

# Chapter 14

## Urban Forestry for Multifunctional Urban Land Use

The contributions of forests, trees and other urban green areas to the quality of urban life and the environment can be significant. When existing good practices are built upon, urban forestry has shown significant contributions to the quality of urban life and the environment, together with other types of comprehensive green-space planning and management concepts. Through agroforestry systems, for example, urban forestry and urban agriculture join forces in supporting livelihoods. A review of the current status of urban forestry research and development, policy-making, implementation and education across the globe shows that advances have indeed been made. Urban forestry has been developed in response to the call for innovative, comprehensive concepts that promote the multiple benefits of urban green space. Sometimes named *urban and peri-urban forestry*, the concept encompasses the planning and management of forests and other tree resources in and close to urban areas and thus integrates different parts of urban green structures.





systems (FAO 2003, Akinbamijo, 2004). Growing trees in combination with other crops or with keeping animals adds value through enhancement of microclimate and other growing conditions and diversification of produce, for example. Timber and other wood products can be very important in urban areas; large parts of the urban population of Africa, for instance, are still heavily dependent upon fuelwood. In times of war and conflict city dwellers have often turned to nearby woodland for illegal cutting of fuelwood, as in the case of Sarajevo in Bosnia and Herzegovina during the 1990s war that split up Yugoslavia (FAO, 2005a). Forests and trees also provide non-wood forest products such as mushrooms, berries, (medicinal) herbs, rattan, seeds, leaves etc. In the industrialised countries, cities have often turned to green areas for providing attractive environments for businesses to settle in and people to live in (Konijnendijk 2003). The generally positive impact of nearby well-managed forests, green areas and trees on real estate prices and business development has been documented during recent years, for instance through hedonic pricing studies (Wolf, 2004; Tyrväinen et al., 2005). Box 14.1 gives examples on how to assess the economic benefits of urban forests.

### **Environmental and ecological values of urban green**

Many of the environmental services provided by urban green space are characterised as climatic or engineering benefits, offering a “green infrastructure” to cities and towns. Of particular importance in both the developed and developing world is the role of forest resources in water management. Many of the world’s largest cities rely on fully or partially protected forests in nearby or more remote catchment areas for much of their drinking water. Additional protective measures are often needed to ensure high quality drinking water from these watersheds (Dudley & Stolton, 2004). Quito in Ecuador is one of several Latin American cities that has taken active steps, financially supported by the creation of a water consumption fee, to protect their watershed forests (Echavarria, 2001). In arid regions, forest shelterbelts around cities help combat desertification (FAO, 1999). Trees reduce storm water runoff and can assist with processing wastewater. Urban green also protects soils and moderates harsh urban climates, for example, by cooling the air, reducing wind speeds and giving shade (Tyrväinen et al., 2005). Trees and other vegetation intercept particles and gaseous pollutants and thus help reduce air pollution, as a study of Beijing, China, has shown (Yang et al., 2005). Moreover, forests and trees in cities act as carbon sinks in the equations relevant within the context of global warming (Johnson & Gerhold 2003). The level of biodiversity of urban green areas is often surprisingly high, representing nature and the “wild” close to where people live (Kowarik & Körner 2004, Stewart et al., 2004).



Cecil Konijnendijk

The cultural values of urban and periurban forests should not be neglected: centre of Beijing, China.

### **Social and cultural values of urban green**

The recreational values of forests, parks, gardens and other urban green areas are especially well documented in the Western world. Urban woodland in Europe attracts thousands of recreational visits per hectare per year (Konijnendijk 2003). The large majority of all recreational use of forests takes place in areas not more than 1-2 km from people’s homes (Hörnsten 2000). The aesthetic values of trees and green have been known for centuries; urban green space makes for better, more attractive cities. Urban green can have a positive impact on people’s physical and mental health by providing settings for physical exercise, reducing ultraviolet radiation and air pollution, and lowering stress levels (eg. Grahn & Stigsdotter 2003). By being actively involved in tree planting and management, local



### Box 14.1 *Economics of urban forestry*

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*(This box is taken from an article by the same author. The full version of the article appeared in UAM no.13, 2005)*

#### **Economics and Public Value of Urban Forests**

Active management of the urban forest entails costs of planting, maintenance, materials and disposal. These investment costs are readily tallied and accounted for in budgets of municipal agencies or user groups. Returns on investment are less easily calculated. Many “products” of urban forests are public goods. Multiple “owners” invest in a city’s natural capital, generating “products” in the form of intangible functions and benefits for each resident, visitor and user. The experience of these benefits by any single person does not exclude others from experiencing similar benefits, both immediately and indefinitely. In addition, use or experience of benefits by one person or many people does not diminish the encounters of others, which is considered a non-rival situation by economists (Daly and Farley 2004).

#### **Economic valuation approaches**

Economic valuation translates urban forest services and functions into terms that enhance public value. Valuation studies have addressed many facets of urban forest benefits:

- Use value – Goods that are harvested from green space (such as food or fuel) may have market value, or substitute for market goods. Urban agroforestry practices can produce human and animal foods and medicinal materials, thus contributing to urban food security.
- Environmental services – Natural areas and ecosystems provide services to society and the costs of creating such services using built systems are deferred. Based on assessing urban forest canopy cover and modelling of air pollution, storm water mitigation and energy impacts, the annual values of urban forest services have been estimated. The Urban Ecosystem Analysis of the Washington, D.C., metropolitan area concluded that tree cover had reduced storm water storage costs by US\$ 4.7 billion and generated annual air quality savings of US\$ 49.8 million.
- Hedonic pricing – The value of an amenity is determined as an increment of purchase price. Numerous studies have concluded that a quality forest or green space has a positive economic ripple effect on nearby properties (eg., Crompton 2001). Appraised property values of homes that are adjacent to parks and open spaces are typically about 8 to 20 percent higher than those of comparable properties elsewhere.
- Travel cost method – This method calculates the costs that people are willing to add to a trip to experience a desirable amenity or landscape.
- Contingent valuation – The willingness to pay for an actual or hypothetical change in environment, lifestyle, or landscape condition is stated by consumers, often in surveys. Studies on how trees affect shoppers’ behaviour in retail business districts have shown that consumers claim willingness to pay about 9 to 12 percent more for products in downtown shopping areas with trees, versus in comparable districts without trees.
- Externalities estimation – This assesses the costs of a negative consequence of a landscape condition or change, such as the health costs associated with human inactivity in cities that are not conducive to walking. The presence of trees and “nearby nature” in human communities invites people to be more physically active. Kuo and partners (2003) have found that the presence of trees within high density neighbourhoods lowers levels of fear, contributes to less violent and aggressive behaviour, encourages better neighbourly relationships and coping skills. Hospital patients recover more quickly and require fewer pain-killing medication when they have a view on nature.

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## The world's urban forest resources

One of the challenges facing urban forestry is the difficulty to operationalise the concept. This may partly explain why there is very limited information available on the extent of urban forest resources. International, national and even local resource inventories and monitoring of developments are scarce. One important variable is the geographical limit of urban (and peri-urban), which varies from one site to another and in time. Another variable is the type of resources in terms of tree-based and greening systems being considered. For its Forest Resource Assessments (FRAs), FAO defines three main categories, namely “forest and forest land”, “other wooded lands” and “trees outside forests” (Kotka III 1996, Kotka IV 2002). These are all found in urban and peri-urban areas and include for example parks, gardens and street trees and agroforestry systems. The FRA’s activities and mandate have increased substantially over the two last decades and FAO has been requested to pay more attention to aspects such as non-wood forest products and trees outside forests (see Box 14.3). Consequently, trees outside forests comprise an important area for future assessments as mentioned in the FRA 2000 report (FAO, 2001).

### Box 14.3 *Role of Trees Outside Forest (TOF) in urban environment*

Establishing woodlots in villages and near urban centres relieves pressure on natural forests for fuelwood, poles and fodder. In cities, tree planting is stressed for aesthetic and recreational benefits. While urban, peri-urban and roadside planting is promoted in all the countries studied, Tunisia has perhaps been the most active. Initiatives include establishing a green belt around Tunis, creating parks, lining boulevards and motorways, planting coastal esplanades and implementing a national programme for heritage trees.

In Mali, about 22 000 ha of plantations have been established in villages and urban areas since 1986, and there has been additional planting along roadways. Iran has been active as well, with a network of urban and peri-urban planted forests and parks. Often, however, problems arise when irrigation cannot be sustained in the long term because of water shortages. The use of treated wastewater from cities is therefore seen as an opportunity for urban and peri-urban tree planting in several countries.

*Source: FAO's State of the World's Forests 2003 (FAO, 2003).*

A study by the United States Forest Service (Dwyer et al., 2000) was the first comprehensive national level assessment of urban forest resources. A combination of methods was applied, including satellite imagery, national statistical data and assessments of particular cities or metropolitan areas. Tree canopy cover was used as a more reliable indicator than land use types. The assessment showed, amongst others, that 3.8 billion trees in urban areas cover 27.1 percent of the land, i.e. about 1 percent of the country.

Europe has not seen countrywide or international comparative assessments of urban forest resources so far, in spite of some efforts, especially by the European Environment Agency (Pauleit *et al* 2005). An explorative study by Pauleit et al., (2002) used tree canopy cover as an objective indicator and found municipal canopy cover of selected European cities to range from 1.5 to 62 percent. In some European cases resource data has been compiled on specific elements of the urban forest, such as woodlands within municipal boundaries. From the information available, be it sketchy and hardly comparable, the significance of urban forest resources in Europe does emerge. Urban and peri-urban woodland alone covers several millions of hectares (Konijnendijk 2003).

Urban forest resource information from other parts of the world is even more difficult to obtain. Some of the sparse insights in Asian urban forest resources have been provided by Kuchelmeister (1998), Webb (1999) and Palijon (2004), while more recently an increasing

amount of data is also emerging from China (eg. Jim & Liu 2001; Yang et al., 2005). Information on urban forest resources in selected cities of northern and western Africa, Latin America and Central Asian cities have also been documented through case studies (FAO 1999, CIFOR & IDRC, 2003).

Although information on the natural resource base is scattered or incomplete, varies in quality and is not adequately disseminated, it can be concluded that the potential of urban forest resources is under-developed. The status, size and structure of these resources are often significant but vary greatly. Findings also suggest that urban green space is under pressure from other forms of land use in most parts of the world, although recent afforestation in Europe, for example, has led to an increase in urban (forest) resources at local level.

## Urban Forestry Policies and Legislation

### Urban forestry policies

Lack of awareness about the potential of urban forestry, of information exchange, and of strategic, coordinated action so far means that the full potential of the urban forestry concept remains to be realised. This is particularly the case in the developing world (Konijnendijk et al 2004). FAO has been among the first organisations taking up the challenge of promoting the concept - under the name urban and peri-urban forestry - as a framework for action, with emphasis on the developing countries and countries with economies in transition, and urban forestry's contributions to food security and poverty alleviation. FAO's activities have included a review of existing activities within urban forestry, as well as an identification of needs for further development. It has encouraged partnership and information sharing between localities and countries. With a state of the art assessment and institutional and policy strengthening as a basis, the role of urban forestry thinking in sustainable development could be enhanced and developed. One of FAO's recent initiatives is an outlook study of urban and peri-urban forestry in countries of West and Central Asia as part of the Forestry Outlook Study for this region (FOWECA, see Box 14.4).

#### **Box 14.4** *Forestry outlook study & urban and peri-urban forestry – The case of West and Central Asia (FOWECA)*

The Forestry Outlook Study for West and Central Asia (FOWECA) is one among a series of regional forestry sector outlook studies initiated by FAO in collaboration with member countries to examine the trends in the development of forests and forestry. The primary objective of FOWECA is to provide a long-term perspective of the development of the forestry sector in the West and Central Asia region in the context of economic, social, institutional and technological changes. Using 2020 as a reference year, FOWECA aims at analysing the trends and driving forces that will shape the sector during the next two decades, and at identifying policies, programmes and investment options that can enhance the sector's contribution to sustainable development.

This outlook study encompasses the following countries: Afghanistan, Armenia, Azerbaijan, Bahrain, Cyprus, Georgia, Iran, Iraq, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Tajikistan, Turkey, Turkmenistan, United Arab Emirates, Uzbekistan, and Yemen. And within this region, the importance to look specifically at the forestry issues in relation to the urbanisation process and the livelihood of urban and peri-urban populations was identified. It is expected that the outlook study, supported by a selection of city case studies and a range of consultation processes, will help enhance the capacities in strategic planning related to forests, develop a long-term vision to realise the full potential of the sector, and create networks among people and institutions responsible for natural resources management in the region in the context of urban and peri-urban forestry.

*Source: FAO (2004)*

In terms of policy integration, much remains to be done at the global level, in spite of recent developments in, for example, the field of urban agriculture. In the Harare Declaration in Urban and Peri-urban Agriculture in Eastern and Southern Africa (2003), heads of cities and governments have engaged themselves to promote a shared vision of urban and peri-urban agriculture accompanied by concrete policies and instruments. It should be noted, however, that the integration of land issues is not consistently addressed, and that trees and general greening are not even mentioned at times.

At the European Union level of policymaking, attention to urban forests or even urban green space at large has been limited so far, although access to green space is now seen as an important indicator for sustainable cities (Pauleit et al., 2005). At the national level, however, new policies have incorporated the importance of urban forests and/or urban forest elements. Many north-western European countries have issued policies aiming at establishing new forests primarily for providing social and environmental services, and in which urban agglomerations have the highest priority. Accompanying grant schemes thus favour urban settings. Except for Britain and Ireland, comprehensive local urban forestry strategies are even less common. Ottitsch and Krott (2005) mention that it has been problematic to develop true urban forestry policies at city level due to issues such as funding problems, political struggles, and different priorities. Many city administrations face increased pressure by ongoing administrative reform and budget cuts, which often also lead to diminishing resources for green-space management.

In North America, urban forests have become recognised as important elements of national forest and natural resource policies. The development of the Canadian National Forestry Strategy (2003–08) has been a major step for urban forestry in Canada, as a specific section is allocated to the urban forest and public engagement in sustainability (National Forest Strategy Coalition, 2003, see also box 14.5). Urban forestry policies are institutionalised in the United States, where they exist at federal, state and local level, and are accompanied by funding and research programmes (Dwyer et al., 2000).

#### **Box 14.5** *Urban forestry in the Canadian National Forest Strategy (2003-2008)*

Urban Canadians' perception of the forest surrounding towns and cities often shapes their views on the entire forest, whether in their backyard or across the country. The forest in rural areas affects people living in towns and cities because of its contribution to the economy, its environmental functions (for example cleansing groundwater and regulating water flows) and its recreational opportunities. People living in urban areas are increasingly shaping forest policies by their participation in decision making at local regional and national level. The Canadian National Forest Strategy (2003-2008) was developed through an extensive public consultation process and has led to the active engagement of Canadians in sustaining the diversity of forest benefits. Forest Champions are leading and promoting collective implementation of the Strategy's themes, including the one of "urban forest and public engagement in sustainability".

*Source: National Forest Strategy Coalition (2003)*

Although urban forestry capacities and policies are often insufficiently developed, especially outside North America and (parts of) Europe, some successes have been achieved elsewhere. Singapore, for example, has strongly institutionalised urban green-space planning and management. It has developed a proposal for an island-wide park connector network (Yuen 1997; cf. Palijon, 2004). The Chinese government has recently incorporated the urban forestry concept into its national policies, as seen in afforestation, the establishment of shelterbelts around urban areas, and the awarding of urban greening awards to cities with successful green space development and management practices (eg. Liu et al., 2004). The example of Zimbabwe is rather typical for many (developing) countries. Although urban



International Society of Arboriculture (ISA) have been key players here. Researchers from developing countries are taking an increasingly active part in international research networks, aided by modern information technology and donor funding. This trend has been supported by workshops and conferences<sup>2</sup> on policy and development issues.

European urban forestry research has benefited from nearly a decade of networking initiatives, supported for example by the European Commission. A survey of 20 European countries identified more than 400 recent or ongoing research projects on trees and forests in the urban environment (Konijnendijk et al., 2000). A wide range of topics was being investigated by researchers, while attention to three main components of urban forests - woodlands, parks and individual trees - is about equal. Among the recent innovative research projects are those studying the impacts of urban forests on human health (Grahn & Stigsdotter 2003), economic valuation of urban forest benefits (Tyrväinen et al., 2005), and the development of participatory tools for the planning and management of urban woodlands (Van Herzele et al., 2005). Another expanding research area is that of developing and implementing information systems, such as GIS, in order to support policymaking and management of urban forests (Schipperijn et al., 2005).



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Sungai Chongkak Recreation Forest near Kuala Lumpur, Malaysia

Urban forestry research and development has become most firmly established in the United States. The country's Forest Service has generated extensive new knowledge on the urban forestry concept and its benefits through its special, regional urban forestry research centres (Dwyer et al., 2000). Innovative research in the US has included the quantification of various environmental benefits of urban forests, such as air pollution reduction and climate melioration (see Dwyer et al., 2000 for examples), studies of the social and community impacts of

urban forests (Kuo 2003 for an overview), and studies of the economic impacts of trees (see Wolf, 2004; also Box 14.1). Perhaps more than elsewhere, results of state-of-the-art research have been used to develop decision-support tools, such as the CITY-Green programme of American Forests (Schipperijn et al., 2005), thus strengthening the, often weak, science-policy interface.

Quantification of urban forest resources, benefits and monetary values, as well as biotic, abiotic and human threats to urban forest sustainability have been topics of the growing body of Asian literature (e.g., Jim & Lui 2001; Kwak et al., 2003; Palijon 2004; Yang et al., 2005). Australia and New Zealand have been at the forefront of studies on maintaining indigenous vegetation in urban areas and controlling invasive species (eg., Stewart et al., 2004). Recent urban forestry research in Latin America has included a study on the role of Santiago de Chile's urban forest in air pollution reduction (Escobedo et al., 2005), while experiences with municipal forest management have also been compiled for the first time (CIFOR & IDRC, 2003). Research in the region may have benefited from recent networking initiatives; urban forestry was on the agenda during a worldwide IUFRO conference held in Chile, for example (Barros, 2002).

Research needs to help assess urban forest resources, society's demands and preferences, and assist with identifying good practices in urban forestry to support planning and management. City and country case studies of urban and peri-urban forestry (FAO, 1999)



passing a theoretical examination on tree care and management. Several countries have adopted this scheme or developed their own, with differing success (Johnston, 2001). The first group of Singaporean professionals was certified some years ago, while the first Malaysian experts were to be ISA-certified during summer 2005 with the assistance of Danish colleagues.

## Urban and Peri-urban Forestry Institutions and Partnerships

The lack of recognition to urban forests at national or sub-national level, for example as a separate land use category, has limited the required long-term and cross-sectoral planning. In most countries, implementation of the urban forestry concept is restricted to the municipal level from an institutional perspective. But even at city level, green-space responsibilities are poorly defined, and many different municipal departments occupy themselves – often without real cooperation – with specific aspects of urban forestry. In Europe, for example, the planning and management of city parks, street trees and peri-urban woodland - has traditionally been the domain of different professionals and sometimes even different departments (Randrup et al., 2005).

As discussed in chapter 2, multi stakeholder approaches call for non-traditional tools and methods. Huge demands for urban forest goods and services have to be met by a small resource base, and social conflicts have been a logical consequence. Thus all urban professionals and staff dealing with tree-based green-space resources (eg. foresters, landscape architects, planners, geographers) have had to develop their “people” skills as well as conflict management capacities and learn how to involve other stakeholders in their decisions and activities. In high-pressure urban environments, partnerships are a necessity. Team work with fellow professionals, as well as close collaboration with residents and other lay people, is a must. As discussed earlier in this book for Urban Agriculture, Urban Forestry is a potentially powerful tool for community building and conflict management (FAO, 2002a) as, for example, the integration of fringe groups into the community (Ottitsch & Krott, 2005), or the improvement of transparency and forestry’s image in society.



Sammy Carsan

Transportation is a major constraint to urban tree product traders- transporting Eucalyptus poles to the Market from a peri urban location in Kisumu

The development and institutionalisation of urban forestry in the United States gained force only as a result of major lobbying efforts by NGOs such as American Forests. These NGOs saw the benefits of a strategic approach to urban tree planting and management for generating multiple benefits. Awareness raised by these NGOs led to strong links between research, policy and implementation of the urban forestry concept, resulting in national, state and local urban forestry institutions being developed. Great Britain’s National Urban Forestry Unit (NUFU), an independent organisation, has provided assistance to a large number of local and regional urban forestry initiatives (Konijnendijk, 2003). The role of high-level politicians in raising awareness is important. Large-scale tree planting campaigns can be a tool to gain political commitment as well as public awareness. Eighty thousand residents of Puerto Princesa City in the Philippines, for example, were made aware of the benefits of urban forestry through their involvement in a massive local reforestation project (Palijon, 2004).



example, social scientists and local communities. On the other hand, the planning related to “land” (including real estate aspects) is being carried out by other professionals and services, such as urban planners and landscape architects. Further development of urban forestry and enhancing its contribution to sustainable development at large require a bold and strategic approach. Task-oriented, comprehensive urban forestry is a term coined by Ottitsch and Krott (2005), and presupposes that urban forestry will only be successful if it establishes direct links to urban demands and tasks at hand, like infrastructural works, the integration of marginal groups, and improving city competitiveness and image, for example.

Although the positive aspects are dominant, the potential negative aspects of forests and trees close to residential areas such as wildfires, diseases, and increased allergies should be kept in mind. A bad Selection of tree species, the roots of which eventually cause damage to infrastructure, can lead to the rejection of tree planting altogether. Some argue that urban parks are often places of crime and illegal activity. In certain cases, planting of trees has been used for claiming rights of ownership to land, thus becoming a major cause of conflict.



Yemi.Akinbami

High-density cultivation of Moringa in Banjul

The benefits of urban forests should be directed towards local communities, and legal, economic and institutional arrangements should be in place to ensure this. Currently, land tenure practices in many – especially developing – countries has obstructed real community “ownership” of urban forestry and related activities. Moreover, planning and management of urban forest resources is becoming increasingly complex (eg., Dwyer et al., 2001), their outcomes are becoming more significant to people, and the number of individuals and groups involved in planning and management processes is growing. This calls for a

close collaboration with research, so that decisions can be based on a sound, comprehensive knowledge base.

### Research needs and perspectives

Several recent assessments have captured the gaps in knowledge and the research needs within urban forestry. Liu et al., (2004), for example, mention that more information about the size and structure of urban forest resources is needed in China. Other priority topics for research mentioned are species selection, managing pests, diseases and abiotic stress caused for instance by air pollution, and the development of information systems to support planning and management. Nilsson et al., 2005 also list more studies on the characteristics of urban sites and improving tree adaptability to sites as research priorities for Europe. Urban sites are associated with a range of biotic, abiotic and human pressures, for example related to pests and diseases of vegetation, traffic emissions, de-icing salts, and vandalism. Other research needs relate to the development of environmentally-sound management methods, studies of public preferences and changing demands for urban forest benefits, assessment of these benefits and their incorporation in strategies for sustainable development, and the development of better information and public participation tools. Several of the research needs identified for the USA are similar (Dwyer et al., 2001). They include more research to: improve the comprehensive health of urban vegetation; improve resource inventory and monitoring; promote dialogue between urban forest owners, users and managers; foster collaboration among agencies and groups; improve understanding of how forest configuration influences forest use and benefits; create better understanding of urban forest

health; and enhance dissemination about urban forest benefits and management. Overall research needs, mentioned in various reports as well as discussed in this chapter, are supposed to enhance collaboration between disciplines and fields of attention, as well as between scientists, planners and managers.

The need for technology transfer and information sharing exists not only within countries, but also between countries and the world's regions. Calls for research networking, identification of centres of research excellence, and the establishment of demonstration urban forests have been mentioned earlier in this paper. In order to meet these calls and make sure that developing countries are not excluded, sustainable donor and other funding options need to be explored.

### **Educational needs and perspectives**

Education that incorporates an urban forestry perspective is still in its early stages of development, especially in the developing world, but important steps have been taken recently. Programmes and courses should make an effort to focus on the strengths of the urban forestry concept, incorporating multiple perspectives and disciplines, and taking a comprehensive view of the urban forest resource. Initiatives taken in the direction of international cooperation in education should be encouraged. Tertiary education is one area of focus, while training and continued professional development is another. The work of ISA and other organisations to enhance the professionalism of green-space practitioners, for example by international certification and accreditation, should be supported and further developed.



Enjoying walking under the trees

Guy Kramer

### **Urban forestry for development**

The experiences described above show the significant potential of urban forestry, also for developing countries. However, in promoting urban forestry, its basic strengths should be kept in mind. The concept promotes inclusiveness in terms of involving experts, policy-makers and stakeholders from all walks of life. The need to join forces with other initiatives aimed at sustainable urban development is therefore crucial. Urban forestry needs to be considered within the context of other comprehensive concepts for natural resource management and land use in urban areas, at the urban fringe, and at the urban-rural interface, such as urban greening, green structure planning and landscape planning, several of which have been discussed in this book (in chapters 3 and 4). In terms of providing urban livelihoods and helping cities to “farm for the future”, it is obvious that urban forestry should be closely linked with urban agriculture. Trees can provide significant benefits when used in urban agroforestry systems, such as by improving site conditions for growing crops, providing fodder, and offering wood and non-wood forest products that can help diversify production.

### **Notes**

<sup>1</sup> Urban forestry and urban agriculture are not the only relevant new concepts that have emerged. “Urban greening”, for example, has been defined as the planning and management of all vegetation to create or add value to the local community in an urban area (Kuchelmeister 1998). Although the main difference between urban greening and urban forestry may seem the former's explicit inclusion of all non-tree dominated vegetation in urban areas, differences between the two concepts are more fundamental. From this point of view, urban “greening” would also comprise urban “agriculture”. Urban forestry has developed into a science-based field of activity, and, in

different countries, a recognised field of expertise in which professionals from various disciplines (eg. landscape architects, foresters, geographers) can specialise. This is not (yet) so in the case of urban greening, which is a concept, mainly based on activity or philosophy (Randrup et al 2005). It is being developed primarily in a developing country context, as was the case with community forestry before.

- <sup>2</sup> These include, amongst others, events organised by FAO and the Forest Environmental Cooperation of the Asia-Europe Meeting (ASEM). The latter hosted a well-attended Asian-European workshop on urban forestry in Suzhou and Beijing, China, at the end of 2004. Participants at both events called for enhanced international cooperation and networking, for example at the regional level, as well as establishment of national and regional centres of excellence for urban forestry, and demonstration urban forests (ASEM 2004). FAO events have included the World Forestry Congresses, the Expert consultation on trees outside forests in November 2001 (FAO 2002b), and a workshop on urban forestry in Tehran, Iran, July 2003.
- <sup>3</sup> The United Nations set out the following Millennium Development Goals to be achieved by the year 2015: 1) Eradicate extreme poverty and hunger; 2) achieve universal primary education; 3) promote gender equality and empower women; 4) reduce child mortality; 5) improve maternal health; 6) combat HIV/AIDS, malaria and other diseases; 7) ensure environmental sustainability; and 8) develop a global partnership for development (source: <http://www.un.org/millenniumgoals/>)

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afforestation close to cities as well as in remote areas. In Beijing, the new capital of China, for instance, many plantations were established around the city aimed at water and soil conservation and at offering recreational opportunities for city dwellers (see article by Jianming et al., on page 26).

In the 1980s, with a rapidly growing economy, urbanisation intensified in China, causing new environmental challenges. In this context, modern urban forestry was introduced to China as the country opened up to the outside world, and terms such as “urban forest” and “urban forestry” became popular in scientific literature and the news media (Li et al., 2004). In order to improve urban environmental conditions, long-term planning of urban forestry was made part of a national development strategy during the 1990s (Gao, 2003). According to the planning of China’s urban forest development, the overall goal is to expand the cover of urban forests and trees to 45 percent in 70 percent of cities by the year 2050. Today there are several cities, eg. Changchun, Nanjing and Guangzhou, with a forest cover of more than 40 percent.



Chunjiang Liu

Temples near a city are commonly important parts of its urban forest: Daming Temple, Yangzhou, Jiangsu Province.

Since the 1980s, developing urban forests has become an important part of municipal planning as a whole, and urban forests have been established according to a design that caters to the need for recreational opportunities and environmental protection. In 1989, Changchun, the capital of Jilin province, began to carry out a programme of developing a “forest city”, thus being the first city to have this as a goal of city development (Jiang, 2003). In 2001, the planning of urban forest development was worked out for Shanghai, the biggest city in the country, with the goal of reaching 35 percent forest coverage by 2020. This figure was calculated based

on O<sub>2</sub> emission, CO<sub>2</sub> sequestration, water sources protection, recreation, etc. (Chinese Academy of Forestry Sciences & Huadong Normal University, 2002). In 2002, a plan for urban forest development was made for the capital city of Huaining county (Jiang, 2003). This shows that not only big cities but also medium and small cities have become involved in the planning and development of their urban forests.

A second change that has occurred since the 1980s is that urban forests are now being managed for multiple purposes, so that they can fulfill their potential roles in recreation, water sources protection, biodiversity conservation, atmospheric CO<sub>2</sub> sequestration, air pollution reduction, among others. Of course, different cities located in different parts of the country may emphasise different functions of urban forests. Due to the heavy air pollution in most Chinese cities, however, all of the trees and forests in a city are expected to have a high capability of retaining dust and absorbing SO<sub>2</sub>, NO<sub>2</sub>, and other pollutants (Guan & Liu, 1999; Wu et al., 2004).

A third change is that private companies have become involved in developing urban forests, just as they are engaged in other commercial activities in China. In the past, governments had to call for and organise people to establish forests, but now this work can be done as a commercial activity, and this has added a new driving force for urban forest development in China.

The fourth feature of China's new urban forestry policies is that managing urban forests is done as a way of reducing poverty in local areas. In Beijing, for instance, forests in suburban areas have been attracting more and more tourists, especially during weekends and holidays (Qu, 2003). These visitors not only create many jobs at local hotels, restaurants, and other such outlets but also provide an opportunity for farmers to sell their agricultural produce, such as fruits, vegetables, and wood and stone handicrafts. At the same time, this opens a window for the exchange of information between people living in urban areas and those living in rural areas. This stimulates the enthusiasm of local people to get involved in urban forestry.

## Developing Urban Forestry

In China, generally, one important limiting factor for developing urban forests in a city is insufficient investments due to shortage of funds, mainly because these forests do not produce direct economic benefits, and therefore do not attract private companies so much as other industries do in a city. It is necessary for the government to invest in urban forestry, as one aspect of a city's infrastructure, but diversification of fund raising should also be advocated. Due to the exceptional position of Beijing as the capital city, several international cooperation programmes support its urban forest development. From a research perspective, some long-term observation stands should be established so that a set of complete data on urban forests can be compiled. In addition, based on different conditions in terms of climate, species composition, and urban environment, it is good to establish demonstration forests. Results from studies and experiments in these areas can then guide future urban forestry practice. There is also a need to increase the involvement of the public, local inhabitants and tourists in particular, in the development of urban forests in China, a country with a rather short history of modern urban forest management. In this aspect, the most important task is to raise awareness about the role of forests in improving the environment by means of newspapers, magazines, TV, and other media.

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# Agroforestry in Peri-urban Cities of Abia State, Nigeria

Stella N. Odurukwe

**A**bia is one of the 36 states of Nigeria and is located in the southeastern geopolitical zone of the country. The state encompasses two main urban cities, namely Aba and Umuahia, and many other periurban cities such as Bende, Ohafia, Isikwuato, Uzuakoli, Mbawsi and Obehie. These areas have attained the status of periurban either as a result of their nearness to the larger cities Aba and Umuahia or as a result of being local government headquarters.

The agroforestry practices of 180 households (60 households per city) of three of these periurban cities: Uzuakoli, Obehie and Isikwuato, were examined in 2003. The different agroforestry practices reported by the households corresponded to the various needs of the households and their land tenancy arrangements (see Table 14.2). Multi-storey home gardening was reported by 31 percent of the respondents, all of who are landowners. Their involvement in this practice was attributed to the need to ensure family food security, provide different fruits all season long, maintain soil fertility and generate additional income. Multi-storey home gardening is a practice that involves the growing of annuals and perennials in association with crop rotations ranging from a few months to many years (Evans 1992). Such systems are usually characterised by the use of trees, shrubs, creepers and climbers. As much as 17 percent of the respondents reported that they earned a high income of between N 92,000 and N 61, 000 from the sale of various products of multi-storey home gardens such as fruits, food crops, vegetables, leaves, seeds, bark, fuelwood, etc. Medium incomes of between N60, 000 and N 30, 000 were generated by 52 percent of the respondents, while about 31 percent reported incomes below N 30, 000 from the sale of such products.



Stella Odurukwe

Benefits of urban agroforestry can be realised if policies ensure adequate planning

**Table 14.2** Agroforestry practices in the periurban cities

Agroforestry practice	Percentage of the population
Multistorey home garden	31
Woodlots	11
Amenity planting	39
Live fences	53
Alley cropping	0
Improved fallow	5
Taungya system	18
Dispersed multipurpose trees on cropland	68
Border planting of trees	76
Trees and shrubs on eroding sites	58
Wildlife agroforestry	9

Border planting is common on both government and private lands. The respondents reported using border planting to enhance the aesthetic value of their surroundings, demarcate boundaries, control water and wind erosion, cultivate live fencing, and supplement their supply of food, fodder and fuelwood. The choice of plants used for this purpose included timber species such as *Gmelina arborea*, neem, and *Eucalyptus* sp., perennial fruit trees such as *Elaeis guinensis* (oil palm), *Cocos nucifera* (coconut), mango, *Citrus* sp., and shrubs such as *Vernonia amydalina* (bitter leaf), Pitangia cherry, etc. Wildlife agroforestry for cane-rat production was reported by 6 percent of the households and bee pasturage was reported by 3 percent.

### Division of labour

Women and children dominate in the maintenance of home gardens for vegetable production. They clear the land adjoining residential quarters and private houses, prepare the ridges, plant and tend the vegetables. On average, 72 percent of the households involved in this activity use the services of almost all the members of the family. Both men and women are involved in the cultivation of multipurpose trees and shrubs (MPTS) around home gardens, such as citrus, oil palm, coconut, mango, avocado pear, pawpaw, Africa pear and guava. In 89 percent of the interviewed households, annual crops such as maize, cassava, yam, okra and garden egg are planted in combination with vegetables and multipurpose trees. This activity involved more women than men. Men feature prominently in yam cultivation since yam is commonly regarded as a men's crop in the study area. Women and children are solely responsible for weeding agroforestry farms, maintaining soil fertility and watering the plants (especially vegetables) during the dry season.

### Access to and control over land

About 58 percent of the interviewed households are owners of the land on which they practise agroforestry. These landowners exercise full control over the land, what is planted, and how the proceeds are used. 36 percent of the respondents carry out agroforestry on land attached to government residential quarters and offices, which they occupy. They have control over the planted crops but not over the land, and thus run the risk of losing their crops if they move out and a new occupant occupies their office or residential quarter due to staff transfer, retirement, retrenchment or termination.

Only 16 percent of households practise agroforestry on government-owned wastelands and open spaces, and on lands belonging to others. Land belonging to another individual is usually held on trust and a special agreement is reached between the landowner and the tenant. Such tenants cultivate a variety of crop combinations from perennial multipurpose trees to annual crops and vegetables. These tenants have the least control over the land they use for agroforestry; they run the risk of losing all their crops at the slightest provocation of the individual landowner or the government parastatal that owns the land. Continuous

cultivation of such lands despite the high level of insecurity is attributed to constraints in access to land (the majority of those who are involved are aliens), in addition to a strong desire to ensure family food security and earn additional income. Thirteen of the respondents belonging to this category reported situations in the past when the original landowners bulldozed the crops planted on the land (even before they reached maturity) because they wanted to start up a development project on the land.



Stella Odurukue

Border planting is common on both government and individually owned lands

## Benefits

An assessment of the benefits and potentials of agroforestry revealed positive impacts on the lives of the respondents. They attributed both economic and environmental protection benefits to agroforestry. The respondents unanimously mentioned family food security as the most important benefit of agroforestry as it ensures the availability of different food varieties all year round. 75 percent of the households reported having increased their income from the sale of agroforestry products and by-products including fruits, wood, leaves, seeds, fibre, etc. In addition, 91 percent claimed that agroforestry has improved their environment by improving soil fertility, reducing wind and water erosion, purifying the surrounding air, and beautifying the environment. A mere 3 percent reported that it provides food for their livestock. This low response corresponds to the small number of periurban dwellers who keep livestock.

## Problems

The need to reap the benefits of urban agroforestry has resulted in many incidences of reckless planting of multipurpose trees on areas reserved for other purposes, thereby causing obstructions as reported by 68 percent of the respondents, and encroachments on public lands as opined by 54 percent. About 36 percent of the respondents reported cases in which trees planted on dual carriageways caused road accidents when such trees were felled by thunder or heavy trucks. Cases of electrocution arising from trees planted close to high-tension electric wires were also reported by 25 percent of the respondents. 7 percent of the households reported incidences of armed robbers climbing into the compound way of the fruit trees planted close to the fence. About 27 percent of the respondents believe that practising agroforestry close to residential buildings constitutes a health hazard since it encourages the breeding of insects (mosquitoes, cockroaches, etc.), rodents and snakes.

## Recommendations

City farmers should form cooperatives and make formal requests for state land to be used for agricultural production.

The potentials of periurban agroforestry can be fully realised only if policies that ensure adequate planning, management and monitoring of these practices by the relevant government agencies are put in place. The state and local governments should develop policies aimed at proper allocation of public vacant lands to registered city farmers. The state environmental protection agency should intensify efforts towards proper planning, monitoring and management of amenity planting and farming activities around the cities. Agroforestry practitioners are advised to carry on these activities some distance away from the buildings in which people live.

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# Bringing Town and Country Closer Together: Community Forests in North East England

Clive Davies  
Jonathan Scurlock

**T**he Community Forest programme in England, announced in 1988, started as an experimental initiative by the Countryside Agency and the Forestry Commission, with an ambitious vision for the creation of well-wooded landscapes in and around major urban areas to be used for work, wildlife, recreation and education.

One of the largest physical regeneration programmes ever launched in the UK, the initiative comprises 12 designated “Community Forests” that cover some 450,000 hectares, or nearly 2 percent of UK land area. The Community Forests programme has evolved and grown into an important exponent of landscape-scale change, and is helping to bring strategic environmental thinking to a wide range of environmental, social and economic agendas.



Jonathan Scurlock

Watergate Forest Park, Gateshead. A new community woodland on reclaimed colliery land in the Great North Forest, North East England.

The term “community forestry” is applied in a number of different contexts around the world, although its definition and characteristics remain quite similar. According to the UN Food and Agriculture Organisation, community forestry entails the “control, management and use of forest and tree resources by local communities; respect for social, economic and cultural relationships between people and forests; and a decentralised and participatory approach to forest management” ([www.fao.org/forestry/site/14111/en](http://www.fao.org/forestry/site/14111/en))

In England, the Community Forests cover large areas around the edges of towns and cities - but unlike the great forests, which used to cover extensive parts of northern Europe, they are not continuous plantings of trees. Instead, these Community Forests comprise a rich mosaic of wooded landscapes and land uses including farmland, villages, leisure enterprises, nature areas and public open spaces. They are intended to create areas rich in wildlife, whilst making provisions for access, leisure and education - providing attractive areas in which to live, conduct business and enjoy leisure time.

Woodlands provide a good environment for recreation and can absorb relatively large numbers of visitors without loss of visual amenity or damage to habitats. Promoting recreation in the Community Forests includes maximising access to new and existing areas of woodland, creating new and interesting routes for walking, cycling and riding, and providing opportunities for leisure activities ranging from small picnic areas to woodland parks. Further opportunities for developing amenity exist through the creation and maintenance of small woodlands in more densely populated urban areas. Greenways (car-free roadways, often tree-lined) may be established to link points of interest, by connecting them to existing networks of cycle paths and footpaths.

## North East Community Forests

Extending roughly 80 km to the north, south and west of the city of Newcastle, the North East of England is the smallest English region, with about 4 percent of the UK’s population, land area and economic output. Formerly dominated by energy production, heavy industry

and manufacturing, the region has seen enormous change over the past 30 years, and is still dealing with the economic, social and structural consequences of its past - including a legacy of derelict and unused urban and periurban land. Average incomes are lower than in most of the rest of the UK, and some of the most socially deprived living conditions are found in the North East - although there are wide variations in standards of living across the region. The extensive rural areas of the region were traditionally dependent on farming, forestry and mineral extraction, but tourism has grown in importance, building on the region's strong cultural identity and outstanding natural landscapes.

The North East has two designated Community Forests – The Tees Forest (set in the valley of the River Tees) and the Great North Forest (covering the lower Tyne and Wear river valleys and north County Durham). Established in 1991 and 1990, respectively, they are highly regarded as successful partnership organisations, involving a total of 11 out of the region's 25 local government authorities, as well as the national Countryside Agency and Forestry Commission. The Great North Forest (<http://www.greatnorthforest.co.uk/>) covers

an area of 249 square kilometres, while The Tees Forest (<http://www.teesforest.org.uk/>) encompasses some 350 square kilometres. These recognised “brand” names have now been brought together under one heading as North East Community Forests.



Jonathan Scurlock

Community forests in the periurban landscape: view from Falkland Ridge, near New Marske in the Tees Forest, North East England.

Over the last 13 years, the two Community Forest organisations in North East England have undertaken a wide range of activities in urban and periurban areas, helping to create a more attractive and well-wooded environment with accessible and sustainable managed landscapes that enhance the health, well being and quality of life of the local people. High-quality, well-wooded functional environments have been created in the rural-urban fringe, delivering a better quality of life for the people of the region. The environmental projects translate regional and national policy strategies into practical action.

## Community Engagement and Learning

Community Forests have contributed to the evolution of forestry policy in England, from its traditional focus on timber and rural employment to a multifunctional agenda based on the contribution of woodlands to economic regeneration, rural development, recreation and access, environment and conservation. The Community Forests also offer proven and effective partnership mechanisms through which to integrate urban and rural policy and deliver sustainable development. The UK government's Urban White Paper and Sustainable Communities Plan set out an ambitious agenda for delivering an urban renaissance, as well as addressing the problems of neighbourhood decline and the need for new housing in different parts of England. Demonstrating and strengthening the relationship between town and country, through mechanisms such as community forestry, can enable this rural and urban renewal.

Implementation of community forestry requires public involvement. North East Community Forests are increasing the involvement and inclusion of communities and individuals, and empowering communities to become strong advocates for community forestry and local environmental action. The long-term objective is to create a substantial caucus of support within the community, which will in turn influence politicians and decision makers to take positive steps that aid Community Forest implementation.





## Resources



### **Municipal Forest Management in Latin America**

*CIFOR, IDRC (2003) Municipal forest management in Latin America. Ed. by Ferroukhi L. CIFOR, Bogor. 236 p.*

This book is probably the first serious attempt to analyse recent experiences of municipal participation in forest management in Latin America. It is the product of a series of investigations in Bolivia, Brazil, Costa Rica, Guatemala, Honduras and Nicaragua carried out by more than 30 national and international researchers. It offers required reading for anyone concerned with municipal administration and natural resource management.

### **Trees Outside Forests – Towards Better Awareness**

*FAO, CIRAD (2002) Trees outside forests – Towards better awareness. FAO Conservation Guide # 35. FAO, Rome, 2002. 218 p.* Trees outside forests, together with forests and other woodland, play an essential role in solving important problems of rural and urban populations. People, however, do not fully benefit from these important roles, because trees outside forests are neither well perceived nor well documented, and receive little attention in the formulation of national forestry policy and planning. This document is a product of important synthesis work and collaboration, and an attempt to fill in the gaps.

### **Urban forests and Trees – A reference book**

*Konijnendijk CC, Nilsson K, Randrup TB, Schipperijn J (eds) Urban forests and trees. Springer, Berlin, 520 p.*

This first European reference book on UPF (Urban and Peri-urban Forestry) covers all aspects of planning, designing, establishing and managing forests and trees in and near urban areas. The disciplinary background of the authors is varied, ranging from forestry and horticulture to landscape ecology, landscape architecture and even plant pathology.

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[www.cifor.cgiar.org/acm/](http://www.cifor.cgiar.org/acm/)

“Local People, Devolution and Adaptive Collaborative Management” is a programme run by the Centre for International Forestry Research, which applies adaptive management in the forests of Indonesia, the Philippines, Nepal, Cameroon, Ghana, Malawi, Zimbabwe, Bolivia and Brazil. There are many excellent resources available on the site, including reports, journal articles, books and CD-ROMs. The collaborative

