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A NEW PRINCIPLE OF THE EUROPEAN UNION FOREST POLICY: THE CASCADING USE OF WOOD PRODUCTS

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The debate on forestry and bioenergy is influenced by a new principle defined in the recently approved document on the Forest Strategy of the European Union, the "cascade" principle. This principle implies the priority use of wood material based on the higher added value that can be potentially generated along the wood value chain. The paper discusses how the adoption of the "cascade" principle can influence the supply of biomass and other ecosystem services, with special reference to the Mediterranean context.

Key words: cascade approach; biomass; forest policy; ecosystem services.
Parole chiave: Unione Europea; politica forestale; uso a cascata; efficienza nell'uso delle risorse.

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1. INTRODUCTION

Forests provide a range of wood and non-wood products (such as cork, resins, mushrooms, nuts, game and berries); they are grouped as provisioning services by the Millennium Ecosystem Assessment (MEA, 2005). In addition, forests supply ecosystem services, such as climate change mitigation and adaptation, hydrological services, support to agricultural productivity, reduced erosion, increased wildlife habitat, landscape and beauty (grouped as regulating, cultural, supporting services).

Recently, regulating, cultural and supporting services have been gaining recognition and attention from governments, industry, the media and private citizens, as they are increasingly aware of the direct costs and missed benefits of allowing 'immaterial' forest ecosystem services to become degraded or lost.

Nevertheless, the provision by European Union (EU) forests of traditional forest products, such as wood and non-wood products, continues to be essential. About 57% of the total EU forest area is designated primarily for timber production, compared with a global average of 30% (FOREST EUROPE, 2011). The area of Europe's forests designated primarily for production has increased slightly over the last decade (FAO, 2011). Also, according to various authoritative studies, demand for wood and non-wood forest products in the EU is projected to grow in the future, mainly due to the expected increasing demand for fuel-wood (RAUNIKAR *et al.,* 2010). This is because bioenergy is considered – among many other sources such as wind, solar, hydraulic, geo-thermal – a renewable form of energy and, if produced sustainably, avoids greenhouse gas emissions compared to the use of fossil fuels, such

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as coal, crude oil or natural gas. In addition bioenergy is an energy source that is available locally, providing a host of other development benefits, including mobilization of investment and generation of jobs (PELKONEN *et al.* 2014).

While bioenergy offers potentially significant environmental benefits, it is clear that the extent of those benefits will vary hugely depending on how and to what extent it is developed. It is obvious that a substantial rise in wood removal might put additional pressure on forests (MANTAU *et al.,* 2010), which should rightly be safeguarded to ensure biodiversity conservation and the provision of related ecosystem services. This poses serious concerns about (and challenges for) the availability of wood on a sustainable basis and implies that bioenergy consumption should be coordinated with the demand for traditional and new products (e.g. green chemicals or textile fibres) and services.

To ensure that potential benefits from forest energy development materialize and potential threats are minimized, government authorities and decision-makers at national, regional and local levels need to make choices, both in bioenergy strategy development and decisions on promotion and approval of forestry investment options.

2. STATE OF THE ART ON FOREST BIOMASS ENERGY

At global scale renewable energy sources supply an estimated 19% of final energy consumption (REN21, 2013). Biomass is the largest renewable energy source and the world's fourth (following oil, coal and natural gas), contributing about 55 Esajoule, or 13.5% of global energy supply. Heating accounts for the vast majority of biomass use (46 Esajoule), including heat produced from modern biomass and the traditional, inefficient use of animal manure, fuel-wood, charcoal and crop residues for domestic cooking and heating of dwellings and water in developing countries.

Wood has a significant role in total primary energy supply. According to a report issued by the Food and Agricultural Organization (FAO, 2011), 34.1% of wood bioenergy consumption derives, directly or indirectly, from forests. In the EU forest biomass is currently the most important source of renewable energy and now accounts for around half of the EU's total renewable energy consumption. Most of the forest biomass is first used by the forest-based industries for material purposes before it enters energy generation. On average, 46% of available wood fibres are used for energy purposes.

The FAO report affirms that between 2009 and 2011 the amount of wood used for energy purposes in 27 United Nations Economic Commission for Europe countries grew by 4.8% annually. The role of wood in total primary energy supply increased slightly from 4.3% to 5.4%, while the share of wood energy among renewable energy sources increased from 46.1% to 48.7%. Looking at past trends and projecting these into the future we can assume that in the coming years wood energy consumption will have a relevant role in the EU overall energy budget, in the decentralization of energy sources, in the landscape and ultimately in rural development (PELKONEN *et al.,* 2014).

3. SUSTAINABLY DELIVERING PROVISIONAL AND OTHER ECOSYSTEM SERVICES: THE "CASCADE" USE OF WOOD

The Renewable Energy Directive adopted in 2009 sets binding targets for renewable energy: 20% share of renewable energy in the EU overall energy consumption by 2020 (EUROPEAN COMMISSION, 2009). Every EU member state had to set individual targets for the share of renewable energy in overall energy consumption in specific National Renewable Energy Plans. More recently several EU member countries have called for the EU to set a 30% renewables goal and a 40% emissions reduction target by 2030. Bioenergy is a focal point in this effort, as it is expected to be the main contributor to the 2020 renewable energy target, with an anticipated contribution of more than half.

In the EU only 55.9% of the annual increment is currently being cut (433.6 M m^3 over 775.7 M m^3 of increment – EUROSTAT, 2013). Harvest rates are expected to increase by around 30% by 2020 as compared to 2010 (EUROPEAN COMMISSION, 2013). If this is achieved, the amount of wood used for energy purposes in the EU would be equivalent to today's total wood harvest.

It is obvious that mobilisation of more wood in the EU would be beneficial for increasing renewable energy production, for providing additional raw material, which is the basis for maintaining the competitiveness of the forest-based industries, and for stimulating economic prosperity in rural areas (FOREST EUROPE, 2011). Nonetheless, a substantial rise in fuelwood removal might put immediate additional pressure on EU forest resources, especially in the Mediterranean region, and their potential to deliver all ecosystem services in a balanced way. For instance, intensified biomass removal could lead to a significant reduction of deadwood (standing and downed deadwood resulting from mortality and stem residues from felling activities) and this would negatively affect deadwood-dependent species, which constitute an important component of biodiversity in forests.

In addition, as some analysts suggest (see for example BONGIORNO *et al.,* 2011; MOISEYEV *et al.,* 2011), the forest sector markets could be deeply distressed by expansion in wood energy if much higher levels of wood consumption occur, or if the projected recovery in housing demand and wood product output does not occur, or if more restrictive constraints or higher costs are imposed on wood residues utilization. An important impact of the high demand for fuel-wood would be a rise and convergence towards the price of industrial round-wood in the near future. At that point, the wood sector markets would engender increased costs and a loss of competitiveness in relation to non-EU industrial producers. The prices of industrial round wood would then rise and the price of manufactured products (for some strategic bio-based economic sectors, like green building) would increase in concert.

In forestry the trend towards increasing the share of fuel-wood compared to that of the timber industry is generally seen as an indication of a de-specialising process that favours production of wood of lower final added value, with reduced employment impacts. On the contrary it must be considered that the wood processing industry produces a significant amount of residues (from 30 to 50% of the total wood processed) that may be used for energy purposes, in addition to the comparatively more positive impacts in terms of added value and job creation. In this regard prioritising the forest outputs that have higher added value, create more jobs and contribute to a better carbon balance (resource efficiency) is a key element. The need for prioritising between different potential uses of wood products along the value chain is briefly described by the concept "cascade". The "cascade" principle implies the use of wood material according to a priority based on the added value that can be potentially generated, so raw material from the forests should be preferably used for building, furniture and other products with long life span, while bioenergy should preferably derive from the use of waste wood, wood residues or recycled products. The energy use of wood (after recycling opportunities to produce other products have been exhausted) is thus considered as the least valuable option among several uses. A motion approved by the EUROPEAN PARLIAMENT (2013) has called for the development of a legal instrument to establish a cascade principle, rising strong criticisms by a quite large group of forest-related organizations[1]. The new EU Forest Strategy (EUROPEAN COMMISSION, 2013) has taken in a soft approach suggesting the adoption of the "cascade" principle implemented through the development of good-practice guidance for the same principle. Also in the draft Directive on sustainability criteria for solid and gaseous

[1] See the Joint Statement on cascade use of wood by AEBIOM, CEPF, COPA-COGECA, EIPS, ELO and EUSTAFOR in http://www.aebiom.org/wp-content/uploads/2009/11/Joint-statement-on-cascade-use-of-wood-final.pdf

biomass in heating, cooling and electricity production, the European Commission stresses the need to support the use of wood for most valuable purposes before it is used for energy production. A more efficient wood supply organisation (e.g. the creation of biomass trade centres[2]) could facilitate the best use of raw material, reducing the problems of supply fragmentation and low market power of forest owners and managers.

This concept is entirely consistent with the flagship initiative for a resource-efficient Europe within the Europe 2020 strategy. Basically the strategy supports the shift towards a resource-efficient, low-carbon economy to achieve sustainable growth and provides a long-term framework for actions in many policy areas, supporting policy agendas for climate change, energy, transport, industry, raw materials, agriculture, fisheries, biodiversity and regional development. In the forest sector, resource efficiency means using forest resources in a way that minimizes impact on the environment and climate, and prioritising the forest outputs that have higher added value, create more jobs and contribute to a better carbon balance.

4. Conclusions

In order to favour the efficient and cascade use of wood the following recommendations may be proposed. Firstly, stakeholders (forest owners, forest operators, forest-based industries, politicians, the general public and consumers) should be aware of the importance of cascade use and recycling of wood for the sustainability of forests and the entire sector and a more cost-effective EU and national policy framework should be devised for it. In this regard, it is important to promote the principle of efficient use of resources, as part of a comprehensive approach and under the guidance of local and regional authorities, with the aim of ensuring sustainable management of Europe's forests.

The efficient use of resources is favoured by forest management based on technical knowledge, trained professionals and efficient supervision which lead to the best use of the resources obtained independently of their final use. It would be valuable to implement new socio-economic and policy formulas for fostering stakeholder and societal awareness of the importance of a cascade use of wood and to raise awareness of trade-offs between policies supporting: primary wood-based energy production; the material use of wood in the wood-working and construction industries (pulp and paper industry, biochemical and biomaterial industry); the land-use change and forestry measures as defined by the United Nations Framework Convention on Climate Change, as this is a sector that covers emissions and removals of greenhouse gases resulting from direct human-induced land use, land-use change and forestry activities.

The establishment of a territorial platform (cluster) or a local network of enterprises that produce different wood products is to be encouraged, with the aim of developing the collection of residues from harvesting and processing (paper, construction materials, waste wood, forest residues, pruning residues from agriculture, etc.) with priority given to separate collection and quality assortment classifications; developing value-added applications for extracted wood polymers, carbon fibres or ultra-lightweight composites in the fields of construction, interior design and packaging; generating a better knowledge of useful or harmful chemical compounds in different tree parts and wood biomass fractions for cascading purposes (bioenergy, biorefinery and wood products) along the whole wood value chain; improving the re-usability and recyclability of wood composites and construction material.

Finally the research and development sector should develop systems for wooden buildings easily dismantled and remounted; develop environmentally-friendly additives and impregnating preservative agents for wood products; develop solutions for the utilisation of used wood from construction operations (scaffolds, concrete casting moulds) as a biorefinery raw material; establish criteria for

[2] See http://www.biomasstradecentre2.eu

eco-design of graphic and paper packaging products for an optimised recyclability and a cascade towards zero waste; develop innovative sorting systems using new sensors for detection and robotics technologies for paper, wood waste and forest residues to separate according to different types of fibres, inks and fillers, contaminants and soil residues, ensuing in higher sorting accuracy and speed; develop new process technologies like separation, fractionation or extraction with improved selectivity for various components in recycling stock, which enable a utilisation in value-added applications inside and outside the production chain; research the treatment and pre-treatment of recycling stock, including enzymatic processes, for pulp and paper for recycling and other wood-based products; create radical innovations for the removal of inks from paper by new easy-to-remove inks and printing technologies as well as by breakthroughs in deinking technology; boost and reactivate properties of recycled fibres (e.g. functionalisation) to enhance pulp and paper properties using new additives (e.g. nanofibrillated cellulose) and technologies.

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RIASSUNTO

Un nuovo principio per la politica forestale dell'Unione Europea: l'uso a cascata dei prodotti forestali

Negli ultimi tempi il dibattito teorico sulla selvicoltura e sulla bioenergia è influenzato da un nuovo principio che sta diventando sempre più importante nell'agenda politica comunitaria: l'uso 'a cascata' delle risorse. Il concetto di uso a cascata – che si sovrappone ad altri temi come l'economia circolare, il riciclo e il riuso – introduce un meccanismo per assegnare una priorità all'uso delle risorse, inclusa la biomassa legnosa, con il fine di massimizzare l'efficienza dell'uso della risorsa e aumentarne il valore economico e ambientale. Quest'articolo discute il principio dell'uso a cascata del legno, delle principali barriere che ne impediscono una adeguata implementazione e le opportunità offerte dai nuovi indirizzi comunitari di valorizzazione delle risorse rinnovabili d'energia e dalla strategia forestale europea.

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