

Urban Forestry

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1. Concept and Definition

Urban forestry (UF) has at least three roots: (i) urban green management in Europe, (ii) forestry in North America and (iii) urban agriculture in developing countries.

Worldwide, policy decision makers and citizens are increasingly recognizing, articulating and investing in the urban forests as a vital component of the urban landscape, infrastructure and quality of life. Significant progress has been achieved in UF research and development through concerted interdisciplinary efforts in industrialized countries. Multipurpose urban forestry in developing countries is still in its infancy. There is an urgent need to allocate more resources to this area, especially for global, regional and national networking and in particular with a focus on poverty alleviation related UF issues.

Urban forestry, a term used probably for the first time in the 1970s in the United States, is still a developing discipline. UF has at least three roots. The most influential one has been the multidisciplinary approach, developed in North America, but strongly rooted in the European tradition of urban green management. In many European cities, the term UF is still related to urban woodlands only.

Present trends suggest that urban forestry and urban greening approaches are merging worldwide, and the terms are frequently used interchangeably. The latest impetus of UF comes from urban agriculture initiatives in development cooperation. Definitions of urban agriculture include forestry and even all urban vegetation.

In industrialized countries it is common that community and urban forestry are used as a twin terms, whereas community forestry (social forestry) is associated with rural development forestry in development cooperation.

While urban agriculture is still struggling for its identity, especially in conceptualising its distinctive urban (ecosystem) feature, urban forestry has a longer tradition as a holistic, multiand interdisciplinary approach to urban ecosystem management. This extends beyond traditional boundaries (sectoralism) like single tree management/horticulture (arboriculture) and forestry and management of larger green areas (including parks). Today, specialists from (urban/regional) planning, horticulture, forestry, landscape architecture, (landscape) ecology, plant pathology, sociology, psychology, political sciences, agroforestry, etc. work together within urban forestry.

For the general public it would be best to use the term **urban greening** as a comprehensive term, comprising all urban vegetation management (green spaces or urban vegetated areas) including farming and forestry.

The broadest **urban forestry definitions** regard UF as the entire area influenced by the urban population. The question whether the urban forest should extend beyond the edge of urbanized areas is problematic. There have been liberal interpretations of the distance over which urban activities influence forests, but these do not justify the application of a new label to forests which can be understood and managed using accepted concepts and methods.

Therefore, UF has, in a more restricted sense, to focus on planting and management of all sites for urban trees and shrubs and related vegetation. All these woody perennials, and how they are embedded and interact together with the urban ecosystem, form a unified resource, i.e. **the urban forest**. This resource can be broken down into various tree categories including garden and farm trees; street, parks and open space trees; woodlands on vacant and derelict land as well as trees and woodlands along rivers.

Also, regional urban parks and other forest resources within the urban fringe or periurban areas of densely populated areas are an integral part of the urban forest resource. In addition to trees, shrubs and other resources that make up the rural forest, the urban forest also includes many other elements that the forester has to work with, that are not generally encountered in rural forests like utilities, streets, new developments and high population pressure.

UF also addresses the urban-rural interface, i.e. the transitional zone in which land uses

begin to change from urban use associated with land development, to more agricultural or rural forestry land uses. In industrialized countries, models for the rural-urban continuum have been worked out. In developing countries there is much conceptual scope for improvement. In brief: Urban forestry is a modern urban ecosystem approach of urban tree management encompassing long-term planning, interdisciplinary professional coordination and local participation. The aim of UF is to secure the health and vitality of the urban forest resources, and, therefore, the sustained delivery of benefits for both current and future generations of urban dwellers. UF is an approach to make trees compatible and functional in an urban environment (urban ecosystem). Hence, the main focus of UF has to be on the portion of the forest found within the built environment.

In industrialized countries UF has focused on amenities and environmental benefits. In poorer countries there seems to be a consensus among development circles that UF must initially focus on meeting immediate needs for basic necessities and this can be best achieved by multiple resource use.

2. The Urban Forest Resource

Resource base

There is a dearth of information about urban forest resources in developing countries. Even in highly industrialized countries comprehensive information on vegetation in cities is lacking: due to different definitions and mandates only part of the urban forest has been assessed (e.g. street trees, public resources).

The current discussion on criteria and indicators for urban quality and sustainable human settlements pay insufficient attention to urban forests. Vice versa, the development debate on sustainable forest management hardly discusses urban forests. Some models of urban forest sustainability considering vegetation resource, community framework and resource management, have been developed in industrialized countries. For poor neighbourhoods simple and inexpensive indicators still have to be tested.

Benefits

Urban forests can improve the quality of urban life and livelihood in many ways, providing both tangible (e.g. food, energy, timber, fodder) and less tangible environmental and societal benefits and services. Evidence suggests that urban forest resources can play an active role in providing goods and services to alleviate poverty, improve livelihoods, and enhance wellbeing in developing countries.

Tangible benefits

Many urban trees suitable for resource-poor settlements provide **food**, particularly fruits, but also edible leaves, shoots and even flowers. Urban forestry practices improving food security of poor people include the collection of wild edible plants, planting of low-care fruit bearing street trees, including a gardening component, in multifunctional parks or creating edible public parks, laws enforcing that a proportion of new housing schemes is allocated to fruit trees. Food from trees in private agroforestry gardens or allocated plots in public gardens can contribute significantly to food security in developing countries. Yet it is the least documented. In arid and semi-arid areas, it is a common urban forestry practice to establish windbreaks to protect agricultural land and enhance the productivity of the land.

Many forestry development projects have been dealing with urban **wood energy** (woodfuel) issues. However, supply and demand of wood energy in urban areas is not understood as thoroughly as in rural areas. Intensive research in the 90s showed that woodfuel can be beneficial for the global climate (carbon-neutral); the energy safety net of urban poor is increasingly scarce and worse than rural people; thus they spend a significant proportion of their income or time in securing woodfuel. Inexpensive charcoal is as close as many households in poor neighbourhoods will come to modern fuels. Variation in woodfuel collection depends on forest cover, population density, availability and stability of alternative sources of energy, cash income, etc. With the increase in numbers of urban poor, woodfuel will remain a burning issue.

Good urban practices include **timber** harvesting combined with intensive outdoor recreation activities. Systematic planting of street trees for timber production can offset the costs of tree care through harvesting of trees. Timber production from urban forests has not been optimised due to a mix of ignorance, tenure insecurity and deficits in technical know-how. Periurban (timber) plantations are the most recognized urban forestry practice in development

cooperation.

The dependence of people on **non-wood (non-timber) forest products** is also not well understood. Dependence of people in periurban areas and smaller settlements is more obvious.

Shelter

Organic materials are still widely used in urban areas in poor neighbourhoods. Adequate supply of bamboo and other timber seems a problem for a significant and growing number of households. The problem is most severe in arid areas and the vicinity of cities.

Environmental services

Today the main focus of attention in urban forestry is on environmental services. Measuring environmental urban forest benefits and translating these into monetary value in North America has greatly contributed to a situation in which policy makers and citizens appreciate more the value of the urban forest.

Concern about global warming has facilitated the dissemination of in-depth knowledge about the functions of urban trees in microclimates, air quality improvement and carbon dioxide reduction in industrialized countries, especially in North America.

Since urban trees reduce the need to burn fossil energy, they are a more important investment for green house mitigation than rural trees. The energy saving potential (from lower air condition requirements) of an urban tree is up to fifteen times higher than the benefit of a rural tree, although the role in global sequestration is limited. Enhancing carbon sequestration through carbon forests is appreciated by urban initiatives. For instance, ICLEI (The International Centre for Local Environmental Initiatives) is currently recommending "carbon" trading in cities.

Energy conserving landscaping by strategically planting trees can maintain comfort without air conditioning, but has hardly systematically been incorporated in housing projects in resourcepoor settlements.

The benefits of urban forests for the protection of urban water supplies, wastewater treatment systems and storm water management is increasingly being articulated, especially in semiarid and arid zones and periurban areas. Protection of the suburban and rural areas that serve as the source of the cities' water is a traditional urban forestry linkage. Yet there is much scope for integration into urban planning. The link between urban faucets and rural watersheds is increasingly obvious, but few forest services have developed a comprehensive forest plan and compensation or service fees for managing the land for high quality of water and other watershed values.

In many countries it is popular custom to reclaim unused and degraded land and terminated landfill sites through afforestation and to convert these to parks. Basic research on the potential for woodland established on landfill sites demonstrated that trees could be grown successfully on capped landfills without endangering cap integrity, provided that appropriate restoration and silvicultural procedures are adopted.

Urban forests have a vital role in **nature conservation** (e.g. older gardens and parks, periurban agroforests, botanical gardens, wetlands, protected zones). Incorporating urban forests in networks improves biological conservation and biodiversity. Greenbelts and greenways (linear parks) can serve as biological corridors, reconnecting a city to its surrounding bioregion. Yet, the global discussion on biodiversity and forestry does not have a special urban theme.

Societal benefits

Forest related activities and urban agroforestry practices can be labour intensive and can provide work opportunities. This may be especially important for livelihoods and survival strategies of the very poor. No comprehensive study on work opportunities in developing countries has been conducted. In wealthier countries the green (arboricultural) industry is a well-documented and significant business.

Urban forests are increasingly appreciated in environmental **education** for urban dwellers, and are part of environmental education worldwide.

It is obvious that urban forests greatly enhance outdoor **recreation**. Lower income residents tend to frequent city parks more than wealthier citizens, yet the per capita green area is much lower. Only very few cities have delivered plans to increase green space in low-income

quarters. Recreation for poor neighbourhoods must be based on recreation values of the poor, offer affordable access, and combine recreation with other urban functions. With growing policy attention to the social values of urban trees, more studies aim to identify public values and preferences related to the recreative use of urban forests.

Some research in North America has indicated that public involvement in UF can help strengthen **community cohesion** of neighbourhoods by providing people with an opportunity to work together for the benefit of the local environment. It is also a well-known fact in industrialized and transitional countries that urban forest results in increased property value and can attract new businesses and investors. Outside North America, only very few studies have investigated the psychological and health aspects of urban forests and trees. Attention to the health values of urban trees has recently increased.

3. Urban Forestry Practices

Urban forestry practices are increasingly included in best urban practices.

Parks and greenways: Urban parks are traditionally one of the most obvious forms of urban forestry. However, parks have often been the domain of quite different professions, with distinguished approaches and practices, as compared to street trees. In many cities, parks are threatened by buildings, spontaneous settlements, vandalism, environmental stress and restricted government funds. It is more and more acknowledged that many parks can only be preserved and managed through the commitment of residents and innovative management approaches.

The potential of multi-functional park design and management is insufficiently known among urban planners and other stakeholders concerned with the development of low-income communities. Still, there are some cases in which successful innovative multifunctional parks as a component of slum improvement programs (storm water control, wastewater and sewage treatment, recreation and gardening) have been implemented.

Greenways (linear parks) can have multiple uses and functions, such as improving environmental quality, providing recreation, and serving as an alternative transportation route (bicycle and foot paths). They are promising, but have been less promoted than conventional parks.

Public parks are especially important for the urban poor, because they have few affordable options for recreation and thus place a high value on green areas. Lower income residents tend to frequent city parks more than wealthier citizens do because they lack the financial resources and leisure time to reach distant recreation sites.

Street trees, the most obvious urban forestry practices, are often more difficult to establish and maintain than their counterparts in parks. Due to inadequate planting space and the high cost of protecting individual trees, collision and vandalism have destroyed many street trees. Space limits the selection of species and reduces vigour and longevity. On the other hand, sufficient innovative techniques are available that increase the survival rate and longevity of street trees.

A disturbing trend in some cities in developing countries is to replace tough, multi-purpose, and native trees with modern ornamentals that have not yet proved themselves. Often, lowcare wild edible plants are excellent candidates for use as ornamental street tree plantings.

When properly managed, street trees provide significant quantities of fuelwood, poles, fruits or medicine. However, multipurpose street tree research is in its infancy.

The general perception of the exclusive public responsibility for street tree planting has prevented creative public-private partnership in the past. However, entrepreneurs generally prefer to sponsor trees in central locations with high traffic density. These sites are the most challenging ones for good growth conditions, but a good business sponsor can better ensure the survival and vitality of trees. Generally, there is significant evidence that street trees survive and flourish best when people living adjacent to them commit themselves to be responsible for tree care in one form or another.

Trees in urban farming have only recently received more attention under the umbrella of urban agricultural initiatives. Agroforestry gardens are probably the most significant urban green space in tropical developing countries. Some tree species require little space and can be manipulated into shape by training, coppicing, lopping, or pollarding. Climbing woody perennials are very suitable for small gardens. Still, few urban forestry programmes have

facilitated the integration of trees into farming.

There is no reason why agroforestry techniques developed in rural areas could not be adopted to the context of urban areas. For instance, Sloping Agricultural Land Technology (SALT) is a diversified system of contour hedgerow inter-cropping in which permanent and non-permanent crops are grown along with the hedgerow. This can be promoted in low-income settlements to improve farming and stabilize sloping land.

In arid and semi-arid areas, it is a common urban forestry practice to establish windbreaks to protect agricultural land and enhance the productivity of the land. Properly managed windbreaks can provide significant quantities of fuel and poles and other tree products without jeopardizing their primary protective function.

Protected areas are natural or reconstructed habitats that receive some level of ecological protection in order to preserve their ecological or biological functions. Generally they tend to be small in urban areas. For instance, greenbelts are basically open space buffers amid the congestion and pollution of most large cities.

Although urban forests may contain less biological diversity than rural woodlands, they still play a significant role in conservation of biodiversity.

Wetlands deserve attention as a priority candidate for protected status. Usually they contain a high level of biodiversity and offer a range of environmental services. Protected key areas and buffer zone concepts developed in rural forestry can be adapted to the urban context.

4. Research and Development

Status

Urban forestry research has been advancing rapidly in North America through concerted and coordinated actions, particularly through the efforts of the International Society of Arboriculture, the Society of American Foresters and the USDA Forest Service, and nonprofit organizations.

In Europe, urban forestry research is still very fragmented. The Tree Route Network (TRN) dealing with "Research on Urban Trees in Europe" which aims to establish urban forests and urban trees as a scientific domain in Europe, has facilitated much cooperation and coordination in Europe. In developing countries urban forestry is still in its infancy and is strongly oriented towards the style of industrialized countries.

In Europe and developing countries, multiple-country research overviews have mostly been anecdotal or limited in scope, covering for example only parts of the urban forest resource (street trees, urban woodlands) or structural human interference (planning, selection, establishment or management). Traditionally, studies on urban forests are limited to applied, small-scale research at the municipal level.

Coordination at the national level, often enhanced by regular national conferences (e.g. Brazil, Ireland, China, Thailand, United Kingdom and USA) is an exception.

In developing countries UF-related activities are evolving rapidly. However, little technology transfer, research and information exchange occur. Urban agriculture development initiatives take urban forestry into consideration, particularly with regard to agroforestry activities. Many urban development projects include an urban forestry component, yet forestry is hardly on the urban development agenda.

Among donor agencies the Inter-American Development Bank has made the biggest efforts in the development of integrated urban greening. A few initiatives, such as the TREE CITY Initiative, focus on poor settlements in developing countries. FAO has done pioneer work on UF by launching a program on urban and periurban forestry as long ago as 1993. Some city-to-city cooperation (North-South, South-South) has included urban forestry activities. RUAF (Resource Centre for Urban Agriculture and Forestry), a new urban agricultural resource centre has even the term forestry in its acronym.

Multipurpose urban forestry research is in its infancy in developing countries. Most information on urban forestry in developing countries is very scattered. More information is available on vegetation, rather than on people who might benefit from them. There is a dearth of published quantitative information about the relationship between urban dwellers (particularly the poor) in developing countries and urban forests, on how they value, use or would like to use these areas, and how urban forests affect health and well-being.

A limited number of case studies on UF exist such as the EC financed Forest-City Interface component of APFT (Avenir des Peuples des Forêts Tropicales) in Africa, or the series completed by FAO (11 case studies). The latter documented a wide range of benefits including some products directly useful for people. However, it is not clear if the value of these

products exceeds others such as annual cropping. Very little is known about the relationship between urban forestry and livelihood, still less about the livelihood of the poor. The DFID (Department for International Development, UK) which has recently funded case studies on researchable constraints to the use of forest and tree resources by poor urban and periurban households in developing countries, is a very rare exception.

Poverty alleviation

The potential for urban forestry to become more directly instrumental in poverty alleviation initiatives will be debatable as long as it is not better researched. The greatest urban forestry knowledge gap is that the poverty alleviation-urban forestry nexus has not been systematically researched in-depth. The most urgent tasks ahead would include concerted actions to comprehensively assess the role of urban forestry in poverty alleviation and to prioritise specific UF practices for the poor and very poor in urban and periurban areas, in different ecozones as well as small, medium and large settlements and megacities. Since foresters are conspicuously absent in urban development initiatives, and since for other specialists trees are not a major concern, it is very unlikely that forestry will appear more visibly on the urban development agenda very soon. However, there are some indications that food security related development activities will pay more attention to the roles of urban trees in future.

There is an obvious need to improve the exchange of experiences, and to synthesise available information in-depth. This includes: (i) approaches and methodologies for planning urban forestry programs; (ii) the relative importance of the environmental and productive functions of urban forests in different ecozones and for different social groups; (iii) building up the technical knowledge base and developing of adequate institutional frameworks to support urban forestry programs.

5. Challenges

The basic challenge for urban forestry is to develop and maintain a sustainable urban forest resource that meets multiple societal and personal demands. This challenge is especially pronounced in developing countries. Without commitment to allocate sufficient resources for research and development of UF networks at national, regional and international levels, progress will be slow.

Challenges to urban forest development in developing countries - and elsewhere - are: (i) little technology transfer, research and information exchange; (ii) inadequate appreciation of the economic value of the urban forest and low comprehensive valuation of multipurpose urban forestry; (iii) insufficient local participation and private-public partnerships; (iv) inappropriate land use policies (access and security of user rights to urban forest); (v) ecological and technical constraints of the urban environment; (vi) sustaining funds for urban forests, and, above all, (vii) integration of forestry into urban planning and development.

Many local forestry-related initiatives and innovative partnership models are evolving rapidly in developing countries and elsewhere. Yet little exchange occurs. Lack of suitable networks to facilitate coordination means there is a high risk of duplicating efforts, and reinventing the wheel. Also, the experience and methodology gained in rural development (social forestry) is not really utilized in urban forestry.

Urban forestry researchers with a focus on poor neighbourhoods in developing countries have no institutional home. Thus the greatest impact of a research project would be to facilitate networking among all scientists working on urban trees in poor neighbourhoods which find themselves underrepresented in the current development initiatives in urban agriculture and sustainable urban development.

Insecure or unclear ownership and/or rights to the use of urban forests can be the most serious obstacle in poor neighbourhoods in developing commitment towards urban forests.

Participatory planning and management tools can greatly contribute to sustainable urban forest management in poor neighbourhoods.

Over the last decades, many innovations and good practices have become available in industrialised countries for planting and sustaining urban forests. Not all of them are appropriate and relevant for resource-poor people. For instance, in developing countries only a very limited number of species are planted as urban trees. Species richness is not a problem, but for ecological and economic reasons there is an urgent need to increase the number of species which have multiple values. This is a totally new field of action in forestry for community development.

At the urban-rural interface issues such as forest fragmentation, varying land and social values, and numerous landowners, create new challenges in the management of these interface areas. The growing interface and interzone problem of turning rural forests into urban forests poses a great threat to not only the residents but also the environment. For that reason, rural foresters have to take urbanization into account in planning rural forests. They need to develop a better understanding of it, become more involved in the urban planning process and cooperate with urban groups.

With accelerated urbanisation, in order to retain the urban forest resource (thus contributing to functionally healthy urban ecosystems), forestry professionals need a more balanced urban and traditional training, including some demonstrated skills in working with land developers, home builders, municipal governments, planning boards and the urban poor. This would require huge efforts in education and training. Unfortunately, too few education opportunities in developing countries exist as yet.