that require high levels of technology to labour-dependent occupations (Nair 2009). Forestry, in particular, is often well positioned to provide economic benefits in rural areas with many small or medium-sized companies, family-owned businesses, and connections to the local community (Confor 2012).

4.2 Emergence of green jobs and new skills requirements

Following the definition of the UNECE/FAO Team of Specialists on Green Jobs in the Forest Sector (Joint ILO/UNECE/FAO Expert Network) a green job in the forest sector is one which:

- “complies with the principles of sustainable forest management,

- contributes to the green economy, and
- is involved in the value chain of forest products and/or in the performance of forest services” (UNECE/FAO, 2018).

For a variety of reasons, including policy and programmatic purposes, green jobs in the forest sector may be defined more broadly or narrowly in different situations. However, the effort to develop green jobs in the forest sector has included the concept of ensuring decent work. The expectations for decent work include fair income, security in the workplace, social protection for families, personal development and social integration, freedom to express concerns and organize to participate in decision-making, and equal opportunities and treatment (Vančo 2017).

The success of many green jobs in the forest sector requires working relationships between foresters and other forest workers as well as the scientists, engineers, economists, and other professional groups in order to bring emerging research concepts to operational scale.

4.3 Adaptation needs in support of green jobs development

The forest sector is an important area for the growth in green jobs when compared to the whole economy.

The drivers for green job growth include government policy actions, individual company values and choices, and market demands (UNEP 2008). To effectively influence the drivers for green job growth it is necessary to develop better approaches to monitoring, reporting, and researching green job trends. There is also the opportunity to develop metrics and methodologies to measure the environmental benefits that may be attributed to green job growth, including reduced carbon emissions as well as human health and worker safety considerations.

The development of green jobs in the forest sector is closely related to the promotion of innovative uses of forest products.

To ensure that innovation moves from the research lab and testing facility into the marketplace, the forest sector needs to have skills in research, promotion, marketing, and communications. It is increasingly important to recognize the linkages between rural and urban communities, as they relate to green jobs in the forest sector. These trends are apparent within the growth of interest in urban forestry and in the manufacture of products from urban trees. Job opportunities in urban forestry emerge in land management and planning within governmental and private sector service providers. There are also jobs associated with tree care, tree removal and planting. Many of the skills, education and training needs parallel those associated with the rural practice of forestry and there are opportunities for collaboration across the landscape.

Another aspect which may impact the sustainability and adaptability of the forest workforce is the establishment of gender equality in access to work opportunities. Gender inequality and more broadly forest workforce diversity needs can be addressed in several ways, ranging from formal policy to the creation of informal networks. A starting point to this process is to establish consistent mechanisms to measure workplace diversity and to develop communication strategies to increase awareness of the needs and benefits associated with more shared empowerment and engagement (FAO 2006).

Finally, there is a need to raise awareness of the career opportunities and educational programs that are available to develop the necessary training and knowledge skillsets to participate in the green economy and to get a green job in the forest sector.

Increasing the number of green jobs in the forest sector requires addressing specific work force training and education. However, there is also a need to address economic conditions that enhance the competitiveness of forest sector businesses, investment opportunities, and greater use of technology and innovation. These strategies will also strengthen the sector and facilitate greater success with workforce recruitment.

4.4 The way forward

The further development of green jobs in the forest sector will strongly depend on the revision of existing curricula aimed at addressing existing skill gaps and adapting to new career paths. This can also improve the public perception of the forest sector as an innovative sector that attracts qualified workers and offers modern careers in a green economy. This will require looking across the current and future employment needs to train new workers as well as support continuous learning to ensure that workers can adapt to a changing labour market context.

CONCLUSIONS

In the last decades, the forest sector in the UNECE region has experienced an important workforce downsize due to different reasons: depopulation of rural areas, political transformation in Central and Eastern Europe, structural changes resulting in the downfall of several large companies, privatisation, fragmentation of the supply market, and outsourcing of work to contractor workers. The decreasing trend has been noticeable in all sub-sectors, but the most evident in the wood manufacture sector, which depends on the construction sector, particularly affected by the global economic crisis of 2008.

Altogether, the forest workforce in the UNECE region is shrinking and ageing. This trend mirrors the general trend in the working population in the region. Figures only include workforce working in forestry and logging, wood manufacturing and pulp and paper industries. They do not include the increasing number of foresters working in areas such as biodiversity conservation, education, tourism, forest monitoring, certification and other, which also depend on forests. Today it is not possible to estimate the potential of these jobs in tangible numbers, but it may be significant.

A reassessment of training and education needs, and adaptation of existing curricula has been, therefore, identified as a key condition for ensuring resilience and the continuous adaptation of the forest sector workforce to the requirements of a green economy. In many forest enterprises, particularly small and medium sized, the capacity of workers' adaptation to the requirements of new jobs will entail support in training and retraining of the existing workforce.

The number of women employed in the sector has been relatively stable: The promotion of women and other underrepresented groups in the forest sector has gained ground in the last several decades, however only few women occupy senior positions.

The nature of forest work is changing. To stay competitive the forest sector, as all sectors of the economy, needs to continuously adapt to the latest trends in global markets, demographics and to technological development. In many cases, the fast pace of adaptation creates pressures on productivity as well as on health, safety and wellbeing of forest workers.

The general situation in occupational health and safety in the manufacturing segment of the forest sector has continuously improved in the past decades, however there continues to be concern in forestry for many countries. In some regions and for some groups, the situation deteriorated.

The common measure of occupational risks is the data on occupational accidents, however foresters also face health problems resulting from continuous physical and mental stress. To address these problems attention needs to shift to the reinforcement of solutions focusing on behaviour and cultural change in the sector. Recognised means to achieve that include an increase of safety training, of supporting regulations and control measures.

Health and safety is more than just prevention of accidents, however not much research is available on maintaining the physical and mental well-being of workers in their work-places. It is related to the fact that the perception of the forest workers' welfare is very subjective. In the forest sector, factors influencing this perception include occupational risk, job security, isolation and potential for conflict with the public, that prioritize conservation of forest resources. Other factors which affect morale include the decline of the sector in general and the change in the public perception of the status of forestry professionals.

The nature of forest work has been changing due to the technological development and evolving priorities of the forest management (from timber extraction to ecosystems management).. Large companies have merged, downsized, relocated or closed with substantial changes for workers and communities. Trade unions do not have the same influence they once did. Many of the former work corporations, particularly those in harvesting, have been outsourced to a growing number of contractors, who have different work, management and communication cultures.

Standing up to the challenges of a economy and structural changes, (e.g. agriculture), such as globalization of commodity markets, ageing and relocation of rural populations, makes the forest sector less appealing as a workplace. Also, the public perception of forest jobs does not reflect all the merits of the forest sector.

Therefore, making forest jobs safer, better paid and more attractive for the future workers is the first step to ensuring that the forest workforce is fit for purpose so as to the forest sector can play its due role in a green economy. The challenge of developing a sustainable workforce of the future includes becoming more innovative in attracting qualified workforce to fill in new jobs. One element of that, appealing to the Millennials for instance, is to emphasise the aspect of natural resources management and public service of forestry jobs.

The following outlook for the forest sector workforce emerges from the findings of this study:

- The future workforce in the forest sector is the workforce with higher awareness of environmental and social consequences of economic activities in the forests, and the willingness to apply sustainable development values at the workplace; and
- The future jobs in the forest sector are decent, green jobs enhancing all forest ecosystem functions and supporting an inclusive transition of the sector to a green economy.

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