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Defining urban forestry – A comparative perspective of North America and Europe

Cecil C. Konijnendijk[a,*], Robert M. Ricard[b], Andy Kenney[c], Thomas B. Randrup[d]

[a]*woodSCAPE consult, Denmark*
[b]*University of Connecticut Cooperative Extension, USA*
[c]*University of Toronto, Canada*
[d]*Danish Centre for Forest, Landscape and Planning, KVL, Denmark*

Abstract

Urban forestry is generally defined as the art, science and technology of managing trees and forest resources in and around urban community ecosystems for the physiological, sociological, economic, and aesthetic benefits trees provide society. First mentioned in the United States as early as in 1894, the concept underwent a revival during the 1960s as a comprehensive and interdisciplinary approach to the specific challenges related to growing trees in urban environments. Later, urban forestry evoked the interest of scientists and practitioners in other parts of the world. However, harmonization of urban forestry terminology has been complicated by, for example, the involvement of different disciplines and translation difficulties. In many European languages, for example, the direct translation of 'urban forestry' relates more to forest ecosystems than to street and park trees. Efforts in North America and Europe defining 'urban forest', 'urban forestry' and related terms are introduced. A comparative analysis of selected urban forestry terminology in both parts of the world shows that urban forestry has a longer history in North America, based on traditions of shade tree management. Moreover, urban forestry has become more institutionalized in North America. Urban forestry in Europe has built strongly on a century-long tradition of 'town forestry'. In both parts of the world, definitions of urban forestry and urban forest have become more comprehensive, including all tree stands and individual trees in and around urban areas. Agreement also exists on the multifunctional and multidisciplinary character of urban forestry. These similarities offer opportunities for international harmonization of terminology.

Keywords: Urban forestry; Urban forest; Terminology; Community forestry

Concepts for comprehensive urban greenspace management

Those planning and managing woodland, parks, gardens, street and square trees, and other green areas within urban agglomerations (here collectively identified as urban greenspace) are operating in highly complex environments, facing multiple and rapidly changing urban demands (e.g., Miller, 1997; Konijnendijk et al., 2005). Urban sites are often harsh, characterized by many pressures and threats, from limited growing space to adverse climatic conditions and air pollution. Greenspace planners and managers are often struggling to keep greenspace issues on the political agenda. In

*Corresponding author. Tel.: +45 3324 7230.
E-mail address: cecil@woodscape-consult.com (C.C. Konijnendijk).

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response, comprehensive and integrated land use concepts and approaches have emerged, building on the expertise and skills of various professions.

Urban forestry is one of the approaches that gradually has found recognition internationally. It looks at urban greenspace from an integrative perspective, considering individual greenspace elements as part of an integral whole (Miller, 1997; Konijnendijk and Randrup, 2004). Urban forestry focusses on urban greenspace comprising of tree stands as well as individual trees. It is multidisciplinary and does not only involve foresters. Although there is international agreement that it deals, at least, with forests or forest-like systems in urban areas, there is still considerable scientific debate on the contents of the concept and related terms. Which parts of greenspace are seen as the domain of urban forestry? What areas does 'urban' encompass? How does urban forestry relate to other relevant concepts and what are its strengths? This paper aims to provide insight in how the concepts of urban forestry and urban forest have developed in North America and Europe. Similarities and differences in history, definition, and use of the concept will be discussed. This comparative analysis should aid international harmonization of urban forestry terminology.

Comparison and harmonization of urban forestry terminology

Importance of terminology harmonization

Terminology aims at clearly describing and delimiting the meaning of special language in a particular field of knowledge. It distinguishes between concepts and terms. Concepts are mental representations of objects within a specialized context or field not bound to particular languages, but influenced by social or cultural backgrounds. Terms are words or expressions used to designate a single concept in the language of a specialized subject field (ISO 704, 2000). Typically there is more than one term for a given concept. The terms 'woodland', 'bush', 'rainforest' and 'plantation', for example, are all closely linked to the concept 'forest' (Randrup et al., 2005).

Definitions are verbal representations of concepts that identify the characteristics of a concept and permit its differentiation from other concepts. There evoke considerable debate as experts might not agree on a common definition of a certain concept for strategic and other reasons (Lund, 2002). Moreover, concepts change over time as conditions change (Schanz, 1999). For example, the shift in societal appreciation of forest goods and services has also affected the definition of the forest concept (Helms, 2002).

Terminology harmonization is important in natural resource management, as for example, agreement on resource definitions is required for national and cross-boundary inventories and assessments. Thus, harmonization aims for improved comparability, compatibility, and consistency among definitions, establishment of linkages, and a description of relationships among terms. The harmonization process involves documentation of similarities and differences among definitions (FAO, 2002).

Framework for comparing urban forestry terminology

The scope of urban forestry can be described by looking at three key components: the structural (or vegetation) elements included; the locations considered on the continuum urban, suburban, peri-urban and rural; and the benefits generated by urban forestry (Randrup et al., 2005). These elements are considered in the present description and comparison of selected urban forestry terms for North America (here Canada and the United States only) and Europe. However, definition of concepts is also highly dependent on the historical and cultural context.

The descriptions and comparison of urban forestry terminology in North America and Europe is structured as follows:

The origins of urban forestry, including the role of different professions in introducing and developing the concept.
Definitions of urban forest and urban forestry.
Locations considered; what does the 'urban' in urban forestry stand for?
Relevant concepts with a close relation to urban forestry.

In this paper, the authors have based their assessment of urban forestry terminology on literature reviews and their personal experiences as members of national and international networks and research projects.

Development and definition of the urban forestry concept in North America

The origins of urban forestry in North America

It is well established that an explosion of activity in urban forestry occurred in the 1970s and 1980s and this may have led researchers to claim that urban forestry in North America got its start during this period (Johnston, 1996; Jorgensen, 1993; Miller, 1997; Koch, 2000). Whereas volunteer involvement in urban forestry

activities, such as tree planting, occurs throughout the history of the US (Campanella, 2003; McCullough, 1995), there is much evidence that urban forestry has its *professional* origins in the late 19th century and is tied to the beginnings of professional forestry (Ricard, 2005; Williams, 1989). This historical oversight may be due to challenges of definition much like urban forestry is wrestling with today. For example, 'shade' and 'ornamental' were words applied to public trees and the tasks associated with their protection and care throughout the 1800s (Campana, 1999). In fact, since the late 1800s there have been urban forestry professionals who practiced at the municipal level but are identified as city forester, city arborist, municipal forester, municipal arborist, or tree warden (Harris et al., 2004; Jorgensen, 1986; Miller, 1997; Ricard, 2005).

Important landmark, urban forestry state legislation was also passed in the 19th century in the US. For example, New Jersey passed a law in the 1890s that enabled communities to appoint shade tree commissioners (Kinney, 1972) and state laws in New England enabling or requiring municipalities to appoint a tree warden to care for public trees were enacted (Fernow, 1910; Ricard, 2005). During the early and middle years of the 20th century, many states and municipalities had shade tree programs and professionals and there were also a number of shade tree conferences (Johnston, 1996); arboriculture has its professional origins during this period (Campana, 1999). This activity may have been driven by the increasing number of introduced pests and diseases that were decimating both woodland and urban trees. While no academic programs specifically identified as urban forestry or even arboriculture had yet developed as forestry had at the beginning of the 1890s, universities did produce faculty who devoted much of their careers to municipal tree care. These academics and researchers occasionally became the entrepreneurs who founded several arboriculture companies and organizations (Johnston, 1996; Harris et al., 2004).

Urban forestry defined

A true representation of what is urban forestry is historically contextual and has been a challenge to define. A century since the first documented use of the term urban forestry first appears in 1894 (Cook, 1894), there have been numerous definitions developed. These may have emerged in response to changing political and institutional environments. Broadening the historically narrow definition of urban forestry is supported by studies that indicate that urban forests account for about 25 percent of the total land mass in the US (Dwyer and Nowak, 1999; Nowak et al., 2001). McPherson (2003) states that most ecological measures used to describe forest structure can be applied to urban forests equally well. Soil, climate (macro and micro), associated vegetation, fauna, and the built landscape vary significantly throughout urban areas. Variations in urban forest structures change along urban-to-rural gradients that can be visualized from urban cores, through suburban developments, and into villages and rural areas. The tree is the smallest unit in this scenario, and is managed in parks, along streets, and in median strips. However, an increasing recognition of the environmental, economic and social benefits of the urban forests comprised of these individual trees (on private and municipal lands) in *and around* communities will continue to bring together the arboricultural approach to single-tree management with an ecosystem-based approach to urban forest management.

This need, for example, generated a landmark symposium of internationally acclaimed ecologists who coined the term suburban forestry (Waggoner and Ovington, 1962). Jorgensen first used the term urban forestry in Canada in 1965 in response to interest from graduate students at the Faculty of Forestry, University of Toronto. He provided the following definition in 1970 (Jorgensen, 1986, p. 173):

> Urban forestry is a specialized branch of forestry and has as its objectives the cultivation and management of trees for their present and potential contribution to the physiological, sociological and economic well-being of urban society. These contributions include the over-all ameliorating effect of trees on their environment, as well as their recreational and general amenity value.

Urban forestry as a term appears in the title and the papers of the proceedings of several urban forestry conferences in the 1970s (e.g., Little and Noyes, 1971; SUNY-ESF, 1973). Importantly, one of the first and widely quoted definitions of urban forestry in the modern era is provided in the federal Cooperative Forestry Act of 1978 as '… the planning, establishment, protection and management of trees and associated plants, individually, in small groups, or under forest conditions within cities, there suburbs, and towns' (Miller, 1997, p. 35). This legislation is generally credited with launching the US Forest Service's direct involvement in urban forestry with states, municipalities, and non-governmental organizations (Robbins, 1985) and has been responsible for much of the recent expansion of urban forestry in the US, especially since 1990.

One of the more commonly cited definitions has been the one developed by the Society of American Foresters first in the early 1970s and more currently defined as 'The art, science, and technology of managing trees and forest resources in and around urban community ecosystems for the physiological, sociological, economic, and aesthetic benefits tree provide society' (Helms, 1998,

p. 193). Harris et al. (2004, p. 1) state that 'Urban forestry is the management of planted and naturally occurring trees in urban and urban-interface areas.' Miller (1997, p. 27) describes the urban forest as 'the sum of all woody and associated vegetation in and around dense human settlements, ranging from small communities in rural settings to metropolitan areas.' By extension then, urban forestry is the establishment and care of this resource. Interestingly and uniquely, Miller (1997, p. 353) provides a definition of urban silviculture as

> …the art of reproducing and managing forests continuously to obtain sustained yields of forest benefits in urban regions through the application of ecological principles. Traditional silviculture places emphasis on wood production, while urban silviculture has as primary functions recreation and environmental protection, but does not preclude wood fiber production. The transition in management concepts from arboriculture to silviculture becomes somewhat arbitrary in urban forest management. Care of individual trees is arboriculture and management of tree communities is silviculture, but in urban forestry a forest community may be manipulated as a whole, while a tree in that community receives individual attention.

In Canada, Ontario is the only province that specifically recognizes the practice of urban forestry in its legislation. The Professional Foresters Act of 2000 (Province of Ontario 2000, Sec. 3) defines the scope of practice of professional forestry as '… the provision of services in relation to the development, management, conservation and sustainability of forests and urban forests where those services require knowledge, training and experience equivalent to that required to become a member under this Act.' Membership refers to The Ontario Professional Foresters Association which regulates the practice of professional forestry through the Act (Sec. 3(1)) 'in order that the public interest may be served and protected.' This recognizes the importance of urban forests and their sustainable management to the public at large and not simply as trees adorning streetscapes and private yards. The Act simply defines urban forests as '… tree-dominated vegetation and related features found within an urban area and includes woodlots, plantations, shade trees, fields in various stages of succession, wetland and riparian areas.' (Sec. 3(3)).

The first Canadian Urban Forest Strategy was recently completed (Kenney, 2004). This document has adopted a somewhat more detailed definition of urban forest than that used in the Ontario legislation. The Strategy considers urban forests to be: '…trees, forests, greenspace and related abiotic, biotic and cultural components in and around cities and communities. It includes trees, forest cover and related components in the surrounding rural areas (peri-urban forests).' (CUFN, 2005). Some practitioners believe that the urban forest consists only of those trees found in parks and along roads and streets that are under the jurisdiction of the municipality. Since most of the ecological, social and economic benefits of the urban forest accrue to the community as a whole, then clearly the portion of the urban forest that is located on private property (as much as 80–90% of the forest (Sampson et al., 1992)) must also be considered. The term municipal forest is sometimes used to differentiate this later component from the urban forest as a whole.

The term community forestry is sometimes combined with urban forestry as in 'Urban and Community Forestry'. In the United States, where this use is more common, the Cooperative Forestry Assistance Act of 1978 appears to use the terms interchangeably. The United State Forest Service's Urban and Community Forestry website states '[the] Urban and Community Forestry Program enhances the livability of towns, communities, and cities by improving the stewardship of urban natural resources' (USDA Forest Service, 2005). Presumably, this is intended to reflect a more inclusive form in which the members of the community play a direct role in the management of their urban forest.

In Canada the term is less commonly used in conjunction with 'urban forestry'. When used in a stand-alone context, 'community forestry' more commonly refers to 'forestry-dependent communities' or those communities that have a strong economic dependency on the forest industry. For example, Duinker et al. (1994) provided an overview of community forestry in Canada which was strongly skewed to this use of the term with no mention of what we consider as urban forestry in the current discussion. This division in urban and conventional forestry perspective is still strong in Canada and may reflect the gulf that still persists between what earlier definitions of urban forestry clearly recognized as two sub-disciplines of the same (forestry) profession.

Location – urban, peri-urban, rural

Urban is increasingly defined as anywhere people live in communities (Bradley, 1995; Edwards and Bliss, 2003) and many of the definitions of urban forests and urban forestry used in North America recognize the discipline's jurisdiction into the interstitial areas between these communities. As Jorgensen (1986, p. 178) points out 'The politically established boundaries for municipalities rarely include the entire geographical area influenced by urbanization.' Statistics Canada, the governmental body responsible for the national census,

defines urban areas as areas with '…a minimum population concentration of 1000 persons and a population density of at least 400 persons per square kilometer, based on the current census population count. All territory outside urban areas is classified as rural. Taken together, urban and rural areas cover all of Canada.' (Statistics Canada, 2001, p. 262).

In some cases, the interstitial areas can be thought of as 'rural'. However, if we are to use the Statistics Canada definition of urban, then the *entire* country is either urban or rural. Therefore, the interstitial areas would certainly be rural but so would areas clearly well beyond the direct influence of urbanization, of which Canada has plenty. Interestingly, one author (Kenney) has experienced the wrath of 'rural' landowners who have escaped the city and are offended when it is suggested that their forested property 10 km from the city boundary is part of the urban forest!

In Canada, the term 'peri-urban' is gaining usage to describe the regions adjacent to urban areas and clearly under their influence. Amalgamation of smaller municipalities has meant that the boundaries between urban forestry in the truly urbanized area and traditional forestry in the peri-urban areas have become blurred. Since amalgamation, a municipal body must consider traditional forestry (or urban silviculture as described above) and the arboricultural approach to single-tree management. Several peri-urban forests now fall under the jurisdiction of the same departments that traditionally had only dealt with street and park trees.

Development and definition of the urban forestry concept in Europe

The origins of urban forestry in Europe

Europe has had a long and rich history of greenspace design and management (e.g., Forrest & Konijnendijk, 2005). Many cities, especially in Central Europe, have owned and managed nearby woodland for centuries, a phenomenon known as 'town forestry' in several languages. Initially, many of the larger parks and gardens in cities and towns were established by the nobility and well-to-do and public access to these areas was very limited. Although there are earlier examples of city authorities becoming concerned with providing public greenspace, more cohesive action emerged during the 19th century, when industrialization led to a boom in Europe's urban population. Urban parks were seen as important contributors to the quality of urban life and the health of the – working class – population. New greenspaces were established and existing and private parks and gardens were opened to the public during the second half of the 19th century.

The planning and management of public greenspace in Europe had been rather sectoral, with city parks, street trees, woodland, flowerbeds etc. often having their own experts and/or municipal unit or department. Only later did more comprehensive approaches to greenspace planning and management emerge, for example under influence of the fields of urban and landscape ecology, especially during the 1970s (Werquin et al., 2005).

Urban forestry was one of the concepts that also evoked interest as part of this 'wave' of more integrative and holistic perspectives. Inspired by visits to the US and international conferences, British, Irish and Dutch experts were among the first introducing the term 'urban forest' to their country during the early 1980s (Johnston, 1997a, b; Konijnendijk, 2003). City-wide urban forestry projects, based on North-American examples, were subsequently implemented in cities such as London and Belfast (Johnston, 1997a, b). Urban forestry had to overcome initial resistance from foresters (who did not see cities as their domain) and the professions traditionally taking care of urban parks and trees (who where weary of outside interference; Johnston, 1997a).

Gradual recognition of the potential merits of the concept did follow, however, and the period from the mid-1990s saw various national as well as international networks develop that had urban forestry as a central theme. Nordic activities (Randrup and Nilsson, 1996) developed into a European network of greenspace researchers financed by the European Union (COST Action E12 Urban Forests and Trees). Its review of ongoing research illustrated the wide range of disciplines and fields of activity involved in urban forestry-related research. Although about half of all projects were carried out by forestry institutions, other professions such as landscape architecture, (landscape) ecology, and horticulture were also major players (Forrest et al., 1999). COST Action E12 and other networking activities stressed the importance of achieving common understanding between the many experts with their respective backgrounds on concepts and terms, and most importantly on the lead concept of urban forestry (Konijnendijk, 2003; Randrup et al., 2005).

Histories of European urban forests and forestry, such as those written by Johnston (1997a, b), Konijnendijk (1997), and Forrest and Konijnendijk (2005) provide a background for understanding how the concept was adapted to European conditions. Moreover, the large variety in approaches and definitions that exists until today can be explained from the diversity of European landscapes and cultures.

Urban forestry defined

Europe is a continent characterized by diversity; it is a rich mixture of countries, regions, cities, traditions,

cultures, languages, economic development and landscapes. This is reflected in the difficulties to 'translate' the concept of 'urban forest' as a term into different languages and cultures. The long history of town forestry, referring to the conservation and management of woodland owned by city authorities, makes direct translation of 'urban forest' difficult (Tyrväinen, 1999; Konijnendijk, 2003). This may have contributed to the emergence of two main streams defining the urban forestry concept in Europe. A 'narrow' definition links urban forestry primarily to urban woodland (forestry in or near urban areas). A 'broader' perspective includes not only woodland, but also tree groups and individual trees, i.e. the tree-dominated part of greenspaces. This broader perspective can be recognized from the definition of urban forestry provided by British experts in a European research overview: 'Urban forestry is a multidisciplinary activity that encompasses the design, planning, establishment and management of trees, woodlands and associated flora and open space, which is usually physically linked to form a mosaic of vegetation in or near built-up areas. It serves a range of multi-purpose functions, but it is primarily for amenity and the promotion of human well-being' (Ball et al., 1999, p. 325).

Although this dichotomy of definitions is an oversimplification, overviews of definitions from across Europe in Forrest et al. (1999) and Randrup et al. (2005) do provide evidence for it. Randrup et al.'s comparative overview of definitions of urban forest and urban forestry showed that virtually all elements of urban greenspace were referred to, be it not always to the same extent. The majority of the definitions assessed focussed on woody elements, although in most cases non-woody structures were also referred to.

Over time, the *concept* of urban forestry as referring to a wider, tree-based green resource has become more accepted by European experts, even when the *term* might still evoke considerable debate (Randrup et al., 2005). The definition of urban forestry by the former British National Urban Forestry Unit (NUFU, 1999, p. 4) illustrates the comprehensive concept of urban forest(ry) as often used today: "[the urban forest] collectively describes all trees and woods in an urban area: in parks, private gardens, streets, around factories, offices, hospitals and schools, on wasteland and in existing woodlands'.

Most definitions of urban forestry used in Europe stress its multifunctional character and tend to emphasize urban forest services rather than economic goods such as timber. Those adhering to the 'narrow', forestry-based definition seem to stress biodiversity and recreational benefits of urban woodland (Randrup et al., 2005). The environmental services provided by urban forests, such as moderation of the urban climate and air pollution reduction, are especially emphasized by those using the wider definition. Recent years have seen increasing focus on many of the aesthetic and social benefits of urban forests, among which the impacts of urban trees and woods on human health and well-being (Tyrväinen et al., 2005). This seems to be part of a trend to connect urban forestry issues to broader (urban) agendas and quality of life and environment issues (Ottitsch and Krott, 2005).

Urban forestry mostly has been regarded as a public sector activity, with focus on municipal woodland and other greenspace (Ottitsch and Krott, 2005), but increasing attention is given to the large share of urban trees on private lands, as also emerges from the NUFU (1999) definition provided above.

Location – from urban to urbanized

The common denominator of definitions used in Europe is that vegetation within the built-up areas and/or administrative boundaries of larger settlements (cities, towns) should be included (Randrup et al., 2005). The difficulty to define urban areas and especially to set their boundaries is discussed in a background document to the United Kingdom census 2001 (National Statistics, 2005). The main ways for defining urban areas are: based on built-up area, based on functional area (i.e. including surrounding areas that depend on it for services and employment), and based on density of buildings or people. But definitions in Europe vary widely; in Iceland, settlements with more than 200 inhabitants are considered urban (Benedikz and Skarphéðinsdóttir, 1999). Most experts also seem to agree that not only woods and trees inside urban centres are to be included, but also those located in suburban and peri-urban areas. But where does one draw the line? In several studies in the Netherlands, for example, all forests for which decision-making processes were dominated by local urban stakeholders were regarded urban forests (Konijnendijk, 1999). If urban forests include those woodland areas where urban demands are dominant, then even areas as far away as 100 km from the city centre might be considered, for example when they protect a city's drinking water resources. Perhaps these more remote woodlands catering for urban populations, very common in Europe, should be defined as 'urbanized forests' rather than urban forests.

Related concepts – community forestry, neighbourwood, green-structure planning

The term 'community forestry' has traditionally been applied as referring to rural areas and communities (Konijnendijk, 1999). This changed, however, when a name had to be found for a new, national program of woodland and tree planting and management near

metropolitan areas in England. The term Community Forest was introduced to signalize that the new, peri-urban landscapes would be developed in close collaboration with and for providing benefits to local, urban communities (Johnston, 1997b).

The concept of community forestry also links back to the European heritage of town forestry. Like rural communities, urban communities protected and managed their local woodlands in order to secure the goods and services these woodlands provided. Other recently developed concepts have also picked up on this heritage, such as the concept of 'neighbourwoods'. A European research and development project defined the concept of neighbourwoods as referring to places where trees determine or are significant aspects of the visual, social, cultural and ecological character of the townscape (Salbitano et al., 2001). The concept includes not only forests but also smaller treed areas ('woods'), situated on people's doorsteps ('neighbour'), and managed by and for the local community ('our'). The Irish Forest Service was the first to implement this concept in its policies and activities (Forest Service, 2001). Additionally, a wide range of greenspace concepts have been developed that have no explicit link to urban trees. 'Green structure' and 'green-structure planning', for example, are concepts that have become established in many parts of Europe (e.g., Sandström, 2002; Tjallingii, 2002). Green structures are seen as networks of green elements, as a physical infrastructure fulfilling many functions, such as playing a role in water management, protecting biodiversity, and providing a social infrastructure for leisure and the like (Werquin et al., 2005). Very much in line with this integrative perspective, 'green infrastructure' refers to the functioning of the green structure, which provides various services in line with other 'hard' types of urban infrastructure (e.g., Davies, 2005). Another comprehensive concept that has emerged recently is that of 'urban greening', originally defined in terms of 'greening' of cities with greenspace to improve their quality of life and environment (Kuchelmeister, 1998; Randrup et al., 2005).

Comparison of urban forestry definitions in Europe and North America

Table 1 provides a brief comparative overview of the development and definition of the urban forestry concept in North America and Europe. Greenspace planning and management have much older roots in both parts of the world. The use of the term 'urban forestry' has a much longer history in North America than in Europe. Finding ways of better, more comprehensive tree care and of dealing with pests and diseases have been major driving forces (Miller, 2004). In Europe, the term has been applied on a wider scale only since the 1990s. Its emergence was initially closely linked to Europe's heritage of 'town forestry' and the abundance of urban woodland resources. Differences can also be seen when considering the involvement of various disciplines in the promotion of the urban forestry concept. Foresters have played an important role on both continents, but arborists seem to have taken a more prominent role in North America than in Europe.

Urban forestry has gradually become accepted in its broad, comprehensive form as referring to all woods and trees in and around urban centres. Moreover, general recognition exists that no single profession can claim urban forestry, as it requires cross-sectoral and multidisciplinary approaches. Still, definitions of urban forest and urban forestry are under debate and show great variety in both parts of the world.

In North America, Nowak and Dwyer (2000) describe urban forestry goals and outcomes as a range from maintaining a single historic public tree to increasing a city's canopy cover by a specific percentage over a specific period of time. This, rather one-dimensional approach does not reflect the multiple benefits urban trees may have. As a consequence, what urban forestry is remains somewhat elusive in spite of the diversity of opinions in the historical and modern literature (Edwards and Bliss, 2003). On an operational basis, urban forestry remains mostly tree care, protection, and replacement because, perhaps, it still is mostly reactive (Groninger et al., 2002). However, long-term, ecosystem-based approaches to urban forest planning are increasing (Bradley, 1995). Definitions of the urban forest such as the one in the Canadian Urban Forest Strategy (CUFN, 2005) show this more comprehensive focus, by explicitly including 'non-treed' greenspaces. How one defines urban forestry in North America today may originate one's personal, professional, and political values and motives (Haynes, 2002). A city forester, for instance, may be inclined to view urban forestry more operationally since their day-to-day work focusses mostly on individual tree care along streets, roads, and parks. On the other hand, there is a need for a broader view if all benefits of the urban forests are to be explored.

The European research community is also moving towards an understanding of the basic premises of urban forestry. Moreover, the need to maintain flexibility in defining urban forestry reminds us of the situation in North America. In 'Urban Forests and Trees', Randrup et al. (2005) show that some common ground has been found, but that too rigid a definition of urban forestry may not be desirable in order to maintain the rich diversity of approaches in Europe. Randrup et al. (2005) suggest a basic framework for further development of the urban forestry concept in Europe which incorporates

Table 1. Comparison of origins and definition of urban forestry and related concepts in North America and Europe

	North America	Europe
Origins		
First introduction	First mentioning in 1894; rapid development during 1960s and 1970s.	Main development as an independent (academic) field during 1980s; adapted from North America.
Important historical roots	Shade tree traditions and tree warden schemes.	Town forestry; long history of parks and garden design.
Important driving forces	Need to combat pests and diseases on urban trees.	Search for more integrative approaches.
Definition		
Domain of urban forestry (i.e. the urban forest)	All woody and associated vegetation in and around dense human settlements, ranging from small communities in rural settings to metropolitan areas. Traditional focus on street trees.	'Broad' definition similar to North American approach. 'Narrow' definition focuses on woodland in and near urban centers (managed for amenity values), based on town forestry tradition.
Multidisciplinary character	Highly multidisciplinary. Arborists have been more prominent than in Europe.	Highly multidisciplinary. Foresters have played an important role from the town forestry perspective.
Multifunctionality	Urban forestry provides multiple goods and services. Environmental services have been given increasing focus (e.g., air pollution reduction, climate moderation).	Urban forestry provides multiple good and services. Social services have been prioritized (recreation, health).
Location		
'Urban' defined	Urban has become defined very broadly. Areas in, around and close to cities included in urban forestry.	Urban has become defined very broadly. Traditional attention for peri-urban woodland areas.
Related terms		
Related terms that have emerged	Community forestry is increasingly used, often together with urban forestry.	Community forestry less frequently used. Links to, e.g., greenstructure planning. Terms such as urban woodland and neighbourwood have come into use.

a wide range of urban forest locations (from paved to unpaved) and human activities (from design and planning to selection and establishment). In this way it helps define the domain of urban forestry very broadly, recognizing its diverse character. At the same time it is highly inclusive, inviting different professions and perspectives to play an active role in greenspace development, including the 'the urban forestry community'.

Urban forestry's multifunctional focus is stressed both in North America and Europe. The production function (timber) is mostly of minor importance, while social and, to an increasing extent, environmental services are in focus. In Europe, especially social services, such as the aesthetic, recreational and health benefits of urban forests have had a central role. Environmental services such as shading and cooling and reducing air pollution have so far been prioritized more in North America than in Europe, as the frequent (past) use of the term 'shade trees' also suggest. On the other hand, many European cities have a long history of protecting nearby or even more remote woodland resources for safeguarding their drinking water resources. Biodiversity protection is an important function of urban forests as well, although biodiversity is generally seen in the context of allowing urban inhabitants to stay in touch with nature and natural processes. An important development in both Europe and North America concerns the ongoing attempts to link up urban forestry to wider urban development and environmental programs and policies.

The institutionalizing of urban forestry seems to have progressed further in North America (i.e. the United States), where urban forestry as a concept has become part of policy and legislation. European countries do make reference to urban greenspace and peri-urban

afforestation in their policies and legislation, but the concept of urban forestry is seldom used explicitly. This could be a language issue, as the term urban forestry is still not very often used in Europe outside academic circles.

Ongoing urbanization has meant that more and more areas have come under direct and indirect urban influence, illustrated by phenomena such as suburbanization and urban sprawl. This makes it difficult to define the geographical limits of urban forestry, as the traditional dichotomy between city and countryside is no longer very real. Still, as emerged from North America, more rural municipalities are reluctant to see the term urban forestry being used in their case. This has resulted in the use of urban and community forestry as an even more comprehensive concept. It is clear that 'urban' can be defined in many ways and that the boundaries of what constitutes an urban area are hard to draw and fluid. Countries and regions have different definitions of what is an urban area. This will complicate harmonization of urban forestry terminology.

Community forestry has gained prominence in both parts of the world, although not in all countries. In North America, the use of community forestry in a more urban context is stronger in the US than in Canada, while in Europe it has mostly been limited to the United Kingdom. New concepts and terms have been emerging in both Europe and North America in order to take even more comprehensive perspectives of urban greenspace. Concepts such as green structure and green infrastructure demonstrate how more functional and comprehensive perspectives have gained ground, for example to promote urban green issues at the same level as other municipal services and infrastructure.

The brief comparison of development and definition of urban forestry and related concepts in North America and Europe shows that in spite of differences, common ground exists for international harmonization. There is wide support for a broad and holistic definition of 'urban forestry' and 'urban forest', one that incorporates ecological, economic, and sociological elements, and is inclusive of people from cities to suburbs to rural communities. Recognition of urban forestry's multidisciplinary and comprehensive character can be used for further terminology harmonization. How to balance this rather broad definition with more operational definitions to be used for, for example, natural resource inventories will pose a next challenge.

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