

DRAFT - TRENDS IN GREEN JOBS IN THE FOREST SECTOR IN THE UNECE REGION



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Abstract

This discussion paper includes a description of major transformation drivers of green jobs in the forest sector development, a mapping of (i) existing and emerging green jobs in the sector; (ii) skill requirements and; (iii) education needs for forest professionals in the UNECE region.

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BACKGROUND

This analysis builds on the UNECE/FAO publication on “Green Jobs in the Forest Sector”, prepared by the UNECE/FAO Team of Specialists on Green Jobs in the Forest Sector (ILO/UNECE/FAO Joint Expert Network), which included examples of existing and future green jobs in the forest sector within 7 thematic areas: wood energy production; agroforestry and mountain forestry; social and urban development; forest management, inventory and planning; biodiversity and ecosystem functioning, health and recreation, education and research and 19 related fields of activity.

This analysis addresses the issue of how the social and economic trends influence the forest workforce in the UNECE region and, in relation to these trends, identifies major adaptation needs for forest education and training.

This analysis supports the implementation of the UNECE project “Improving the capacity of the UNECE member States to develop green jobs in the forest sector” which addresses the issue of supporting the development of green jobs in the forest sector in the UNECE region. In particular, the key findings of the analysis, summarized in the format of policy brief, contribute to the promotion of decent green jobs and the exchange of knowledge, among member States.

The Joint UNECE/FAO Forestry and Timber Section’s work on green jobs in the forest sector supports the implementation of the Warsaw Integrated Programme of Work 2018-2021, which includes the promotion of green jobs in the forest sector under Work Area 2: *Policy Dialogue and Advice* and capacity-building activities on the contribution of the forest sector to a green economy under Work Area 4 *Capacity-Building*. It also contributes to the implementation of the *Rovaniemi Action Plan for the Forest Sector in a Green Economy*, in particular to pillar C, which addresses green jobs in the forest sector with the following overall goal “*The workforce is able to implement sustainable forest management, and the forest sector contributes to achieving the social goals of the green economy by providing decent jobs*”.

MAJOR TRANSFORMATION DRIVERS OF GREEN JOBS IN THE FOREST SECTOR DEVELOPMENT

The green jobs development has been initiated and supported by several major transformation drivers, including social, environmental, and economic conditions. Globalisation, digitalisation, changing requirements of society, and changing labour markets influence the forest sector (FAO 2017). Forest sector is highly vulnerable to risks associated with environmental degradation as currently as much as 16.7 million jobs in forestry are dependent upon the provision of ecosystem services (ILO 2018). With rising concerns related to climate change, there is urgency to develop environmental skills and diverse sectors of the economy, including the forest sector, that have the potential to provide solutions to reduce and mitigate atmospheric pollution and other environmental risks (Forest Europe 2017; Prins 2016).

The forest sector offers several characteristics that support effective employment generation, including low capital requirements in many situations, 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). There are important opportunities for green forest jobs to create economic development and employment that address social concerns and objectives for greater equality. Many quality of life considerations can be addressed through employment in forestry, including improvements to food security and nutrition, non-timber benefits, human health, and recreation (Estruch 2013; Herkendell 2016). Green jobs in the forest sector are central to these opportunities because of the global distribution of forest resources and the potential for job creation in many regions, including both urban and rural populations with diverse skillsets and entrepreneurial potentials.

Green jobs are key to supporting sustainable economic development within the goals of a green economy, where natural resources are used responsibly, and environmental degradation is avoided or minimized. Forestry 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). Green jobs in the forest sector can be created to support local, community-based needs as well as broader international or global objectives, including the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs).

Achieving the objective of 1.5°C under Paris Agreement requires the development of carbon sinks through reforestation, which could also create employment and growth opportunities for the forestry sector (ILO, 2018). There are examples from many countries of investments in forestry being a key component of economic development, including efforts in Canada, Chile, China, India, and the United States of America (Nair 2009). These experiences help inform the current interest in supporting the forest sector as a component of green jobs creation and sustainable development opportunities.

The *Rovaniemi Action Plan for the Forest Sector in the Green Economy* identified five pillars supporting the transition of the forest sector to a green economy (Table 1), third one addressing green jobs in the forest sector (UNECE/FAO, 2014).

Table 1. The Five Pillars of the Rovaniemi Action Plan for the Forest Sector in a Green Economy (RAP)

Pillar	Objective
1. Sustainable wood consumption and production	Patterns of consumption and production of forest products are truly sustainable.
2. The low-carbon forest sector	The forest sector makes the best possible contribution to mitigation of, and adaptation to, climate change.
3. Decent green jobs in the forest sector	The workforce is able to implement sustainable forest management and the forest sector contributes to achieving social goals of the green economy by providing decent jobs.
4. Valuation of and payment for forest ecosystem services	Forest functions are valued and payments for ecosystem services are established.
5. Policy development and monitoring of the forest sector	Policies and institutions promote sustainable forest management, policy making is evidence-based, and policy instruments are effective, efficient, and equitable.

Source: UNECE/FAO, 2014

Within each pillar, there are a number of objectives and proposed actions. To address green jobs in the forest sector there are objectives for job creation, skills development, reduction of risk and injury, monitoring impacts and trends, and addressing education needs (Brizay, 2014).

EXISTING AND EMERGING GREEN JOBS IN THE FOREST SECTOR

As defined in the UNECE/FAO publication “Green Jobs in the Forest Sector”, green jobs are jobs that “*minimize the adverse environmental impacts of enterprises and economic sectors by preserving or restoring the quality of the environment*”.

Following on this definition a green job in the forest sector has been defined as 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)

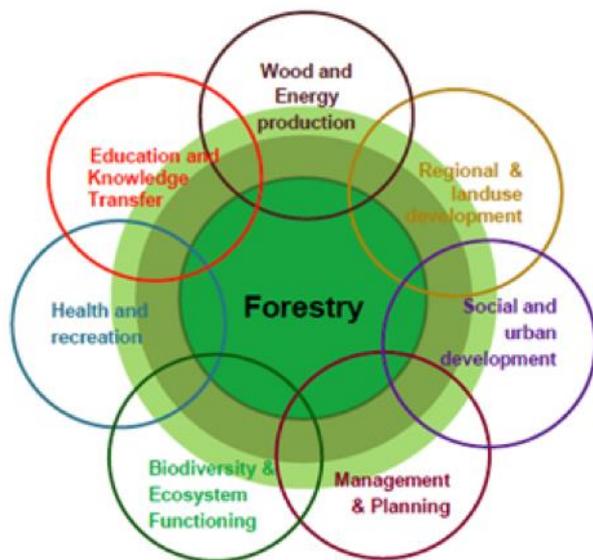
With these definitions in mind, the publication identified 7 thematic areas and 19 related fields of activity associated with green jobs in the forest sector (Table 2 and Figure 1).

Table 2. The Seven Thematic Areas and 19 Fields of Activity for Green jobs in the forest sector

7 Thematic Areas	19 Fields of Activity
1. Wood & Energy Production	1. Wood Production 2. Energy Production
2. Regional and Land Use Development	3. Agroforestry 4. Mountain Forestry and Soil Bioengineering
3. Social & Urban Development	5. Urban Forestry and Arboriculture 6. Culture and Forests
4. Forest Management, Inventory and Planning	7. Forest Inventory and Forest Monitoring 8. Planning, Governance, Sustainable Forest Management 9. Pests, Diseases and Forest Fires 10. Risk Management and Contingency Planning
5. Biodiversity & Ecosystem Functioning	11. Biodiversity Conservation and Nature Protection 12. Climate Change 13. Forests and Water 14. Mycoforestry
6. Health & Recreation	15. Forest Ecotherapy 16. Recreation, Leisure and Sports
7. Education & Research	17. Education, Further Training and Knowledge Transfer 18. Forest Research
	19. Other New Fields of Activity

Source: UNECE/FAO, 2018

Figure 1. Categories of green jobs in the forest sector



Source: McAree, D., 2017.

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, across the many approaches to identifying green jobs in the forest sector there is a consistent trend of recognizing the inter-connectedness of the jobs and skillsets that are necessary to support green job creation and growth in the sector from the forest to finished product. For example, there is a need for collaboration between people working in Education and Knowledge Transfer with

people those in Wood and Energy Production to ensure that training programs develop the skills and capabilities that employers need. Similar linkages exist across the many categories of green jobs in the forest sector.

There remains the potential to add more detail to the categories of green jobs and entirely new areas of job opportunity. For example, the following areas of emerging and potential green job opportunity within the forest sector are not fully incorporated in most existing literature:

- Nanotechnology applications, including modification of lignocellulosic materials to increase durability and provide additional environmental benefits;
- Wood recycling and reuse, including pre- and post- consumer recovery of materials from new and existing construction and redevelopment activities, as well as urban wood utilization to reduce environmental impacts associated with disposal;
- Life Cycle Assessment research and policy development to support improved understanding of environmental impacts and the benefits of renewable wood-based materials;
- Research and product development to replace fossil-fuel based materials with wood-based materials, including work in adhesives, plastics, batteries, computer chips, and other wood and fiber-based products;
- Wildfire Risk Management, Mitigation, and Emergency Response, as a dimension of biodiversity and forest protection, these are growing areas of need, opportunity, expertise, and educational awareness;
- Plant breeding, genetics, and gene-therapy technologies to adapt tree species to climate change and other health and productivity threats.

These areas of work offer job opportunities related to research, education, production, and marketing. The success of many green jobs in the forest sector require working relationships between foresters and other forest workers as well as the scientists, engineers, economists, and other professional groups who are necessary to bring emerging research concepts to operational scale and support implementation.

REGIONAL, SOCIAL, AND ECONOMIC TRENDS

The number of potential green forest sector jobs is significant across the various categories. For example, it has been estimated that the development and growth of the wood fuel resource could lead to the creation and support of more than 7,000 jobs in the UK economy through direct and indirect effects (Confor 2012). Job creation can be associated increased timber harvesting, processing capacities and manufacturing, tree planting for reforestation and afforestation, tree nursery growth and supporting services. For example, it is reported that the forest sector in Canada is expected to fill 60,000 positions between 2010 and 2020 (The Greenest Workforce 2018).

There is recognition that more workforce is needed in the forest sector. Population and demographic trends indicate that the current workforce within the forest sector is increasing in age and more workers need to be recruited. According to the [State of Europe's Forests 2015 Report](#), about 30 percent of people employed in forestry in Europe are 49 years of age or older, and in some countries the rate is over half of the workforce. The forestry workforce is ageing, which is posing a significant threat to the future of the forestry sector in many regions.

There is recognition that some forest areas within the UNECE region are not currently being managed and expanding the workforce may help improve forest stewardship. For example, Forestry Commission England (FCE) reported that 52 percent of woodland is actively managed, leaving more than 600,000ha of woodland unmanaged (Confor 2012). Several European countries report less than half of the forest area under management plans (or equivalent), including France, Denmark, Portugal, Spain, Cyprus, United Kingdom, and Norway (Forest Europe 2015). Expansion of management activities creates job opportunities as well as capacities to address forest health threats, wildfire risks, invasive species, and other concerns that diminish the potential for forests to provide environmental, economic, and social services and benefits.

Additional workforce concerns for the forest sector include the lack of young entrants, insufficient training and education, high accident rates and health risks, gender imbalance and low profitability of forest operation services (Kastenholz 2014). For these and other reasons, 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).

At the international policy level, these and other concerns are being integrated into environmental instruments. Namely the International Tropical Timber Agreement (2006) mentions the need to improve working conditions within the forest sector, taking into account

standards established by ILO instruments. Likewise, there is an observable trend at the national level to include occupational safety and health standards in laws and policies focusing on agriculture and forestry (ILO, 2018). Increasingly, legislation relevant to greening the forestry sector includes green jobs concerns (ILO, 2018). Diverse organizations such as cooperatives can assist in developing green jobs while also addressing training needs and working conditions (Örnek 2017). There is also evidence of good practice instruments that combine environmental objectives as related to forests, with social objectives, such as policies pursuing unemployment protection; cash transfer programmes; public employment programmes (PEP) with environmental components; and payment for ecosystem services (PES) with social components (ILO 2018a).

The drivers and limitations to green jobs in the forest sector include impacts from outside the sector. For example, the demographic, environmental, economic, and social trends impacting forestry are widely felt throughout economies. Additionally, other land use activities and urban development impact forest resources and associated economic opportunities for individuals and organizations and the green job creation opportunities. Green jobs and green job opportunities are not unique to the forest sector. In fact, green jobs are represented in most of the major industrial sectors. This trend is likely to further expand. It is estimated that the adoption of sustainable practices in the energy sector, for example, will lead to a net increase of approximately 18 million jobs across the world by 2030. Advancing towards circular economy will create additional 6 million new employment opportunities (ILO 2018).

A review in the USA found green jobs identified within utilities, construction, manufacturing, trade, transportation and warehousing, services, and industry (including crop production, animal production, and forestry and logging). The percent of green employment was found to be highest in the forestry and logging sector at 19.8 percent (Deschenes 2013). There are green initiatives within many sectors, including energy, construction, and agriculture, and it is important for the forest sector to identify opportunities to engage with these efforts in a way that maximizes the environmental benefit and minimizes any negative impacts to forest resources and green jobs in the forest sector.

The forest sector is closely linked to intra-regional trade, including trade between Canada and the USA, between northern and central Europe, and within southeast Asia; and these connections continue to evolve with changing global trade patterns (ILO 2001). These trade flow patterns connect to workforce issues, including the ability for workers and materials to move between countries, immigration patterns, and education and training needs.

SKILLS REQUIREMENTS FOR GREEN FOREST SECTOR JOBS

The *Rovaniemi Action Plan* has prioritized the development of the necessary skills to support green forest sector jobs through strategic actions that include monitoring and analysis, policy reviews, entrepreneurship, tripartite approaches, investments in education and training, and encouragement of the role of associations.

The forest sector employs people across a wide range of job types and working conditions. It is estimated that as of 2010 the forestry sector in Europe provided direct jobs and income for at least three million people. The largest share being the wood manufacturing sector (1.4

million), while 790,000 jobs were reported in the paper industry, and 620,000 jobs in forestry operations. It is also estimated that one-quarter of the forest sector workforce is self-employed or a business owner (Forest Europe 2015). A survey conducted in the USA identified nearly 50,000 workers employed in forestry and logging in 2011 (Hamilton 2013). While global employment numbers are very difficult to assess, in 2008 the FAO provided a global estimate of 16.7 million full-time equivalent workers in the formal forest sector, and the ILO previously estimated 29.6 million in indirect employment, for a total global forest-based employment of nearly 48 million (ILO 2018; ILO 2001; Nair 2009).

While millions of people are formally employed in forestry globally, there are millions more that are employed informally, including in fuelwood harvesting and subsistence work. There are an estimated 350 million people around the world that obtain additional income from nearby forests (World Bank, 2004; Estruch 2013). Furthermore, 70 million of the world's indigenous and tribal peoples depend on forests to meet their livelihood needs (ILO 2018). The majority of people that have direct contact and impact on the forest have limited training opportunities. For instance, more than 70 percent of forestry work in Turkey is undertaken by forestry cooperatives and partners. Cooperatives also play an important role in education and training (Örnek 2017). There is also gender inequality within forest sector work and concerns about forced labour and child labour. Women account for only about 20 percent of the forest sector workforce (FAO 2017). The representation of women varies between countries and sectors with a higher participation rate in the paper industry and a lower rate in direct forestry operations (Lawrence 2016).

The forestry workforce is highly productive, and many parts of Europe have achieved a high level of mechanisation, although variability remains (Forest Europe 2015). Jobs in the forest sector can also provide high quality career opportunities and competitive income levels, although this is also widely variable. For instance, research in the USA found that most occupations in forestry and logging had median annual wages that were near or above the national median annual wage (Hamilton 2013). Higher annual wages are associated with the forest sectors in North America and Europe and lower wages have been reported for regions of Asia and the Commonwealth of Independent States (CIS) (Poschen 2001).

Considering the many trends and pieces of evidence, the future of the forest sector will be dominated by diversification and new technologies. The biggest challenges for green jobs in the forest sector are the threat of a lack of workers with the necessary skillsets. As evidenced in the recent ILO report on *Greening with Jobs – World Employment and Social Outlook 2018*, skills mismatch is one of the major hurdles in the greening of the economy (ILO 2018). Addressing this requires building education and training capacities and actively motivating and recruiting the next generation of forest sector workers.

EDUCATION NEEDS FOR FOREST PROFESSIONALS IN THE UNECE REGION

The *Rovaniemi Action Plan* includes an objective to improve forestry education and strategies to review existing curricula and stimulate information exchange between member states on education requirements.

Education within the forest sector can be categorized as basic, vocational, and professional. In general, the forestry workforce in Europe is well educated with nearly three-quarters achieving vocational or professional qualification (Forest Europe 2015). There is interest in strategies that create life-long learning and re-training opportunities to address the major changes that are ongoing and anticipated in the forest sector and in the transition to a green economy (ILO/OECD 2012; Hetemäki 2014). Some research has found widespread use of on-the-job training and in-house classrooms by employers that are seeking to prepare green workers (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 (OECD 2012).

MAJOR ADAPTATION NEEDS FOR FOREST EDUCATION AND TRAINING

Several areas of adaptation needs can be identified for meeting the education and training needs of green jobs in the forest sector, including innovation, rural and urban connections, monitoring and research, gender diversity and recruitment strategies. Each of these is discussed briefly below and provides opportunities for greater development and creativity.

Innovation

The development of green jobs in the forest sector and the full expression of the role of forests in the green economy are closely linked to the need for innovation and the promotion of innovative uses of forest products (Brizay, 2013). To achieve the necessary impact from innovation, several related efforts and skills are needed. These include research needs as well as promotion, marketing, and communications skillsets. To ensure that innovation moves from the research lab and testing facility into the marketplace and then ultimately to businesses and consumers, it is necessary to have individuals with the appropriate skills to operate throughout the product development process and throughout the supply chain. It is necessary to provide training and education that addresses wood product information and complements business, marketing, and communications expertise. The development of innovation within the forest sector relies upon the enabling legislation and policy as well, including efforts to support investment in research and to combat harmful practices such as illegal logging. Therefore, it is important to have the capacity to engage policy makers in developing a shared understanding of the forest sector and the opportunity to provide green jobs. It is also strategic to support forest sector experts in roles where they can directly engage in policy discussions and actions. Developing all the diverse skillsets that are necessary to support innovation in the forest sector requires recognizing that the education and training needed for a thriving, green forest sector happens within and also well beyond the forestry departments at universities. The education and training needs for green jobs in the forest sector require collaboration with many other professions and on-going learning opportunities.

Rural and Urban Connections

It is commonly recognized that forest sector jobs are highly relevant in rural areas (Brizay, 2014). As the role of green jobs in the forest sector expands, it is increasingly important to recognize the linkages between rural and urban communities and the quality green job opportunities that exist across the landscape. 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 include 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. A more robust engagement with urban forest opportunities can contribute to achieving several SDGs, including SDG11 *Sustainable Cities and Communities* where the green infrastructure of a well-managed urban forest can have an impact on quality of life (Herkendell 2016). There are also connections being made between rural forests and urban communities through the development of innovations in building design and construction as well as development of “eco-quartier” projects. The expanded use of mass-timber and tall-wood building designs link rural forest resources to urban planning and sustainable community design goals. Addressing these opportunities requires education and training capacities that can operate across the landscape, including the use of online and digital technologies to deliver information.

Monitoring and Research

Many jobs in the forest sector are recognized to be green jobs; however, green jobs continue to be a relatively small proportion of overall employment. A review of 11 countries data about green jobs provided a range from 0.2 percent to 4.5 percent of total employment being identified as green jobs (Deschenes 2013).¹ However, over the period of 2002-2011, employment in the environmental goods and services sectors in the EU-28 increased by 40 percent, including growth of 20 percent during the years of recession (McAree 2017). The beneficial potential for green jobs across many sectors, including forestry, continues to be widely anticipated (Renner 2010).

The drivers for green job growth include government policy actions, individual company values and choices, and market demands (UNEP 2008). For example, skill development priority for the green economy have in some countries a stronger focus on forestry (Estonia, Spain) (ILO 2018). A recent survey of the forest sector in one US state (Louisiana) found that 63 percent of responding companies were not willing to incur incremental costs to increase green jobs, even though general attitudes and behaviours toward green activities were positive (Olson 2011). 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.

¹ Countries included in the review and their reported green jobs as a percent of total jobs: Austria (3.99%), Finland (0.24%), France (1.60%), Germany (4.50%), Hungary (4.18%), Japan (2.19%), South Korea (2.56%), Portugal (0.40%), Spain (2.62%), Switzerland (4.50%), and the United States (2.43%).

The *Rovaniemi Action Plan* includes objectives for monitoring trends related to green jobs in the forest sector, including social aspects of sustainable forest management and employment conditions. Continuing to monitor the forest sector based upon the number of companies, employment trends, promotional activities, investments, use of technology, and other key indicators is important to evaluating the overall situation. To ensure that this monitoring enhances green job opportunities, it is important to measure benefits that are unique to forest sector job conditions and may be key indicators for the importance of green jobs in the forest sector, including unique environmental benefits associated with green jobs in the forest sector such as biodiversity protections, water benefits, and carbon storage. Green jobs in the forest sector may also contribute to human health and well-being in unique ways. These metrics may support additional objectives within the Action Plan. Applying consistent definitions and measures of forest sector jobs and green jobs is key to understanding conditions and trends (ILO/OECD 2012; Kastenholz 2014). A better understanding of green job trends and challenges will enable forest educators to best adapt training programs to fit the emerging needs and opportunities.

Gender Diversity

Gender inequality in the forest sector workforce persists in all countries (FAO 2006). The *Rovaniemi Action Plan* includes integrating national gender strategies into relevant forest policy strategies and emphasizes the importance of gender mainstreaming for providing decent green jobs in the forest sector. These actions are strategic for several reasons and are anticipated to aid in the recruitment and retention of the necessary workforce for supporting green jobs in the forest sector and sustainable forest management.

Establishing gender equality is a consideration in evaluating and understanding decent work opportunities (Kastenholz 2014). Gender inequality and more broadly forest workforce diversity needs can be addressed in several ways, ranging from formal policy to 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). A variety of programs and organizations have been established to support the success of women in the forest sector, for instance the “Association of Women Foresters” in Slovakia and “Women in Wood” in Canada. Education and training programs can actively address gender diversity and inequality in their programs and curricula.

Recruitment Strategies

The forest sector is just one sector of the economy that is competing to recruit and retain workers. To aid in recruitment, forest sector specific job listing resources have been developed. For example, “Forestry Jobs in Canada” is a website that features career opportunities in all fields of Canada's forestry and forest products sector (Canadian Forests 2018). The website is a useful resource for current and potential employees and employers in understanding the opportunities and needs that exist in the sector. Similar websites for forestry jobs are also available in the USA (Forestry USA 2018; USDA-Forest Service 2018), Portugal (Green Career 2018) and the UK (Green Jobs 2018). Additional examples are the

listing at www.ecojobs.com that includes a wide range of environmental jobs (Environmental Career Opportunities 2018), “O-Net”, addressing diverse green economy sectors (O-Net Online 2018), and a book addressing “Green Careers for Dummies” that looks at green jobs in forest resource management (McClelland 2010).

Another website in Canada “The Greenest Workforce” goes beyond job listings and provides tools for employers and employees to better understand the full range of opportunities for green jobs and careers in the forest sector. The site provides career resources, job insights, and labour market information with a focus on the environmental benefits of working in the forest sector. The site also supports students and new workers as well as life-long learning and career advancement opportunities (The Greenest Workforce 2018).

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. Several online resources provide listings of aggregated information about classroom and online opportunities, for example the agriculture and forestry career program listings by Environmental Science (Environmental Science 2018). As training and education programs are developed, it is important to conduct evaluations of the programs to aid in improving the design and delivery of job training programs.

Improving opportunities for green jobs in the forest sector requires address specific workforce development needs that are closely related to education and professional development. 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.

CONCLUSIONS AND OUTLOOK

The green jobs development 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 exciting opportunities to grow the forest sector workforce.

The *Rovaniemi Action Plan for the Forest Sector in the Green Economy* provides a foundation and a roadmap for continuing to advance green job opportunities in the forest sector and 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 recent UNECE/FAO publication on *Green Jobs in the Forest Sector* finds that a number of green jobs already exist in the forest sector. While the number of jobs in the traditional

forestry will continue to decrease, the number of jobs in the sector will increase in relation to all forest ecosystem services.

Many of the new fields of activity, identified in the study, will contribute to the rural development and can help retain jobs in small and medium-sized enterprises. They can also create new employment opportunities for professional groups that may incur job losses in the process of the transition to a green economy and facilitate the integration into the labor market of other vulnerable groups, such as young people and women.

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 support new workers as well as developing the life-long learning opportunities for the forest sector workforce.

Continued work is needed to increase awareness of the existing and emerging green job opportunities within the forest sector, including on adaptation to changing trends to ensure resilience and flexibility of forest workforce and to enhance economic, social and environmental benefits of forests in a green economy.

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