

Assessment of urban forestry research and research needs in Nordic and Baltic countries

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Abstract

A review of research and research needs in urban forestry was carried out in Denmark, Estonia, Finland, Latvia, Norway and Sweden during 2005. A questionnaire addressing post-2000 and ongoing research was sent to 146 researchers and generated 76 completed questionnaires. Universities were found to lead urban forestry research, while municipalities headed funding organisations in terms of number of projects funded. Planning, ecological and management aspects were the most common research themes, but socially oriented research also played an important role. The research needs questionnaire was sent to 192 key research actors (assignors, users and researchers), resulting in 63 completed needs assessments. The research themes of 'urban forest management', 'social and cultural values' and 'urban forest and green planning' were prioritised for future research. Comparison of ongoing research and research needs showed discrepancies, as ongoing research does not always cover the same themes identified as primary research needs. Priorities for future research as identified by the research community respective those assigning and using research also differed. Economic assessment of benefits, for example, scored much higher as a need among researchers than other respondents. In terms of present weaknesses in the research 'infrastructure', research actors emphasised lack of funding, fragmentation of research and insufficient critical mass. The region's urban forestry research can be enhanced and made more meaningful by strengthening national and international networking within the research community, across disciplines, as well as between researchers and those commissioning and using research.

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Introduction

In recent years *urban forestry* has developed as an integrative, multidisciplinary approach to the planning and management of all forest and tree resources – ranging from street trees to peri-urban woodlands – in and near urban areas to provide multiple benefits (Helms, 1998; Konijnendijk, 2003; Randrup et al., 2005). Urban forestry was initially developed in North America, where a strong research base has been generated over the years (Miller, 1997; Dwyer et al., 2001, for overviews). Also in Europe, the scientific field of urban forestry has developed strongly in recent years. Today, in most countries, many different types of organisations are engaged in creative work undertaken on a systematic basis in order to increase the stock of knowledge and the use of this knowledge to improve practice (Forrest et al., 1999; Konijnendijk et al., 2000). Universities, research institutes, regional governments and municipalities, businesses, and non-governmental organisations (NGOs) are all active, but with their own scientific approaches that can be found along the gradient from basic research to developmental projects used, among many others, by the Organisation for Economic Co-operation and Development (OECD, 1994, see Table 1). Generally speaking, universities have an obligation to do basic and strategic research. In comparison, the more applied and sector-oriented research undertaken primarily to acquire new knowledge with a specific application in view, and their extension into experimental development activities often is in the hands of, and many times in close collaboration between, governmental research institutions and businesses. Also regional governments and NGOs primarily take part in research with a specific application in view. In summary, it seems fair to expect that these differences in emphasis on basic understanding respectively certainty of application, will lead to divergent scientific

agendas across organisations and persons engaged in or using urban forestry research.

In Europe, the Nordic (Denmark, Finland, Iceland, Norway and Sweden) and Baltic countries (Estonia, Latvia and Lithuania) have played an important role in the development of urban forestry research. Practitioners in Finland, Norway and Sweden can draw upon a long experience of managing forest ecosystems in and near urban areas (e.g., Bondo-Andersen et al., 1974; Konijnendijk, 1999; Tyrväinen, 1999; Florgård, 2000; Rydberg and Falck, 2000; Gustavsson, 2002; Gundersen et al., 2005), an experience shared by the Baltic countries (e.g., Meikar and Sander, 2000; Donis, 2003). Researchers and practitioners in Denmark and Iceland have developed major expertise within urban afforestation (e.g., Blöndal, 2002; Kirkebæk, 2002; Madsen, 2003; Nielsen and Jensen, 2007). The management of urban parks and street trees offers another relevant domain for research and development (e.g., Bucht, 2002; Jonsell, 2004; Sæbø et al., 2004; Randrup, 2005).

The Nordic Forest Research Co-operation Committee (SNS) supported initial Nordic and Baltic networking during the second half of the 1990s and first part of the 21st century (Nilsson and Randrup, 1996; Sander and Randrup, 1998; Randrup et al., 2001). These networks provided a basis for pan-European COST Action E12 “Urban Forests and Trees”, which was coordinated by the Danish Centre for Forest, Landscape and Planning (Forrest et al., 1999; Randrup et al., 2002). COST is a European programme to facilitate international scientific and technical cooperation. COST Action E12, which ran from 1997 to 2002, involved 23 countries and more than 80 researchers. All Nordic countries participated, with limited participation from Estonia and Lithuania.

The important role of Nordic institutions – increasingly working together with Baltic institutions – in the establishment of urban forestry as a European research

Table 1. Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge and the use of this knowledge to devise new applications

Basic research	Basic research can be divided into two sub-categories: <ul style="list-style-type: none"> • Pure basic research, which is original experimental and theoretical work undertaken to acquire new knowledge without looking for long-term benefits other than the advancement of knowledge • Strategic basic research, which is experimental and theoretical work undertaken to acquire new knowledge directed into specified broad areas in the expectation of useful discoveries. It provides the broad base of knowledge necessary for the solution of recognised practical problems
Applied research	Original work undertaken primarily to acquire new knowledge with a specific application in view. It is undertaken either to determine possible uses for the findings of basic research or to determine new ways of achieving some specific and predetermined objectives
Experimental development	Systematic work, using existing knowledge gained from research or practical experience that is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed

R&D is a term covering three activities. Modified from OECD (1994).

field was confirmed by an assessment of ongoing research within COST Action E12. The assessment was performed using the research mapping technique which is not to be confused with research reviews. Whereas a research review examines a fairly narrow subject area in depth, research mapping analyses the body of research in a broader field without considering the content of each piece of research in detail. As such, the mapping performed by COST E12 was more focused on examining the scope of the subject, with the possibility to more efficiently identify gaps and patterns of research over time (Bell et al., 2007). In the COST research mapping, carried out during 1998 and 1999, national coordinators prepared 20 country reports in which they: (1) provided a general insight in their country's urban forestry research and research capacities and (2) listed recently completed (i.e., post-1990) and ongoing urban forestry projects (Forrest et al., 1999; Konijnendijk et al., 2000). All in all, 404 research projects were listed; the five Nordic countries accounted for 108 of these.

As a next step in Nordic-Baltic urban forestry research, SNS set up a so-called Centre of Advanced Research in January 2005. This Centre, CARE-FOR-US (Nordic-Baltic Centre of Advanced Research on Forestry serving Urbanised Societies; website: www.sl.life.ku.dk/careforum) had among its first tasks to map the current state of urban forestry research in the Nordic and Baltic countries and to assess research needs within urban forestry in the region. Both mapping exercises were regarded crucial as a next step after the COST E12 assessment, in a process for determining where urban forestry research should be headed in Nordic and Baltic countries, as well as for maintaining and developing the region's leading role at the European level. This article presents and discusses the main findings of the CARE-FOR-US mapping of research and research needs in Nordic and Baltic urban forestry, carried out during the year 2005.

Materials and methods

Research and research needs were mapped by means of two questionnaire surveys carried out by, the CARE-FOR-US research team. The team was led by an overall coordinator. One or more coordinators per country undertook the research and research needs assessments in Denmark, Estonia, Latvia, Finland, Norway and Sweden. Iceland, the seventh CARE-FOR-US partner country, did not participate.

Before developing the questionnaires, a definition of urban forestry research was agreed upon. The research team decided, based on, e.g., the definitions of urban forestry provided in Randrup et al. (2005), that all

research could be included that dealt with any of the following topics: function and use, policy-making, planning, design, management and maintenance, and selection (i.e., breeding and selection of appropriate plant material) and establishment of 'urban forests', defined as the tree-dominated parts of green structures within and surrounding cities and towns. Urban Forests were regarded to include urban woodland, urban parks, amenity tree plantations along streets, waterways and squares, in gardens and cemeteries, orchards, trees and woods on land reclamation sites and in natural areas. In line with the definition of research and development (R&D) used by OECD (1994), all creative work undertaken on a systematic basis in order to increase the stock of knowledge and the use of this knowledge to improve practice on the above-mentioned topics was included in the survey.

Two separate questionnaires were developed. The first named 'project description form', solicited factual information about relevant research projects. The second explicitly dealt with research needs as identified by key research stakeholders. These stakeholders included some of the researchers who completed project description forms, but also those commissioning research ('assignors') and end-users of research, as explained below. Both questionnaires were sent electronically (i.e., by e-mail) by the national coordinators to all researchers and institutes that could be expected to be involved in urban forestry research, together with an explanatory cover letter, during August–October 2005. The selection of potential respondents was done by the national coordinators based upon their knowledge and overview of the field of urban forestry in their respective countries. Although the questionnaires were in English, respondents were given the opportunity to respond in their own language, in which case the national coordinator provided a translation. A reminder was sent and in almost all countries some respondents were phoned and interviewed by telephone.

Research questionnaire

The research questionnaire was directed towards researchers and contact persons at organisations based in Baltic and Nordic countries who could be expected to be involved in urban forestry research. It was assumed that the national coordinators had a comprehensive overview of their country's relevant research capacities, helped by information about past participation of researchers in international networks such as COST Action E12. The national coordinators were asked to focus on recent (i.e., post-2000) or ongoing projects. The research questionnaire asked respondents for the following information:

- project name and project website;
- (lead/main) research organisation, including full address and contact person;

- project partners;
- project setting (for example, whether the project was part of larger programme);
- brief project description and keywords;
- duration (start and end date);
- project budget (according to five pre-set categories);
- funding organisation (name(s), as well as marking of pre-set categories); and
- main publications so far.

The questionnaire was sent out to 146 persons in the six participating countries (Table 2). Sixty-five of those contacted responded, either by returning one or more completed questionnaires or by stating that they did not have any relevant ongoing research. This resulted in an overall response rate of 45%, although large differences existed in the response rate of different countries. A total of 76 completed questionnaires providing information for a single project were obtained. The Baltic States listed very few projects.

Research needs questionnaire

In the case of the research needs questionnaire, national coordinators were asked to send it to at least 20–30 ‘key players’ in urban forestry research in their respective countries, i.e., researchers, research leaders, and assignors and end-users of research. The research needs questionnaire included open-ended questions on:

- name, function, organisation and contact details;
- urban forestry research topics the respondent considered well covered in his or her country;
- the country’s ‘specialities’ within urban forestry research as seen from an international perspective;
- important urban forestry research themes which are absent or poorly investigated in the respondent’s country;
- main weaknesses in terms of organisation, funding and implementation of urban forestry research;

- urban forestry research themes and topics to be covered/prioritised in the future;
- supporting actions at the national and international level to enhance urban forestry research needs; and

Only the question on willingness to participate in national urban forestry research networking and/or conferences had limited reply options (‘yes’, ‘may be’ and ‘no’).

Completed questionnaires were sent to the study coordinator, accompanied by a brief note from the national coordinator. In this note, the national coordinator provided information about the response rate, some reflections on main findings, and other relevant information. The coordinator then compiled all data and used descriptive statistics to examine and present all information.

National coordinators sent the questionnaire to 192 persons in all. Sixty-seven of these people responded positively by returning a completed research needs questionnaire, giving a response rate of 35% (see Table 3). Some questionnaires were completed by two or more people, meaning that the total number of usable questionnaires was 63. As mentioned before, research coordinators in some countries filled out the research questionnaire themselves during a telephone interview with the person concerned. Response rates varied considerably between the countries, ranging from 20% in Norway to 78% in Latvia (where fewer people were contacted). Respondents in Finland submitted the most needs questionnaires, followed by those in Denmark and Sweden.

University personnel comprised the largest group of respondents (23), followed by those working for municipalities (18), i.e., primarily municipal green departments or units, ministries (six), research institutes (five), regional government (four), businesses (four) and NGOs (three). Respondents were also categorised according to their function/job type. In line with the

Table 2. Overview of the response to the urban forestry research questionnaire in six countries

Country	People contacted	Response (positive or negative) ^a	Response rate (%)	Number of projects described
Denmark	26	5	19	18 ^b
Estonia	25	4	16	5
Finland	38	17	45	23
Latvia	5	1	20	1
Norway	29	28	97	19
Sweden	23	10	43	10
Total	146	65	45	76

^aAlso included were people who responded that they did not have any relevant research ongoing.

^bThe project coordinator was able to complete questionnaires for a large number of Danish projects based on personal involvement in these projects and/or through publicly available project information.

Table 3. Overview of response to the urban forestry research needs questionnaire from six countries

Country	People contacted	Response (positive) ^a	Response rate (%)	Number of needs assessments completed
Denmark	40	13	33	12
Estonia	41	10	24	10
Finland	41	19	46	16
Latvia	9	7	78	7
Norway	35	7	20	7
Sweden	26	11	42	11
Total	192	67	35	63

^aOnly people who completed a research needs questionnaire (individually or with one or more colleagues) are included here.

findings above, researchers comprised the largest subgroup, followed by municipal staff. Research managers and professors ('research leaders') were the third largest category among respondents, followed by those working for national and regional forest services.

Results

Research assessment

Organisations carrying out urban forestry research

Universities have been leading urban forestry research, being the main/lead partner in 38 projects. Governmental research institutes have been involved as lead partner in a smaller share of all projects (15 in the survey). Municipalities (lead partner in 11 projects) are also involved in urban forestry research. In some cases this is undertaken through actual research units within the municipalities. In other cases municipal employees and consulting researchers work together, for example, to support urban forest planning and management. The private sector accounted for six projects. NGOs (three projects) are involved primarily through public involvement and dissemination projects which might have a research component, thus explaining why they were included. Ministries (three projects), regional governments (two) and international organisations (one; a project led by the Food and Agriculture Organization of the United Nations) were also involved in urban forestry research.

Urban forestry research themes

Urban forestry research in the Nordic and Baltic countries is very diverse. Project topics range from tree selection to studies of the impacts of urban woodland and nature on human health and wellbeing. In order to gain insight in which research themes are studied most frequently, project keywords (316 in total) were grouped

into 20 overall themes by the research coordinator. The list of themes for urban forestry research was based on previous work, such as the COST E12 survey (Forrest et al., 1999), and verified by the research team. Although the aim was to develop a comprehensive and balanced list, obviously the procedure clearly had a subjective element, and other groupings/allocations would have been possible. Fig. 1 shows how all keywords were allocated to the different research themes.

Research on urban (forest) planning issues is most common (mentioned 34 times, i.e., about 11% of all keyword allocations). This includes projects ranging from forest planning to green (structure) planning and urban planning (e.g., how to deal with green space in road building, housing construction). Studies on ecology and biodiversity issues, including for example work on nature conservation topics, rank second (32 times mentioned; 10% of allocated keywords). Projects dealing with urban forest management aspects, including urban silviculture, i.e., the management of urban woodland stands are also very common (25 times mentioned; 8% of allocated keywords). Social aspects of urban forestry are relatively well covered, as can be derived from the number of keywords falling within the theme of recreation and use (17), as well as on social and cultural values (13). These include, for example, studies on people's perceptions and preferences concerning urban forests and work on the cultural meaning of urban forests. The topic of nature and health ranks low among all research themes in Nordic and Baltic urban forestry. Topics such as organisation and ownership (studies on administration, legislation, and ownership issues in urban forestry), tree selection, and information and decision-support are also not often studied, at least not according to this specific survey.

Project duration and funding

Two-thirds of all projects last between 1 and 5 years, with 1–3 years and 3–5 years taking about equal share.

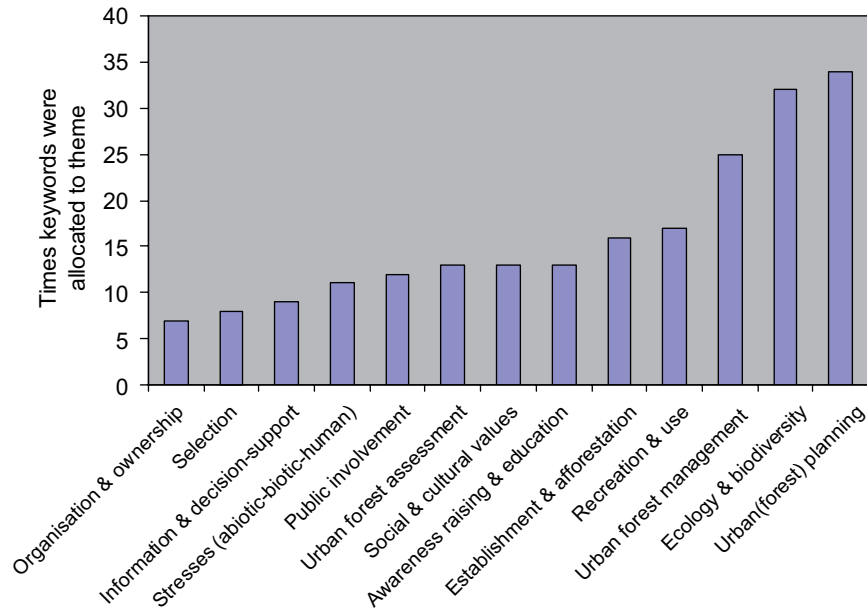


Fig. 1. Frequency of research themes based on grouping of project keywords. Total of 306 keywords (up to five per project) allocated; only the 13 highest scoring themes are shown here.

One-fifth of all projects have a long time-horizon of 5 years or more. Often these projects include long-term monitoring of experimental and other urban forest areas. In terms of funding, projects appear evenly divided between different funding classes, although larger projects (of 500,000 euro or more) are least common. Projects of less than 100,000 euro cover more than half of all research projects.

In addition to information about amount of funding, respondents were asked to indicate which organisations were funding their research. Municipalities were found to be the leading funding agency – at least in terms of *number* of projects funded, namely 25 – followed by ministries (20 projects) and universities (18). International funding, for example from the European Union, is contributing to less than 5% of all projects. The picture is different when only larger projects, i.e. with funding of 100,000 euro or more are considered. Ministries and national research councils – the latter for example by funding many PhD-projects – then move up the list, while municipalities play a less dominant role.

Project dissemination

Slightly over one-third of all projects have resulted in international articles. National language publications are the most common type of output. For 21 projects (28%) no information was provided, which could mean that publications had yet to be written. It has to be noted that respondents were specifically asked to prioritise peer-reviewed and international publications in their response.

Research needs assessment

Country specialities in urban forestry research

Respondents were asked to identify what they considered were their country's 'specialities' within urban forestry research. The same list of groups of research themes as for the research survey was used. Keywords were derived from respondents' replies (which could be anything from keywords to longer statements and explanations) and allocated to the relevant groups. The identified specialities for the six countries are listed in Table 4.

Both Denmark and Finland listed research on urban forest recreation, use and social values as their first speciality, while Sweden considered this topic as its second speciality. Estonia listed historical studies of urban forest(ry) as its main speciality. Latvian respondents mentioned only one topic more than once, i.e., urban forestry in coastal areas. Norwegian experts saw urban forest management and, in particular, urban silviculture as their country's research speciality. Swedish respondents mentioned the relatively new topic of nature's impacts on human health as its most important speciality on an international scale.

Main weaknesses in present urban forestry research

Assuming that urban forestry research in the respective countries was not meeting all needs, respondents were asked to identify the main weaknesses hampering research in their country in terms of organisation, funding and implementation. The answers given

Table 4. Main urban forestry research specialities per country ranking from 1 (highest score) to 3

Research theme	DEN	EST	FIN	LAT ^a	NOR ^a	SWE
Recreation and social values	1		1			2
Urban forest management and urban silviculture			3		1	
Historical studies		1				
Coastal urban forestry				1		
Nature and health						1
Ecological studies		2	2			
International coordination	2					
Urban planning						2
Establishment and afforestation	3					
Conflict studies		3				

Den = Denmark, EST = Estonia, FIN = Finland, LAT = Latvia, NOR = Norway, SWE = Sweden.

^aOnly one theme was mentioned more than once for Latvia and Norway.

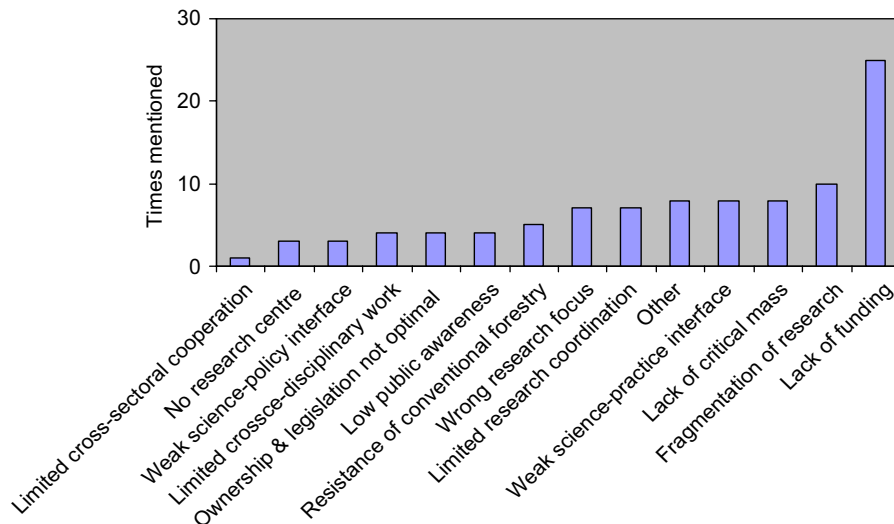


Fig. 2. Main weaknesses hampering current Nordic–Baltic urban forestry research according to respondents in six Nordic and Baltic countries (total of 96 answers by 63 respondents). ‘Other’ combines the groupings of replies that scored lower than those shown.

were subsequently grouped into main categories of answers.

As shown in Fig. 2, lack of funding was most frequently mentioned. Other important weaknesses noted were fragmentation of the research community, lack of critical mass (i.e., few researchers for specific themes), and a weak science–practice interface (i.e., little collaboration between researchers and practitioners). Limited coordination of research, closely related to research fragmentation as well as a wrong research focus was also mentioned. The latter will be relevant when comparing research needs with the themes studied by ongoing research.

Results were also analysed per country, although the limited number of responses per country makes it more difficult to draw conclusions. While realising this, differ-

ences between countries were noted for some of the most frequently mentioned weaknesses. Fragmentation of research was most frequently mentioned in Norway. Lack of critical research mass was perceived as a problem in the Baltic countries, while a weak science–policy was scored highly in Finland. Overall many respondents mentioned lack of funding as a main weakness.

Research needs

A key segment of the questionnaire concerned the identification of (up to five) themes or topics to be prioritised within future urban forestry research. A summary of research needs for the six countries is provided in Fig. 3. Once again, topics were allocated to the more general research themes of the research survey in order to make meaningful comparisons. For example,

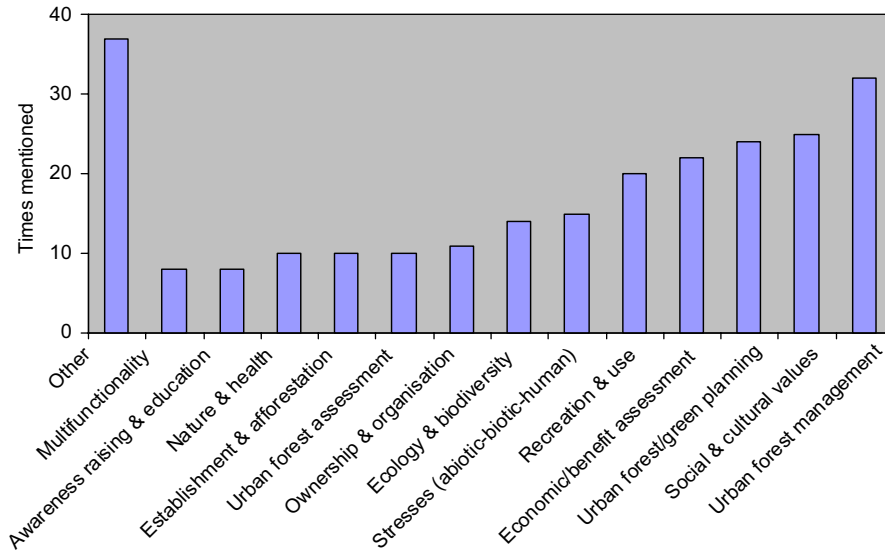


Fig. 3. Most frequently mentioned themes for future urban forestry research in Nordic and Baltic countries (246 answers given by 63 respondents). ‘Other’ combines the themes that scored lower than those shown.

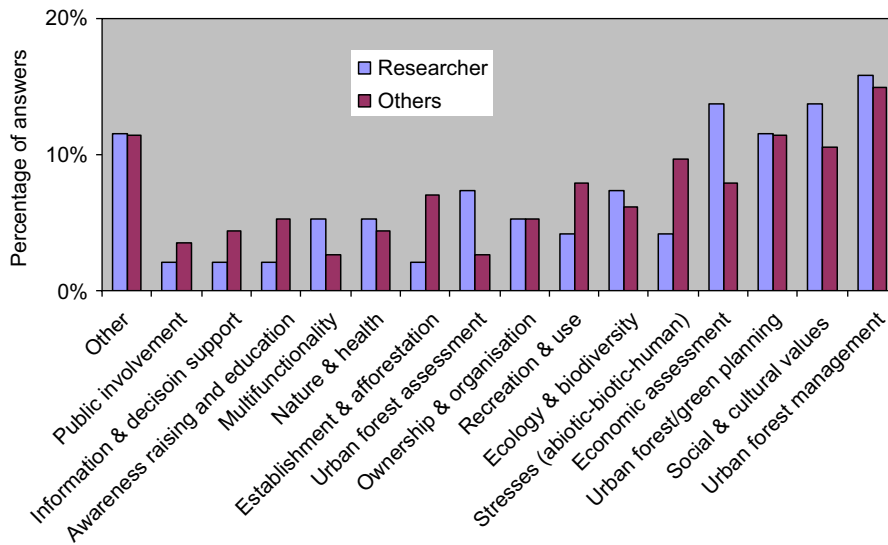


Fig. 4. Comparison of share (in %) of preferred themes for future urban forestry research as mentioned by the research community respectively other respondents (i.e. assignors and end-users of research) in Nordic and Baltic countries. ‘Other’ combines the themes that scored lower than those shown.

‘study of public preferences’ was categorised under the theme ‘social and cultural values’. Research on aspects of urban forest management ranked first, followed by studies on social and cultural values, and research on urban forest and green planning. Economic assessment of urban forestry benefits also ranked high as need for further research, as did the theme ‘recreation and use’. The emerging topic of ‘nature and health’ was not highly prioritised as a need, in spite of limited ongoing research. The category ‘other’ included research themes such as historical studies, conflict studies and research on tree selection.

Further examination identified differences between the research community and those commissioning and using research regarding research needs. As Fig. 4 illustrates, the two groups appear to agree on priority research needs, at least where the most ‘popular’ needs are concerned. However, some differences can be noted. Economic assessment studies scored considerably higher among researchers, for example, as did work on urban forest assessment. Assignors and users of research prioritised topics such as ‘recreation and use’, ‘stresses (abiotic, biotic and human)’, and ‘establishment and afforestation’ much higher than researchers.

Research needs also differ among countries. The need for more research on management of urban forests (including urban silviculture) ranked highest in Finland and Norway, countries with large areas of forests in and near cities and towns. In Denmark, planning issues comprised the first priority, although several needs scored almost equally high. Estonian respondents favoured more work on historical aspects and their Latvian colleagues stressed research on the many abiotic, biotic and human threats to urban forests. Respondents in Sweden prioritised various types of social research, on recreation and use and social and cultural values. It is also this topic, together with urban forest management and economic assessment that featured in the ‘top three’ in four out of the six countries.

Actions to support urban forestry research

Having listed their research needs, respondents were asked to mention supporting actions (at the national and international level), which could help promote and improve urban forestry research in their country. Replies were once again allocated to some more general categories by the research team. As lack of funding was identified earlier as the main weakness, it is not surprising that more funding is mentioned most frequently. Respondents gave more specific answers, for example, relating to initiatives by national research councils (e.g., on cross-disciplinary research), the European Union, and the private sector. Again, a comparison was made between the replies of the research community versus those commissioning and

using research findings (Fig. 5). Apart from suggesting better funding, the two groups did not agree very much on what actions should be taken to strengthen research. The research community’s prioritisation of international coordination and networking scored very low among planners, managers and other users of research, for example. Many of the supporting actions suggested by non-research respondents fell in the category ‘other’. They included, for example, changes in the ownership conditions of urban forests, better education and training of professionals and better opportunities for field trials and management experiments.

Respondents were asked about their own willingness to participate in future national networking and/or conferences within urban forestry research. Two-thirds of the respondents showed an interest to participate in national networking and/or conferences, and 91% of all respondents if those replying ‘maybe’ are also included.

Discussion

Discussion of research survey findings

The research survey shows that a large amount of research is ongoing, especially in the Nordic countries. Based on the knowledge of the research team as well as a quick scan of scientific literature, however, not all relevant projects seem to have been listed in the survey. This might have been caused by the selection of possible

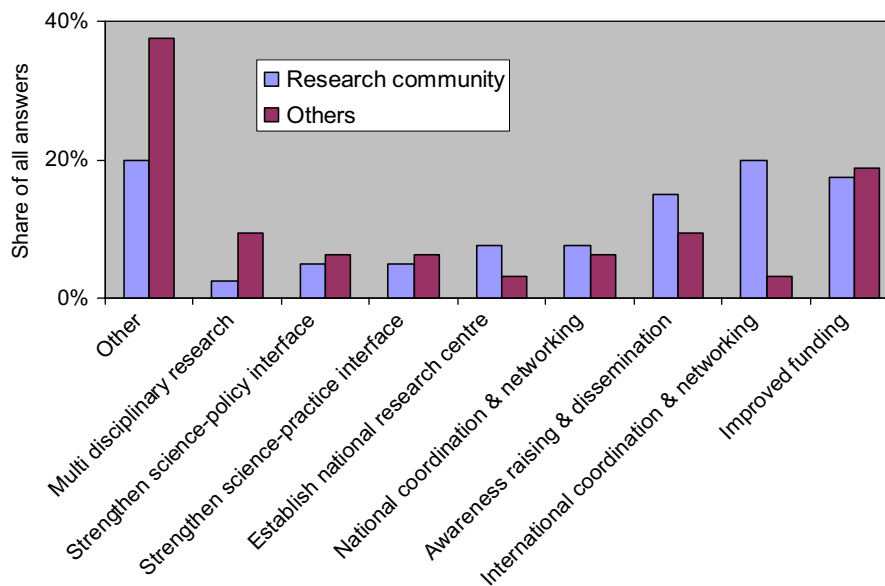


Fig. 5. Supporting actions to meet urban forestry research needs according to share (%) according to the research community respectively other respondents (i.e. commissioners and end-users of research) in Nordic and Baltic countries. ‘Other’ combines the answers that were attributed to groups scoring lower than those shown.

respondents by the national coordinators, who perhaps unconsciously favoured sending it to researchers and institutes they personally knew of. Furthermore, the (lack of) personal contacts might also have influenced the respondents; it is plausible to assume that a potential respondent was more likely to return the questionnaire if he or she knew (of) the person sending it.

Results are at least partly comparable with those derived from the 1998–1999 urban forestry research survey by COST Action E12 (Forrest et al., 1999; Konijnendijk et al., 2000). Estonia and Latvia were not included in the original COST survey. The COST E12 survey listed more projects (152 as compared with 78 in the CARE-FOR-US study), especially for Finland and Sweden. This difference could signal a decrease in research activity, but could also be the result of differences in study design. The COST survey, for example, covered a broader time span and was carried out by teams of national experts who represented a wider disciplinary range, including for example researchers in horticulture. The CARE-FOR-US research team consists mainly of forestry (and landscape planning/architecture) experts.

An interesting comparison concerns involvement of different types of research organisations. By share of all projects, universities took a similar dominating role in urban forestry research in the late 1990s as they do today. The role of research institutes as lead partner of urban forestry research has decreased. This decline is in line with reorganisations of state research institutes in for example Denmark, where the Danish Forest and

Landscape Research Institute became part of the University of Copenhagen (KU).

Main research themes can also be compared between the two surveys. For this purpose, the original COST E12 data were reinterpreted, examining keywords derived from project titles and abstracts, and categorising keywords according to the same overall themes at the CARE-FOR-US material. The allocation of keywords (387 for the 152 projects in the COST survey, 316 for the 78 projects in the present study) over the different research themes is shown in Fig. 6. The much higher shares of mentioned keywords within the themes ‘selection’ (17% versus 3%) and ‘establishment and afforestation’ (11% versus 5%) appear to point at the differences in study focus; the COST E12 survey appears to have paid more attention to urban tree and horticultural studies. However, many of the other themes appear to be about equally represented in the two studies, such as ‘urban forest management’, ‘recreation and use’, ‘social and cultural values’ and ‘urban forest assessment’. Current research appears to pay more attention to the themes ‘urban (forest) planning’ and ‘ecological studies and biodiversity’. It is interesting to note that the themes ‘Awareness raising and education’ and ‘Public involvement’ were poorly present in the COST E12 survey, while they rank in the top 10 of themes identified by CARE-FOR-US. ‘Nature and health’, a research topic which has been given increasing international attention lately (e.g., COST Action E39, 2003; Grahn and Stigsdotter, 2003; Nilsson and Nielsen, 2006) scored only moderately higher in the

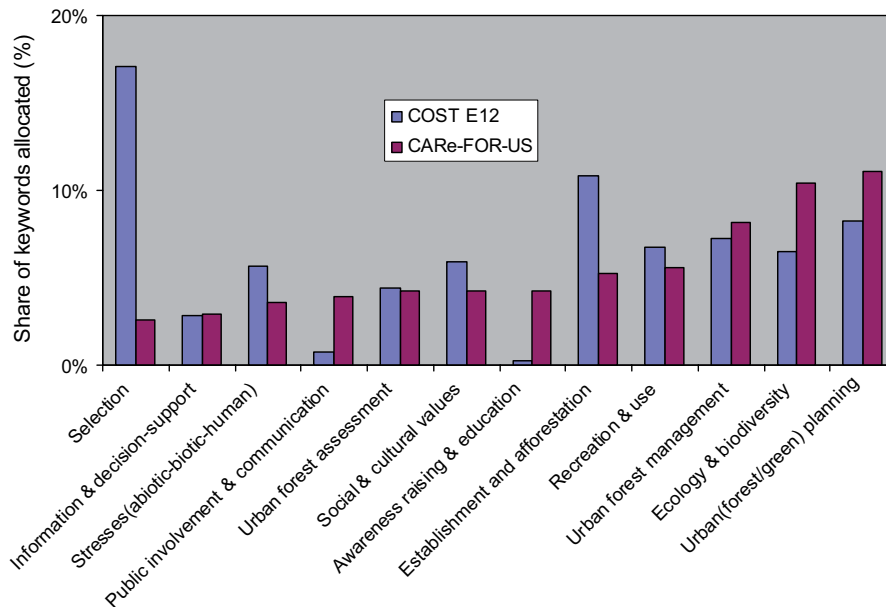


Fig. 6. Comparison of main research themes as share (in %) of all allocated keywords between COST E12 ‘Urban Forests and Trees’ and CARE-FOR-US study. Ordering according to share of themes in CARE-FOR-US study. Themes shown account for 66% (CARE-FOR-US), respectively, 76% (COST E12) of all keywords mentioned.

CARe-FOR-US study of current research (2% versus 1% of keywords).

Discussion of research needs assessment

This research needs assessment indicates that more research is required in specific management approaches and methods for urban forests, ranging from woodlands to parks and street tree plantations, for better understanding of public preferences and perceptions, and improved strategic planning in urban forestry. The survey also identified current strengths within urban forestry research, which often differ between countries. But generally, social issues such as recreation and use are well studied in the Nordic countries, although according to this survey more investigations are required. Another area of key Nordic-Baltic expertise is that of urban silviculture; many cities in the region have been built ‘into’ the forest, thus calling for research to support management of these forests in and close to cities.

Based on the activities of COST Action E12 ‘Urban Forests and Trees’, Nilsson et al. (2005) mention several urban forestry research needs in Europe. They state that studies on the characteristics of urban sites and improving tree adaptability to sites are to be prioritised by those commissioning research. Studies of urban sites are to examine a range of biotic, abiotic and human

pressures, for example, related to pests and diseases on vegetation, traffic emissions, de-icing salts, and vandalism. The importance of the theme ‘stresses’ also emerges from the CARe-FOR-US survey, although it ranks only fifth among future themes. Other European research priorities mentioned by Nilsson et al. (2005), such as study of public preferences and assessment of urban forest benefits, also featured in the CARe-FOR-US survey, perhaps with the exception of more environmentally sound management methods.

Research needs compared to ongoing research

Comparison of findings of the research and research needs survey will assist in assessing how far current urban forestry research in the Nordic and Baltic countries is meeting research needs. The comparison shows that, although substantial urban forestry research is ongoing in the Nordic and Baltic countries, much remains to be done. One can assume that at least some respondents will have been aware of omissions in current research. However, Fig. 7 shows that the situation is more complex. In some cases, for example, for ‘urban forest/green planning’ and ‘urban forest management’, themes score highly both in terms of share of present research and research needs. This could be interpreted in different ways; research is ongoing but it is insufficient, or alternatively, research is ongoing, but

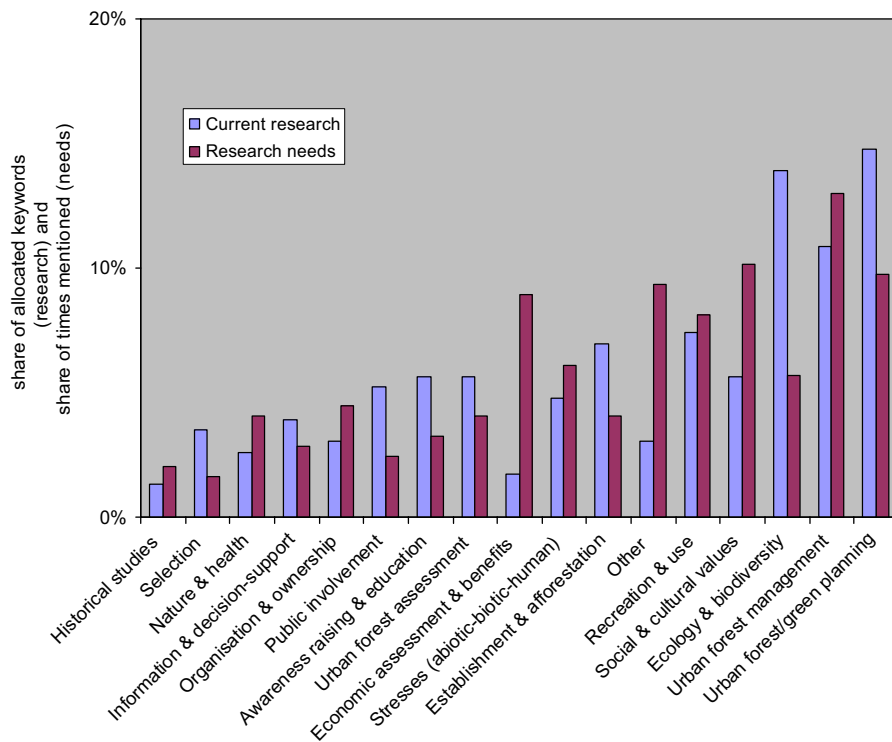


Fig. 7. Comparison of relative importance of research needs and current research per theme in the CARe-FOR-US survey. Share of research needs by percentage of all answers; share of research theme as percentage of allocated keywords. ‘Other’ combines the overall themes that scored lower than those shown.

end-users are unaware of it. Research appears to surpass needs for the themes ‘awareness raising and education’, ‘public involvement’ and ‘ecology and biodiversity’, which includes research on ecological processes and elements, nature protection and biodiversity. Respondents’ demand for more research on ‘social and cultural values’ and ‘economic assessment and benefits’ in particular seem justified, as these topics account for a moderate share of all ongoing research.

These results, however, ought to be interpreted carefully, as their validity is limited to the persons who received and responded to the questionnaires. The response rates were 45% and 32% for the research questionnaire and the research need questionnaire, respectively, with great variability among the countries. Moreover, it is likely, that the national coordinators overlooked research capacities and ‘key players’ in urban forestry when selecting who were to receive the questionnaires. Furthermore, the CARE-FOR-US research team consists mainly of forestry (and landscape planning/architecture) experts, with little emphasis on arboriculture. These possible sample selection biases’ have to be kept in mind when interpreting the results.

Examination of the responses indicated some disagreement between the research community and those commissioning and using the research regarding research needs. Researchers prioritised basic research topics such as economic assessment and long-term studies related to forest assessment much higher than assignors and users of research (Fig. 7). Keeping in mind the scientific role of research in society, the differences are, however, understandable. Researchers at a university have an obligation to look for basic understanding and basic arguments for (further) research, and researchers may thus have a different agenda than assignors and user of research. A problem arises if the gap between research and practice becomes too wide. Whether this is the case in the Nordic and Baltic countries, is beyond the present study to judge.

Several publications (e.g., Dwyer et al., 2001; Nilsson et al., 2005) have stressed the overall needs in urban forestry to enhance collaboration between disciplines and fields of attention, as well as between scientists, planners and managers. These issues are reiterated in the various actions for developing research found. However, strengthening of science–policy and science–practice interfaces and multidisciplinary work are poorly ranked in comparison to, for example, improved funding, more international coordination and networking, and awareness raising and dissemination. In terms of present weaknesses, Baltic and Nordic research stakeholders also emphasise current fragmentation of research, as well as (especially in the Baltic countries) critical mass. These results emphasise the importance of international research networks for the development of urban forestry research. By enhanced networking and collaboration

within the research community, across disciplines, and between researchers and those commissioning and using research, urban forestry research can be strengthened and made more relevant. By joining forces at the national and international level, for example, through real or virtual urban forestry research centres, fragmentation can be reduced and critical mass can be generated.

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