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C. C. Konijnendijk

URBAN FORESTRY INNOVATIONS IN SCIENCE-PRACTICE COLLABORATION

The demands of modern, urbanising society require major changes in forestry and other types of natural resource management. More cross-sectoral, participatory, multi-disciplinary approaches have been called for, as well as better integration between science, policy and implementation. The concept of urban forestry offers an interesting example of innovation in forestry to meet current challenges. This article draws upon examples from urban forestry related to scientist-practitioner networking, knowledge brokers, and decision support, with the aim to provide inspiration for enhanced science-policy-public linking in forestry at large.

Key words: urban forestry, forest science, urbanisation, international projects, innovations.

Introduction. The demands of modern, urbanising society require major changes and perhaps even a paradigm shift within forestry and other types of natural resource management [1]. More cross-sectoral, participatory, multi-disciplinary approaches have been called for. With its strong rural roots, forestry runs the risk of losing its relevance if it cannot find ways to contribute to these broader approaches to serve urban societies.

In a lead article in the *The Forestry Source*, the monthly newspaper of the Society of American Foresters (SAF), former SAF President John Helms (2003) [2] makes an attempt to identify a set of core values defining the common base of forestry and uniting professional foresters in a changing society. Helms mentions, for example, the recognition that forests are a fundamental source of global health and welfare and the fact that forests must be sustained through simultaneously meeting environmental, economic, and community aspirations and needs. But also mentioned by Helms are core values related to foresters' dedications to sound forest management and conservation and to serving land owners as well as society by providing sound knowledge and professional management skills. Contributions like this to the discourse about the 'core' and future of forestry show that the profession is struggling to define a strong and distinct common basis. Obviously forestry's societal relevance is a key aspect in the debate.

The discussion about forestry's societal relevance also affects forest science which has traditionally been catering specifically for forestry practice. As complex problems in society increasingly require broader, cross-sectoral and multidisciplinary approaches, forest science also needs to reconsider its role. Forest science needs to produce theories and knowledge that are of relevance also within a broader land use and natural resource management context. It has been argued that if forest science will not live up to this challenge, it could gradually lose its relevance [3].

If forest science is to produce theories, approaches and knowledge relevant to meeting societal problems and challenges, it may need to move closer to its customers, e.g. to land use and natural resource policy-makers, but also society at large. International organisations such as the International Union of Forest Research Organization's (IUFRO) have taken up this challenge, for example in identifying and promoting ways to strengthen the science-policy interface in forestry [4].

Research should be geared towards having policy relevance and ideally research needs are (at least to a large extent) defined together with policy makers and other 'customers'. Moreover, research outcomes need to be properly 'translated' and packaged for use in a decision making and societal context. Janse and Konijnendijk (2007) [5] extend the science-policy interface to a 'science-policy-public'

interface, thus recognising the need for forest science to serve policy-makers as well as the public at large.

In the improved links between science, policy and society, the group of scientists and policy-makers should be extended beyond the limited field of forestry. The role of forests in the climate change debate, for example, shows that forestry is only one of the fields with an interest and role to play.

Urbanisation is another driver of greater policy-science and cross-sectoral collaboration related to forests. This article looks at 'urban forestry' as promising example of innovation regarding forestry, e.g. in terms of focus of actual societal needs, involving a wide range of disciplines and professions, and greater focus on policy-science collaboration. The latter aspects will be the particular focus of this article.

The emergence of Urban Forestry.

The concept of urban forestry was developed in response to the demand for more integrative, problem-oriented approaches to taking care of city trees and other green space. It has its roots in practice, as North-American green management practitioners dealing with e.g. Dutch Elm Disease called for integrated approaches to better deal with the challenges of modern cities.

Miller (1997) [6] has defined urban forestry as "an integrated, city wide approach to the planting, care and management of trees in the city to secure multiple environmental and social benefits for urban dwellers". A more elaborated definition was provided by Grey and Deneke (1986) [7], who stress urban forestry's "multifaceted" character, as it deals with woodlands, groups of trees, and individual trees where dense conglomerations of people live, involves a wide variety of habitats, and is concerned with a great range of benefits and problems. Later, definitions in e.g. Europe have built on this approach [8], although the definition of what urban forestry encompasses differs between Europe and North America (table 1).

The strengths of the concept of urban forestry include its being:

- integrative, incorporating different elements of urban green structures into a whole (the 'urban forest'), and ranging from technical to strategic dimensions of natural resource management;
- strategic, aimed at developing longer-term policies and plans for urban tree resources, connecting to different sectors, agendas and programmes;
- inter-/multidisciplinary, involving experts from natural as well as social sciences;
- participatory, aimed at developing partnerships between all stakeholders;
- aimed at multiple benefits, stressing the economic, environmental and socio-cultural goods and services urban forests can provide; and urban, i.e. recognising and valuing rather than combating the challenges posed by urban societies and urban environments [9].

Urban forestry has gradually gained following among scientists and practitioners across the world, including Europe. Here, an important role in the promotion urban forestry was played by initiatives such as COST Action E12 'Urban Forests and Trees', a network of more than 100 experts from 22 European countries financed by the European Cooperation in the field of Science and Technology [9].

In addition, several international and national research programmes and projects have been carried out and the launch in the year 2002 of a new peer-reviewed journal, *Urban Forestry & Urban Greening*, strengthened urban forestry as a field of scientific interest. This also shows, however, that initial urban forestry networking in Europe was primarily science-driven, with limited involvement of policy makers and practitioners. This in contrast to North America, where through involvement of federal and state governments in policy, science and implementation, a strong policy/science interface has been created within urban forestry.

Still, in spite of its short history, European urban forestry has generated some good examples related to strengthening the policy/science interface. Three categories of these good practices are discussed here: networking between scientists and practitioners, the role of knowledge brokers, and the role of science in support decision-making. The definitions of Urban Forestry in North America and Europe are presented at table 1.

Networking between scientists and practitioners.

The first example refers to networks of scientists, policy-makers and practitioners involved in urban forestry. The European Forum on Urban Forestry (EFUF) was set up on the initiative of the International Union of Forest Research Organisations in 1998 [9]. The event, which changes location/city every year, provides a meeting place for practitioners, scientists and educators involved with the planning and management of urban forests, from woodland to urban parks and street trees. Participants come from across Europe, as well as from other parts of the world.

Table 1

Urban forestry definitions in North America and Europe (from Konijnendijk et al., 2006).

North America	Europe
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.
Highly multidisciplinary. Arborists have been more prominent than in Europe.	Highly multidisciplinary. Foresters have played an important role from the town forestry perspective.
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 prioritised (recreation, health).

Every year, the EFUF takes up an actual theme within urban forestry, such as financing, public involvement, partnerships, education and training, or management innovations (see Table 2). The first edition of the EFUF was held in Wuppertal, Germany, in 1998. The 2009 EFUF, held in Arnhem, Netherlands was the 12th Forum. It focused on the theme of how to promote 'green city values' through an urban forestry and partnership approach [10].

Table 2

Themes of the twelve editions so far of the European Forum on Urban Forestry

Year	City (or region)	Country	Theme
1998	Wuppertal	Germany	Multiple-use of town forests in international comparison
1999	Aarhus	Denmark	Communicating urban forests
2000	Budapest/ Gyarmatpuszta	Hungary	Paying for urban forestry
2001	Durham	United Kingdom	Partnership-led regeneration
2002	Trondheim	Norway	The urban forests - between dreaming and doing; the dynamics of developing the experiential quality of urban woodland
2003	Arnhem and Flanders	Netherlands and Belgium	Educating the urban foresters
2004	Stockholm	Sweden	Urban woods - to be used by everyone
2005	Celje	Slovenia	Urban forests: a different trade mark for cities and forestry
2006	Florence/Vallombrosa	Italy	Urban forestry: bridging cultures, disciplines, old attitudes and new demands
2007	Gelsenkirchen	Germany	New forests after old industries
2008	Hämeenlinna	Finland	Forest recreation and tourism serving urbanised societies
2009	Arnhem	Netherlands	Urban forestry – Working together for green city values

One major objective of the EFUF has been to 'team up' policy-makers and managers together with scientists involved in research and development of relevance for urban forestry (Figure 1). These scientists thus have had the opportunity to disseminate their findings directly to the right (and European) audience. On the other hand, policy-makers and managers have had the chance to identify some of the most pressing issues they would like to see studies. During the first twelve years of its existence, the Forum has contributed to important exchange of knowledge, experience and research questions between the participants.

The role of knowledge brokers. The second innovation example deals with so-called 'knowledge brokers' in urban forestry. Reviews have shown that quite a lot of relevant research is ongoing within

urban forestry – but often research results do not reach decision-makers, e.g. because they appear in scientific literature not read by policy makers [11]. For research to become policy relevant, it needs to be ‘packaged’ in a form which is digestible to decision makers and managers.

An important role here can be played by so-called ‘knowledge brokers’ [12], institutions that take the role of ‘translating’ and disseminating research findings relevant for e.g. urban forestry. Knowledge brokers operate at the interface between science and policy/practice. On the one hand they translate research findings into a digestible form for decision-makers and managers, while on the other these knowledge brokers help practitioners to better express their research needs.

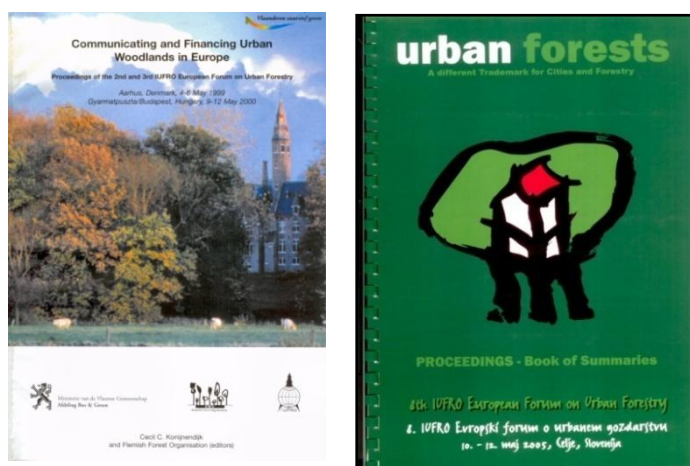


Fig. 1. The European Forum on Urban Forestry has brought together researchers and practitioners to e.g. discuss research needs and findings. Here are the proceedings from the EFUFs in Aarhus and Budapest (left) and Celje (right)

The success of knowledge brokering in the United States can serve as positive example. The USDA Forest Service, through regional urban forestry research stations, undertakes and disseminates relevant research [13]. Many of the States also employ urban forestry coordinators and/or extension services that have the dissemination of state-of-art knowledge as primary objective.

European examples of knowledge brokers have included the National Urban Forestry Unit (NUFU) in the UK, which was unfortunately dissolved several years ago, primarily due to lack of public funding. NUFU was set up in 1995 as an independent organisation championing the need for integration of tree planting, conservation and management with different agendas, such as health, land reclamation, built development, heritage, and education [11]. NUFU has been initiating and carrying out research based on needs expressed by the urban forestry sector. It has also supported a large number of local and regional urban forestry projects aimed at providing multiple societal benefits through tree and forest planting and management. But arguably its main merit has been acting as a link between policy-makers, practitioners, interest groups, and the scientific community. It produced, for example, a series of good practice booklets in which results of relevant research are summarised in a highly accessible way.

Presently, the UK Commission for Architecture and the Built Environment, the government’s advisor on for example public space issues, has taken over part of NUFU’s role. It has issued, for example, a series on interesting publications on green space planning and management issues, including ‘manuals’ on how to develop better, sustainable and multifunctional urban green spaces [14], (figure 2).

Support to sound decision making. The third and final example concerns the role of science in providing information and tools for sound decision-making in European urban forestry. A key important role of science is to provide credible, value-neutral, relevant and accessible knowledge for decision making, as well as decision-support tools [4], [15]. In forest science, for example, a strong tradition of developing sophisticated models to assist forest management and silvicultural decisions exists. Decision-support systems at policy level are of more recent date. Examples of these are the various criteria and indicator (C&I) schemes.

Within urban forestry, various projects funded by the European Union have resulted in tools for integrating state-of-art information in decision-making. Moreover, better ways of incorporating the preferences and demands of local residents have also been sought.

An example of the latter was the so-called NeighbourWoods project, aimed at the development of innovative tools for the planning and management of urban woodlands in Europe. The project developed a series of 'tools' to enhance decision-making, for example by better collaboration between woodland managers, policy makers, interest groups and local residents [5]. In a case study in Helsinki, for example, a tool for 'social mapping' was developed and implemented. Researchers supported the city's green space managers by mapping the preferences of local inhabitants for nearby green areas. Through GIS-analysis, it has become possible to identify those green areas that are appreciated for particular reasons, as well as areas that are facing problems [16].

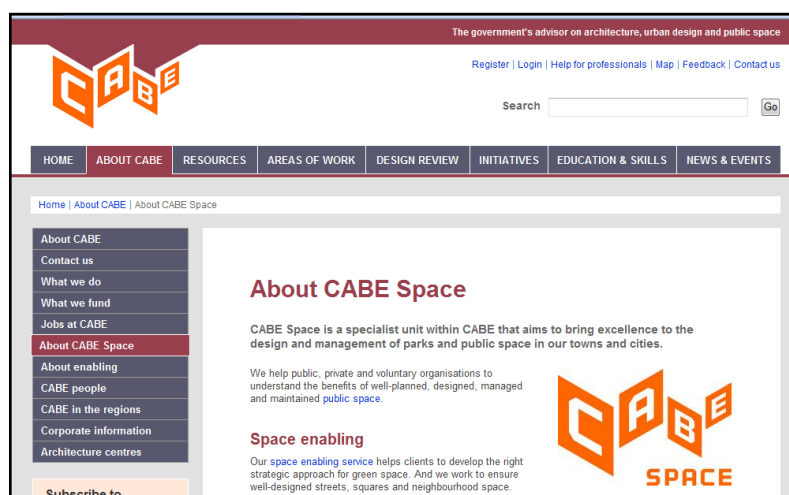


Fig. 2. The UK Commission for Architecture and the Built Environment's 'space' (<http://www.cabe.org.uk/about/cabe-space>) section acts as knowledge broker in e.g., green space planning and management

Other examples of international projects aimed at enhancing science-policy(-management) collaboration include the GreenKeys project financed under the so-called Interreg Programme [17]. This partnership between local authorities and scientists from Central Europe prepared, among other, a manual for the development of green space policies. In a bilateral collaboration ('twinning') project between Denmark and Malaysia to support sustainable forest management, decision-support in urban forestry was one of the central components [18]. For a local forest reserve near Kuala Lumpur under high urbanisation pressure, for example, an assessment was made of the various benefits and costs involved with the alternatives of forest conservation versus transformation of the area into a housing area. The analysis showed that benefits of keeping the forest in terms of e.g., timber, non-wood forest products, carbon sequestration, recreation and tourism, and higher real estate prices were higher than the benefits of selling the forest off for housing development.

Conclusions. As described, urban forestry as a relatively new approach to dealing with the demands of urbanising societies provides some interesting examples for strengthening the science/policy interface in forestry and green space management at large. Urban forestry is on the 'cutting edge' of urbanising natural resource management. From the start, it has had a clear problem-solving focus. Its operating in dynamic and high-pressure urban environments makes close links between different disciplines and fields, as well as between science, policy and the public a necessity.

As forestry at large is facing the challenge of staying relevant in rapidly changing society, urban forestry's lessons can be very useful. The policy-science(-public) innovations described in this paper, related to networking between scientists and practitioners, the involvement of knowledge brokers, and information support to decision-making, are all highly relevant to forestry, and also already applied here and there. Still, the good practices described above are not widespread and further development is needed.

Finally, another important lesson from urban forestry is that forestry needs to embark – more than it has done so far – on strategic alliances with other disciplines and professionals.

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С. С. Конийендийк

**ГОРОДСКОЕ ЛЕСОВОДСТВО: ИННОВАЦИИ
В СОТРУДНИЧЕСТВЕ НАУКИ И ПРАКТИКИ**

Современное урбанизированное общество требует перемен в лесном хозяйстве и других формах управления природными ресурсами. В настоящее время существует необходимость в расширении межсекторальных, многоплановых подходов, а также лучшей связи науки, политики и практики. Концепция городского лесоводства предлагает интересный пример инноваций в лесном хозяйстве, отвечающих требованиям современности.

Ключевые слова: городское лесоводство, наука о лесе, урбанизация, международные проекты, инновации.

КОНИЙЕНДИЙК Сесиль С. – профессор консалтинговой фирмы Вудскейп и Датского центра леса, ландшафта и планирования, Университет Копенгагена, Дания. E-mail: cecil@woodscareconsult.com.