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# 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 seven job types: 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.

This analysis addresses the issue of how 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 from this analysis, summarized in the format of a policy brief<sup>1</sup>, contributes to the promotion of decent green jobs and the exchange of knowledge among member States.

The 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 (Rovaniemi Action Plan)*, 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*” (UNECE, 2014).

<sup>1</sup> Green Jobs and their implications for the forest sector in achieving the objectives of the Rovaniemi Action Plan for the Forest Sector in a Green Economy <http://www.unece.org/fileadmin/DAM/timber/meetings/2019/20190327/Draft-GREEN-JOBS-IN-FOREST-SECTOR-policy-brief.pdf>

## MAJOR TRANSFORMATION DRIVERS OF GREEN JOBS IN THE FOREST SECTOR DEVELOPMENT

The development of green jobs 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 has characteristics that support employment, such as: generally low capital requirements, a multiplier effect between direct and indirect jobs, and job diversity that ranges from tasks that require high levels of technology to labour-dependent occupations (Nair, 2009). Green forest jobs provide economic development and employment that address social concerns and objectives for greater equality. The forest sector has strong potential for green jobs as a result 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.

Green jobs are key to supporting 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 and as a consequence they support 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 (Nair, 2009).

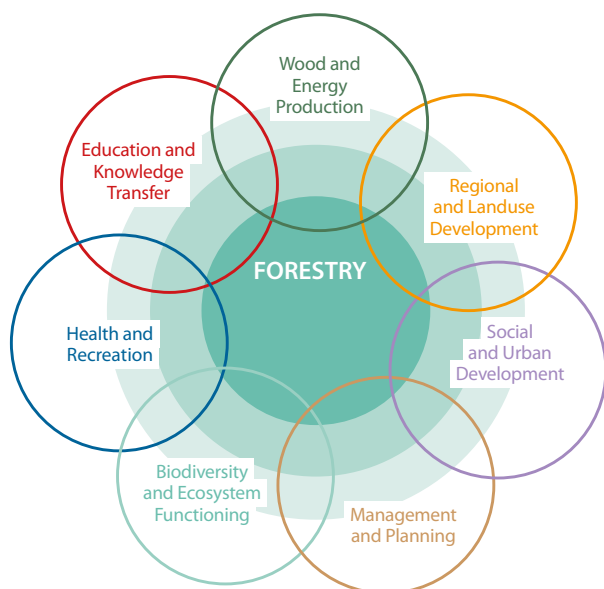
The *Rovaniemi Action Plan* identified five pillars supporting the transition of the forest sector to a green economy (Table 1), with pillar 3 addressing green jobs in the forest sector (UNECE/FAO, 2014).

**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).

**FIGURE 1. CATEGORIES OF GREEN JOBS IN THE FOREST SECTOR**

Source: McAree, D., 2017

## 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*”.

In addition, 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.*
- *Is involved in the value chain of forest products and/or in the performance of forest services.* (UNECE/FAO, 2018).

This publication has classified green jobs in the forest sector into seven types of jobs and 19 related fields of activity associated with these jobs (Table 2 and Figure 1).

There are new emerging areas of green jobs. For example:

**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 activities, as well as urban wood utilization;

**TABLE 2. GREEN JOB CLASSIFICATIONS AND FIELDS OF ACTIVITY**

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

Source: UNECE/FAO, 2018

**Life Cycle Assessment** research and policy development on the environmental impacts and the benefits of renewable wood-based materials;

**Research and product development for wood-based materials in substitution of carbon intensive products**, including work in adhesives, plastics, batteries, computer chips, and other wood and fiber-based products;

**Wildfire risk management, mitigation, emergency response**, and productive use of fire; as a dimension of biodiversity and forest protection.

**Plant breeding, genetics, and gene-therapy technologies** to adapt tree species to climate change and pathogens.

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 energy could lead to the creation and support of more than 7,000 jobs in the UK through direct and indirect effects (Confor, 2012). 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 (Forest Europe, 2015). The forestry workforce is ageing, which is a challenge for the forestry sector in many regions.

There is recognition that some forest areas within the UNECE region could benefit from more forest management. For example, Forestry Commission England (FCE) reported that 52 percent of the woodlands in England are actively managed, leaving more than 600,000 ha 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 concerns for the forest sector workforce 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). As a result, 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, such as the International Tropical Timber Agreement (2006), which mentions the need to improve working conditions within the forest sector, taking into account standards established by the ILO. Likewise, there is a trend at the national level to include occupational safety and health standards in laws and policies focusing on agriculture and forestry (ILO, 2018). 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 (with environmental components); and payment for ecosystem services with social components (ILO 2018a).

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 forests.

## 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. This includes: monitoring and analysis, policy reviews, entrepreneurship, partnering, education, training, and the role of associations.

The forest sector employs people across a wide range of job types and working conditions. In 2010, the forestry sector in Europe provided direct jobs and income for at an estimated three million plus 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). 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). 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).

Jobs in the forest sector can also provide competitive income levels, although this is variable. For instance, most occupations in forestry and logging in the US 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).

The forest sector is increasingly embracing new technologies. A big challenge for green jobs in the forest sector is the potential lack of workers with the necessary skillsets. The recent ILO report, *Greening with Jobs – World Employment and Social Outlook 2018*, cited 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). There are many examples of on-the-job green work training (Brite 2010). This can be done in partnership with universities and other educators. There is also recognition of the need to raise skills related to science, technology, engineering and mathematics (OECD, 2012).

## MAJOR ADAPTATION NEEDS FOR FOREST EDUCATION AND TRAINING

Several working culture adaptations in the forest sector have been identified, including innovation, rural and urban connections, monitoring and research, gender diversity and recruitment strategies. Each of these is discussed briefly.

### **Innovation**

The roles of green jobs in the forest sector and forests in the green economy are linked to the need for innovation of new products and processing methods as well as innovative use of forest products (Brizay, 2013). This will require skills in promotion, marketing, and communication. In addition, it is important to have an enabling policy framework by working with policy makers to develop an 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 participate in policy discussions.

### **Rural and Urban Connections**

It is commonly recognized that forest sector jobs are highly relevant in rural areas (Brizay, 2014). However, it is important to recognize the link between rural and urban forestry. Interest in urban forestry and in the manufacture of products from urban trees is increasing. Job opportunities in urban forestry include land management and planning, tree care,

tree removal and planting. Many of the skills, education and training needs parallel those associated with the rural practice of forestry. Urban forests contribute to achieving several SDGs, including SDG11 *Sustainable Cities and Communities*, where a well-managed urban forest can have a beneficial impact on quality of life (Herkendell, 2016). There are connections made between rural forests and urban communities through the development of innovations in building design. There is also the new development of “eco-quartier<sup>2</sup>” projects, with the objectives of creating communities where sustainable development, social equity and a reduce the ecological footprint is the aim. The expanded use of mass-timber and tall-wood building designs link rural forest resources to urban planning and sustainable community design goals

### **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).<sup>3</sup> However, over the period of 2002-2011, employment in the environmental goods and services sectors in the EU-28 increased by 40 percent (McAree 2017).

The drivers for green job growth include government policy, company values, and market demands (UNEP, 2008). A recent survey of the forest sector in the state of Louisiana (US) found that 63 percent of responding companies (mostly small businesses) were not willing to incur additional costs to increase green jobs, (Olson, 2011). It is important to develop better approaches to monitoring, reporting, and researching green job trends in order to influence the drivers for green job growth. There is also the need to measure the environmental benefit from green a green economy, which increases green job growth. This should also include reduced carbon emissions, as well as human health and worker safety considerations.

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. To ensure that this monitoring enhances green job opportunities, it is important to measure benefits that are unique to the forest sector such as biodiversity protections, water benefits, and carbon storage. Green jobs in the forest

<sup>2</sup> Neighborhoods built with the objectives of sustainable development, social equity and to reduce the ecological footprint of a neighborhood, urban area, or region

<sup>3</sup> 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%).

sector will contribute to human health and well-being and 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).

### **Gender Diversity**

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.

Gender inequality and workforce diversity needs can be addressed in several ways. A starting point to this process is to establish consistent measurement of workplace diversity and increase awareness of the needs and benefits associated with a diverse workforce (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 address diversity and inequality in their curricula.

### **Recruitment Strategies**

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 found in many of the countries of the UNECE region.

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 skillsets 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). It is

important to conduct evaluations of the green job training programs to continuously improve these programs.

## **CONCLUSIONS AND OUTLOOK**

The transition to a green economy offers new prospects to the forest sector and the creation of new jobs. While the forest sector has a long history of providing green jobs, it is recognized that many current environmental and social considerations can be addressed through forests and forestry, offering opportunities

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 concrete actions so that the forest workforce is able to implement sustainable forest management and achieve social goals of the green economy.

The recent UNECE/FAO publication on *Green Jobs in the Forest Sector* finds that green jobs already exist in the forest sector and that while the number of jobs related to timber production and the manufacture of forest products will likely continue to decrease, the number of green jobs in the sector will likely increase.

Green jobs have strong potential to contribute to rural development by retaining jobs in small and medium-sized enterprises and offsetting job losses from mechanization, transitioning to a green economy. In addition, green jobs provide an opportunity to integrate young people and women into the forest sector workforce.

The revision of existing curricula, including on the job training, will help to address the skill gap. This can also improve the public perception of the forest sector that offers modern careers in a green economy.

Continued work is needed to increase the awareness of existing and emerging green jobs within the forest sector and to ensure resilience and flexibility of the forest sector workforce. The economic, social and environmental benefits of forests in a green economy will heavily depend on society’s ability to provide workers with the appropriate skills.



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# Trends in green jobs in the forest sector in the UNECE region

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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