

Forests and trees help to build the city image in a time of increased competition for investment: the city of Dalian, China



Cecil Konijnendijk

## Trees and Cities - Growing together

While human societies throughout history have largely been rural, currently the majority of the world's population lives in cities and towns. Increasingly land is needed for urban areas to cater for the needs of the inhabitants, which often a detrimental effect on forests and other green areas.

component of urban and periurban green structures, including forests, parks, orchards and any other tree system, which are referred to collectively as *urban and periurban forestry* (UPF).

This is a particularly interesting topic, since urban agriculture and forestry are often mentioned together but in practice appear to be treated as quite separate areas. This issue of *UA Magazine* tries to bridge these worlds and show that they have many similarities as well as much to learn from each other. In the quest for healthy, liveable and sustainable cities, urban green (productive) spaces have an important role to play. By providing a range of goods and services, they can help provide livelihoods, moderate harsh urban climates, conserve biodiversity and contribute to better public health.

### TREES AND FORESTS FOR SUSTAINABLE CITIES

The challenges related to urbanisation are clear and present, such as the provision of food and housing, sanitation, and employment (especially in the developing world). What is the role of trees and forests in and around urban areas in addressing these challenges? Experience shows that these and other green spaces form more than just a "supplementary" urban infrastructure.

There is tremendous pressure on policy makers to develop sustainable cities where inhabitants can enjoy a high quality of life and a healthy environment. The policy makers thus have to tackle a wide range of associated challenges. The Second World Urban Forum (held in Barcelona, September 2004) looked at many of these challenges faced by cities. The participants emphasised, among other things, that trees and their related ecosystems are very important, multifunctional components of urban green structures. In recent years integrative and strategic approaches have therefore been developed and implemented across the globe to promote and develop tree-based resources that cater for multiple urban demands.

### Editorial

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In earlier issues of *UA Magazine* a number of the challenges facing cities were related to the topic of urban agriculture, and innovative approaches to improving urban environments were highlighted. This issue will focus on the **tree**

### Role of trees outside the forest

Establishing wooded lots in villages and near urban centres relieves the pressure on natural forests for fuel wood, poles and fodder. In Tunisia 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 periurban 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 to support urban and periurban tree planting in several countries.

Source: FAO 2003, p. 16.

### Urban Forestry in the city of Curitiba

Curitiba is known beyond Brazil's national border for its policies in favour of well-ordered urban development, a sophisticated public transportation system and environmental conservation, which have given Curitiba the character of a modern model city in Latin America. For the last 30 years, Curitiba has focused on its urban planning. A master plan for an orderly urban development was implemented in 1971. The development of the master plan was supported by the IPPUC ("Research and Urban Planning Institute of Curitiba") and permanent discussions throughout society ("Tomorrow's Curitiba" seminars). Today, the city is moving forward to extend its solutions to the whole metropolitan area such as "zoning and land use" with time tables for execution. A significant part of the population is involved in Curitiba's environmental programmes. The most successful environmental project in Curitiba with respect to local participation is the communal planting project "Plantios Comunitários". With the supported of the Environmental Education Department, native (fruit) trees are planted together with the local people. When suitable areas are found, the Department contacts local representatives and involves them in the planning process. The areas designated for planting are always public areas, mostly threatened by erosion or inundation like steep slopes or riparian zones. The local people are also provided with knowledge about the tree or shrub species to be planted. These activities are not restricted to the city centre but have an emphasis especially on the periphery of the urban agglomeration.

Source: FAO, 2002b. (Proceedings TOF expert consultation, November 2001)



Stella Odurukwu

Urban Agriculture in Dzorwulu next to the power station

#### Economic and livelihood values

Poverty alleviation and food security are high on the agenda of many international institutions and development aid programmes, and in previous issues of *UA Magazine*, it was argued that urban agriculture can play an important role in this respect. Indeed, many countries have a long tradition of urban dwellers supplementing their diets and/or incomes with local agricultural produce. In this issue, Thaman illustrates this (on page 12) by providing an overview of, often tradition-rich, urban agricultural systems on the small islands of the Pacific.

Farmers involved in integrated agriculture and forestry systems, agroforestry, can enhance urban agricultural production by growing trees together with crops or by combining cultivation with animal husbandry, thereby adding value through the enhancement of the microclimate and growing conditions, or through the diversification of produce (see also the article by Oosterbaan on page 23). Forest systems can also provide fodder for animals, as shown by Akinbamijo in his article on Gambia (page 40). In the case of small-holder dairy farming in and near urban areas of central Kenya described in this issue, woody species such as shrubs are essential for providing protein-rich fodder (Wambugu and Franzel on page 18). Timber and other wood products are very important in urban areas; large parts of the urban population of

Africa, for example, are still heavily dependent upon fuel wood. Urban and periurban forests also provide non-wood forest products such as mushrooms, berries, (medicinal) herbs, rattan, seeds, leaves, and so forth (see for instance the article on Abia State in Nigeria by Odurukwu on page 8).

#### Environmental and biodiversity values

Urban forests and trees have major effects on the urban environment. The large majority of households in the Abia State of Nigeria have demonstrated their awareness of the positive impacts that trees and agroforestry systems have on their environment, for example through their efforts to improve soil fertility and reduce erosion. Important in both the developed and developing worlds is the role urban vegetation plays in water management. Trees reduce storm water runoff and can assist with processing wastewater. Many cities have established and conserved forests in order to protect their drinking water resources (Konijnendijk 1999). In arid regions, forest shelterbelts around cities help combat desertification. Trees and other vegetation also intercept particles and gaseous pollutants and thus help reduce air pollution (see the article by Mock on page 29). This function of urban forests has been recognised in countries like China, as mentioned by Liu et al. on page 15.

The level of biodiversity of urban green areas is often surprisingly high, representing nature close to where people live. Cities such as Rio de Janeiro and Singapore still have tracts of tropical rainforest within their boundaries. In Europe, national parks are found at the gates of large cities such as Warsaw, Moscow and Vienna (see also *UA Magazine* no. 6).

### *Social and cultural values*

The recreational values of forests, parks, gardens and other urban green areas are especially well documented in the Western world. Urban woodlands in Europe attract as many as several thousand recreational visits per hectare per year (Konijnendijk 1999). People often appreciate diverse landscapes that include trees as a main element. Ledin describes (on page 21) how grazing is used in Sweden to create more diverse and attractive recreational landscapes. The presence of large herbivores, moreover, provides an attraction of its own. Oosterbaan mentions (on page 23) how agricultural and forestry elements can be combined to create multifunctional, open urban and periurban landscapes with high recreational values.

Recently the health impacts of urban green have also been studied (e.g., Grahn and Stigsdotter 2003; see also the contribution of Wolf on valuation on page 31). Urban green can have a positive impact on people's physical and mental health, for example by providing settings for physical exercise, reducing ultraviolet radiation and air pollution, and reducing stress. By being actively involved in tree planting and management, local communities can be strengthened (as in the UK experience described on page 38). In many developing countries, trees often have cultural and spiritual values that could assist new urban dwellers in finding their place in cities and towns. Today's green spaces and the ways they are used and managed often have strong historical roots (see the articles by Liu et al., Thaman, and Cai et al.).

Despite these benefits, the value of trees and forests within city limits is not always acknowledged by municipal leaders and policy makers or by urban inhabitants. Whether this is due to a lack of awareness, misinterpretation of the concepts (as with agriculture, the term

city forests is not always seen as an important or attractive issue by urban planners) or simply unwillingness to make urban green a priority, the fact is that urban greening is not yet universally integrated in city planning. There is a need for integrative and comprehensive approaches to planning and management of urban and periurban green spaces to optimise the many benefits discussed above (also see Wolf on page 31).

### **UPF AS AN INTEGRATIVE AND STRATEGIC APPROACH**

Given the complexity of natural resource planning and management in highly dynamic urban societies, approaches are needed that extend beyond traditional boundaries and involve a wide range of disciplines as well as stakeholders. In the case of urban and periurban forestry, as well as urban agriculture, new approaches should recognise the multiple benefits provided, as well as the role these areas can play in sustainable development.

The concept urban and periurban forestry (UPF) has its roots in North America and can build on a history spanning close to 40 years. It has gradually gained broad acceptance among scientists and practitioners, although the concept is still being adapted to local conditions.

Miller (1997) defined UPF as "an integrated, city-wide approach to the planting, care and management of trees in the city to secure multiple environmental and social benefits for urban dwellers". A more comprehensive definition was provided by Grey and Deneke (1986): "Urban and periurban forestry is defined as the planned, integrated and systematic approach to the management of trees in urban and periurban areas for their contribution to the physiological, sociological, and economic well-being of urban society. Urban forestry deals with woodlands, groups of trees, and individual trees where people live - it is multifaceted, for urban areas include a great variety of habitats (streets, parks, derelict corners, etc.), and it is concerned with a great range of benefits and problems". As introduced by Mock in this issue, the concept of urban and periurban forestry (UPF) has been evolving and implemented during past decades as a particularly promising approach to integrated planning and management of urban tree resources. What is called an

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"urban forest" in the United States refers to the sum total of all vegetation growing in urban and community areas, including the city centre, inner-city residential areas, suburbs and the suburban fringe. The three main components of a sustainable urban forest are a healthy tree resource, comprehensive management and community-wide support. The UPF concept is attractive to urban planners because it is:

- *dynamic in time and space*
- *integrative and comprehensive*
- *strategic*
- *multidisciplinary and multisectoral*
- *participatory*
- *multifunctional*

The UPF concept seeks to incorporate different elements of urban greening and it promotes a holistic view of green structures. Moreover, it aims for more integrated land-use systems, and as such addresses forestry, agriculture, and recreational needs (see also the articles by Liu, Mock, and Oosterbaan). For instance,

in mountainous areas protected forests will be integrated into watershed management and justified by the need to avoid land slides, infrastructure damages and human loss, while in lower areas, particularly in arid and semi-arid areas they help provide forage for animals or save energy by cooling the environment (see box).

The concept advocates the development of longer-term policies and plans for urban tree resources, connecting forestry to different sectors, agendas and programmes. Various examples of this strategic and planning dimension have been described in earlier issues of *UA Magazine* and are highlighted again in this issue (e.g., Cai et al., Lattuca et al. and Davies and Scurlock).

Furthermore, UPF is built on the involvement of experts from a wide range of disciplines, including not only natural resource managers, but also urban planners, social scientists, economists, and so forth, and it is aimed at developing partnerships between multiple stakeholders. As in community forestry approaches, it emphasises the involvement of all segments of local communities in managing and using tree resources (see Davies and Scurlock on page 38). Urban forests and agriculture comprise both public and private land, and therefore legal arrangements often have to be put in place to incorporate private land in UPF strategies, as the

example from Zimbabwe illustrates (on page 34). Access to resources and land is a major issue, as described for example by Odurukwe in the case of urban agroforestry in Nigeria. This development of true partnership approaches often requires the development of new institutions (see Kisumu on page 36 who describes links made between the work of trade unions and urban greening).

As described in several articles, UPF highlights the provision of multiple benefits by urban greening, stressing the economic, environmental and socio-cultural goods and services it can provide for urban society.

Considering the dynamic of the urbanisation process, there is a need to promote tree-based systems in the most appropriate and sustainable way. UPF includes all aspects related to establishing, conserving and managing trees in the forest and “trees outside forests”, including the agroforestry systems. A comprehensive and inclusive vision is necessary.

The Food and Agriculture Organization of the United Nations is one the institutions that have actively promoted UPF as a tool for developing more sustainable cities, especially in the context of food security and poverty alleviation in developing countries and countries with economies in transition (see Box). Assisting the countries in developing their national

strategies for the promotion of urban and periurban forestry as well as action plans and programmes for specific cities is of strategic importance in the process of identifying viable solutions. In the decentralisation to local authorities, FAO facilitates dialogue between municipalities, governmental organisations, NGOs, CSOs and the private sector. Its experience in community-based forest resource conflict management (FAO, 2002c) and facilitation of equitable partnerships between corporate and smallholder partners is put to good use in the urban forum. Cities are encouraged to support each other in the areas of capacity building and implementation of good practices through partnerships (city twinning-).

### INNOVATIVE APPROACHES

Urban agriculture and UPF should be based on, and include, positive experiences and good practices from across the world, some of which are discussed in this magazine. Mutual learning and integration of these experiences is the challenge for the future. Some of the lessons learned so far involve the following areas.

#### *Awareness raising*

The development of UPF in the United States gained force only after major lobbying efforts by NGOs, such as American Forests, that recognised the benefits of a strategic approach to urban tree planting and management. Awareness-raising by NGOs led to strong links between research, policy and implementation of UPF (Johnston 1996). Likewise, the National Urban Forestry Unit (NUFU), an independent organisation, has provided assistance to a large number of local and regional urban forestry initiatives in the United Kingdom (Konijnendijk 1999). See for example the case in Northern England described on page 38. The role of high-level politicians in awareness raising is important. Large-scale tree planting campaigns can be a tool to raise political commitment as well as public awareness. Eighty thousand residents of Puerto Princessa City in the Philippines, for example, were made aware of the benefits of UPF through their involvement in a massive reforestation project in their city (Palijon 2002).

FAO, in its Strategic Framework (2000-2015) and Medium Term Plan (2004-2009), promotes urban and periurban forestry as a development tool, paying particular attention to developing countries and countries with economies in transition. The Forest Resource Assessment (FRA) programme and the FAO prospective studies of the forest sectors supply urban-related information on the current status of forests and foreseeable trends to 2020. Advice to member countries and policy makers is given through these national, regional and international processes of data collection, methodology development and multi-stakeholder dialogue. For instance, the current Forestry Outlook Study for West and Central Asia (FOWECA) to 2020 aims to analyse the trends and driving forces that will shape the forestry sector during the next two decades and to identify policies, programmes and investment options that can enhance the sector's contribution to sustainable development. Multidisciplinary actions in urban development are facilitated through the Priority Area for Interdisciplinary Action (PAIA) on “Food for the Cities”. Urban and periurban agriculture and forestry together address complex issues such as food security, income generation, environmental management and planning.

### *From resources assessment to local experiences*

Very often little is known about the characteristics and potential of forest and trees resources, or about the best ways to plan and manage them. Country-wide assessments of urban and periurban forest resources have been virtually non-existent.

Information on the collection of data and development of assessment methodologies related to trees located outside forests have been mandated to the FAO Forest Resource Assessment (FRA) Programme by the FAO expert consultation on Global Forest Resources Assessment at Kotka III and IV in Finland (FAO, 2001a; FAO, 2002a). The FRA published "Trees outside forests – towards rural and urban integrated resources management" as a contribution to the FRA 2000 report. Assessments of research activities and higher education on urban forests and trees were made by COST (Urban Forests and Trees), a European expert network supported by the European Union.

FAO also compiled a series of country case studies on urban forestry in Egypt (Cairo), Ecuador (Quito), Brazil (Rio de Janeiro), Iran (Tehran), Senegal (Dakar), Mauritania (Nouakchott), Burkina Faso (Ouagadougou), Niger (Niamey), Ethiopia (Addis Ababa), Hong Kong (China), Kuala Lumpur (Malaysia) and Singapore. These case studies showed that urban development has included important social forestry initiatives and provided important lessons for cities that are at early stages in the development of their urban forestry programmes. (El Lakany et al. 1999)

Many of the services provided by urban forests and green space are difficult to quantify in monetary terms, which makes it difficult to capture the full attention of politicians. Recent attention in the North has shifted to assessing the economic impacts green space can have in terms of contributing to attractive and safe cities for people in which to work, live and recreate. In her contribution to this issue, Wolf demonstrates how economic valuation has been used in North America to derive green space values, for example related to environmental services, real estate prices, and human health estimations.

### *New technology and knowledge generation*

New technologies and knowledge for optimising management and the provision of UPF goods and services need to be developed. In the United States, the USDA Forest Service, through special urban forestry research centres, has generated extensive new knowledge on urban forests and trees and their benefits. But the development of knowledge and technologies also needs to take place at the grassroots level, as the example of urban farmer experiments in Kenya in this issue shows (Wambugu and Franzel on page 18).

### *Institutional capacity*

Institutional capacity and municipal policies related to urban forests and trees are often insufficiently developed. However some significant efforts have been made. Singapore, for example, has strongly institutionalised urban green space planning and management and it has developed a proposal for an island-wide park connector network (Yuen 1997, cited by Palijon 2002). The Chinese government has recently incorporated UPF in its national policies, for example for afforestation and the establishment of shelterbelts around urban areas (see also the articles by Cai et al. and Liu et al.).

### *Policy and legal strengthening*

Although urban forestry is hardly recognised in the national policies and legislation of Zimbabwe, municipal by-laws have often been used to safeguard cities' ornamental tree resources (see the contribution by Makonese and Mushamba on page 34). The development of legal frameworks and the means to implement them at national and sub-national level need to be developed. This is a very complex issue as it involves many departments (e.g. forestry, agriculture, environment, planning), central and decentralised bodies of governmental and local authorities. Guidelines for policy and decision makers at governmental and municipal level would assist them in designing their own frameworks and regulations in response to their national needs. See also boxes.

In the UK, the government has developed a forestry strategy that focuses on urban and periurban areas. This strategy is implemented in part through the Community Forests programme which

### **Canadian National Forest Strategy (2003-2008)**

Urban Canadians' perceptions of the forests surrounding towns and cities often shape their views of forests in general, whether they be in their backyard or across the country. The forests in rural areas affect people living in towns and cities because of the contributions to the economy, environmental functions (for example cleansing groundwater and regulation water flows) and recreational opportunities the forests offer. 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 a public consultation process and actively engaged Canadians in sustaining the diversity of the forests' benefits. Forest Champions will lead and promote collective implementation of the Strategy's themes, including "urban forest and public engagement in sustainability". *Source: (National Canadian Forest Strategy, 2003)*

uses the planting and management of forests and trees as vehicles for social, economic and environmental regeneration of 12 large urban agglomerations in the country (see the article on page 38).

In order to maintain the attractive and liveable image of the rapidly growing city of Hyderabad (Pakistan), the local authorities have set up an extensive greening programme. Keeping the city competitive – for example as a high-tech centre – by keeping it attractive has been a major objective (Zwingle 2002).

### *Information sharing and dissemination*

Networking between researchers, policy makers, practitioners as well as other stakeholders is crucial in relatively newly emerging fields such as urban forestry and urban agriculture. In recent years, some good examples have emerged. Apart from the aforementioned COST Action E12, networking among the research community on urban forestry has been facilitated by the International Union of Forest Research Organizations (IUFRO). In the developing countries,

*To be continued on page 7*

## Coordination of greening efforts in Hong Kong

In Hong Kong six government bureaux (out of 16 policy-formulation bureaux) and 15 departments (out of 38 departments) are involved in greening issues. The division of tree administrative duties is based on a range of criteria, including land ownership, land administration, land use planning, land use, development agent, land user, planting agent, vegetation management agent and so forth (Works Branch, 1994a; 1994b). Each relevant department has to follow nebulous policies and guidelines that include many uncertainties and overlaps. Both government and private land users have to deal with a bewildering array of often ambiguous and sometimes conflicting duties, rules and requirements. The departments often operate in isolation, oblivious of one another's information base and decision rationales.  
*Source: (Jim, 2002)*

# Linear Urban Agriculture

Accessing 'the commons' for food security, a healthier environment and community development

Imagine thousands of kilometres of linear space throughout urban areas: roads and their verges, electric and other utility right-of-ways, railroad tracks, fences and walls, airport runways, rivers and streams and their banks, and more. Recognise that most of the urban infrastructure is linear. Consider that most of this space, horizontal and vertical, is 'the commons'. It is public space that belongs to all of us.

Linear urban/periurban space is a very large underutilised development resource. This potential at its simplest may be the fence around a playground. Imagine this fence, typically two metres high, exploited to produce beans, cucumbers, peas, tomatoes, squash, grapes and other foods. Consider that this garden can be the core of an education programme for the children using the playground and a source of fresh healthy food for the families using and maintaining the playground.

This potential exists on fences surrounding, protecting, and defining many public institutions including: schools, libraries, hospitals, prisons, golf courses, airports, museums, reservoirs and much more. To use this public facility for the further public good a small number of prerequisites will have to be put into place including: a.) an enabling policy, b.) legally binding agreements between owner and user, c.) health supervision, d.) security services, and e.) extension/education services.

Roadside and railroad-side verges are being farmed in many cities worldwide from Oslo, Norway, to Windhoek, Namibia; but they are not being farmed in a great many more cities. As with farming on fences, all the prerequisites a. through e. noted above are needed. It is also necessary to regulate the time of day/week during which certain activities can take place. Many roadside verges now have fences, thus offering a double opportunity. However, the types of crops

and the timing of some farming tasks are clearly limited, and security operations may be time consuming at and near harvest time.

Utility right-of ways (ROWs) are being put to agricultural use more often than fences or roadside verges, but they are often not farmed as intensely as would be optimal. Rio de Janeiro and Los Angeles both have very well-conceived and implemented programmes. However, in too many cities utility ROWs are used mostly for livestock grazing and for providing a green infrastructure rather than for intense food production.

The most well-known linear green infrastructure is street trees. In the majority of the world's cities street trees are primarily utilised for their beauty and the cooling shade they provide. However in many cities street trees also provide food, medicinal products and inputs for handicraft industries.

Thies, Senegal, and Port au Prince, Haiti, are two among many cities that use Neem trees at street side for medicine and handicraft production as well as for beautification and greening. Argentina and Chile have programmes to produce fruit on their street-side verges for social service agencies.

Linear urban farming has several benefits: a.) the farmer does the maintenance, which saves municipal costs, b.) the crop reduces erosion on transport verges and stream banks, c.) carbon dioxide and ozone are cleansed from the air, d.) groundwater aquifers are enriched and cleansed, e.) the quality of food is improved, f.) street traffic is reduced [fewer 'food miles'], g.) the population's economic base is enlarged and stabilised, h.) jobs are generated [especially for women, young people and the elderly], and i) the urban youth is connected to the food system.

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In tropical cities such as Kuala Lumpur, street and park trees play a crucial role in providing shade and moderating the city climate.

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FAO has played a major role through its publications and the annotated bibliography of urban forestry in the developing countries (FAO 1995). Information about UPF is also disseminated via organisations such as the Resource Centre for Urban Agriculture and Forestry (RUAF) and the European Urban Forestry Research and Information Centre (EUFORIC). The importance of extension services that demonstrate UPF benefits and methods to local communities is described in several of the articles in this issue of UAM.

#### PERSPECTIVE

The experiences described in this *UA Magazine* show the importance of urban greening. The concept of UPF offers important lessons and emphasises the need to join forces with other initiatives aimed at sustainable urban development. Further development of the concept of UPF and its contribution to sustainable urban development requires a strategic approach. Mock identifies the need to develop a healthy tree resource, comprehensive management and community-wide support (page 29). Furthermore, UPF needs to be linked to a broad range of issues and agendas, like urban agriculture, but also to the many related urban issues mentioned above.

The problems faced by cities in the 21st century cannot be effectively resolved without a coherent alliance of all forces at local and international levels. Initiatives for cooperation and city-twinning open

the door to various kinds of partnerships. In addition, the forthcoming year 2005 will be crucial for the revision of the Millennium Development Goals up to 2015. Events such as the IUFRO World Congress 2005 in Brisbane, Australia, in August 2005 and the Third World Urban Forum in Vancouver, Canada, in 2006, offer unique opportunities to put urban forestry and agriculture on the map, build strategic partnerships (at all levels) and develop adequate support.

*This UA Magazine has been supported by FAO Forestry Department ([www.fao.org](http://www.fao.org)) and the European Urban Forestry Research and Information Centre (EUFORIC) [www.sl.kvl.dk/euforic](http://www.sl.kvl.dk/euforic)*

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#### Johannesburg City Parks Agency

As the city tries to implement more efficient, business-like policies, various services have been reorganised into self-contained "utilities" and "agencies". Utilities have been formed for services that can be charged directly to individual consumers, such as electricity and water, while agencies have been created to look after the city's roads and parks. These agencies then charge the city council for services rendered. Johannesburg City Parks is run by a managing director and a board of directors who report to the city manager. How does this benefit the taxpayer? Previously parks services were fragmented across The idea is that, with a more business-like approach, responsibilities are more clear, and the agency will be able to build and maintain more parks within the existing budget.

Source: <http://www.johannesburg.gov.za>

#### Legislation

In Turkey, urban forests are covered by forest law, with 270 wooded recreational areas being governed by forest legislation (FAO, 1993b). In Sudan, forestry policy, dating from 1986, considers recreation as a function of the forest. In Kenya, tree-planting in periurban zones is encouraged, and management plans are required in order to fell such trees (Profous and Loeb, 1990, cited in Carter, 1995). In Vienna, Austria, an environmental protection law covers trees on both public and private land (Carter, 1995). In Brazil, the Curitiba municipal code specifies that tree-cutting in urban areas requires prior authorisation from the Secretariat for the Environment. Such authorisation is subject to the condition that two trees must be planted or donated to the city. In green areas *Auracaria* trees cannot be felled without a special permit (Spathelf, 2000). Source: FAO, 2002b.

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# Agroforestry in Periurban Cities of Abia State, Nigeria



Stella Odurukwe

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

Abia 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.

This study examined the level and purpose of agroforestry practices carried out by inhabitants of three of these periurban cities: Uzuakoli, Obehie and Isikwuato. A total of 180 households (60 households per city) were randomly selected and interviewed in 2003. The result reveals the underlying reasons for the involvement of households in agroforestry, access and control over lands, gender division of labour, and problems and prospects of agroforestry. The results of the research findings are presented below.

## TYPES OF AGROFORESTRY PRACTICES

The different agroforestry practices reported by the households corresponded to the various needs of the households and their land tenancy arrangements. Multistory home gardening was reported by 31% of the respondents, all of whom are landowners. They attributed their involvement in this practice to the need to ensure family food security, provide different fruits all season long, maintain soil fertility and generate additional income. As much as 17% of the respondents reported that they earned a

high income of between N92,000 and N61,000 from the sale of various products of multistory home gardens such as fruits, food crops, vegetables, leaves, seeds, bark, fuelwood, etc. Medium amounts of between N60,000 and N30,000 were generated by 52% of the respondents, while only about 31% reported incomes from the sale of these products that were below N30,000.

Border planting is common on both government and individually owned 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% of the households and bee pasturage was reported by 3%.

## GENDER 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% of the households involved in this activity employ 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 pears, pawpaw, Africa pear and guava. In 89% of the interviewed households, annual crops such as maize, cassava, yam, okra and garden egg are planted in combination with the vegetables and the MPTS. This activity involved more women than men, who 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% of the interviewed households involved in agroforestry are owners of the land where agroforestry is being practiced. These landowners exercise full control over the land, what is planted, and how the proceeds are used. 36% of the respondents carry out this practice on government residential quarters and offices. They are allowed control over the planted crops but not over the land, and

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they thus run the risk of losing their crops if a new occupant moves in to such an office or residential quarter due to their own transfer, retirement, retrenchment or termination. Such a tenant has only a temporary hold on the crops cultivated and his legal control over such crops is dependent on his continual occupation of the office or residential quarter. Some respondents gave this as one of the reasons they limit the kind of crops usually cultivated to fruit trees such as citrus, mango, pineapple; perennials such as oil palm, coconut, plantain, banana; the annuals maize, cassava, yam; and different varieties of vegetables including *Amaranthus* sp, waterleaf, and *Telfaria* bitter leaf.

Only 16% of households practice agroforestry on government-owned wastelands and open spaces, and lands belonging to other individuals. 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 all varieties of crop combinations from perennial MPTS to annual crops and vegetables. These tenants have the least control over the land they plant on and they run the risk of losing everything planted at the least provocation of the individual land owner or the government parastatal that owns the land. Their continual cultivation of such lands despite the high level of insecurity is attributed to constraints in access to land (as they are mostly 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 cases in the past in which the original land owners bulldozed the crops planted on the land even before they reached

maturity because they wanted to carry out development projects on the land.

### BENEFITS AND POTENTIALS FOR PERIURBAN DWELLERS

An assessment of the benefits and potentials of agroforestry among the respondents revealed that agroforestry impacts positively on their lives. They attributed both economic and environmental protection benefits to agroforestry. All the respondents considered the most important benefit of agroforestry to be provision of family food security since it ensures the availability of different food varieties all year round. 75% 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% claimed that agroforestry has improved their environment by improving soil fertility, reducing wind and water erosion, purifying the surrounding air, and beautifying the environment. Only 3% of the respondents 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 advantages of urban agroforestry has resulted in many incidences of reckless planting of MPTS on areas reserved for other purposes, thereby causing obstructions as reported by 68% of the respondents, and encroachments on public lands as opined by 54%. About 36% of the respondents reported cases in which trees planted on dual carriageways caused road accidents when such trees were felled by either thunder or heavy trucks. Cases of electrocution arising from trees planted

close to high-tension electric wires were also reported by 25% of the respondents. 7% of the households reported incidences of armed robbers climbing into the compound through the fruit trees planted close to the fence. About 27% of the respondents believe that practicing agroforestry close to residential buildings constitutes a health hazard since it encourages the breeding of insects (mosquitoes, cockroaches, etc.), rodents and snakes.

### RECOMMENDATIONS AND POLICY INTERVENTION

City farmers should form cooperatives and make formal requests for state land to be used for agricultural production. The state and local governments should develop policies aimed at proper

**Both economic and environmental protection benefits are attributed to agroforestry**

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 plants 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.

### SUMMARY AND CONCLUSION

Agroforestry practices in some periurban cities of Abia state show a high degree of diversity in crop combinations and purposes. The main purposes are food security, economic empowerment and environmental protection. Periurban agroforestry in the state showed a strong potential for generating cash income, enriching family diets, and reducing family expenditures on food, fuelwood and land improvement inputs such as fertilisers. Land ownership status was found to limit the type of agroforestry usually adopted by the periurban dwellers, and the legal arrangements on government-owned lands do not respect tenants' agricultural development on such lands. Therefore, the great benefits of periurban agroforestry can be fully realised only if policies are put in place to ensure adequate planning, management and monitoring of these practices by the relevant government agencies.

**TABLE 1: POPULATION ACTIVE IN AGROFORESTRY**

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 multipurposetrees	68
Border planting of trees	76
Trees and shrubs on eroding sites	58
Wildlife agroforestry	9

# Promoting the Integration of Agroforestry in Urban and Periurban Kisumu

The dramatic increase in the urban population of Kisumu demands corresponding attention to food, fuel and shelter. Improving the quality of life thus calls for design strategies which include agroforestry.

**K**isumu is the third largest city in Kenya and a growing commercial, fishing, industrial and communication centre in the Lake Victoria basin. Kisumu city covers an area of approximately 417 km<sup>2</sup>, with an estimated population of 345,312 (GoK 1999 census), which is growing at a rate of 2.8% per annum. The city lies at a height of over 1100 metres above sea level and has a humid climate with an average annual rainfall of 1245 mm.

## URBAN AGRICULTURE IN KISUMU

Urban and periurban farming practices in Kisumu largely include small-scale rain-fed mixed farming, small-scale river-irrigation, wetland farming, fish farming and free range livestock keeping. The most intensive agriculture is practised along the lake shore in the lower-lying flood plains of Nyalenda and Dunga, and in the wetlands to the south of the city. Larger plots under agriculture are found along the foothills to the east bordering the periurban fringe. There is no data showing the extent and coverage of urban agriculture in Kisumu city.

Agriculture in the larger Kisumu district is still characterised by mainly small-scale subsistence plots, consisting commonly of maize, groundnuts, beans and sorghum. Rice and sugar cane is also common in the smallholder irrigation schemes. Cultivation of crops such as kale, tomato and local vegetables for the urban market is reported to be increasing.

A common feature in all these



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**

farming practices is the progressive elimination of tree and shrub cover to allow maximum space for cultivation, inadvertently exposing the soils to natural forces of degradation. Over-cropping has resulted in degradation of the once highly fertile soils in the region. Most poor urban farmers are unable to afford the high cost of fertiliser, and they sometimes apply household and livestock waste directly on the fields. Farmers around the city's Nyalenda sewerage ponds have been noted to apply wastewater from the dysfunctional ponds to fertilise their crops, oblivious of the associated health risks.

The present urban agriculture land use practices often result in high crop failure owing to hitherto poor farming practices, unreliable rains, drought and frequent floods in the flood-prone areas of Kadibo. Kisumu city is thus a net food importer and suffers from a food deficit. The present municipal policies pay little attention to agroforestry practices and to urban agriculture, even though incidences of dust storms and wind destruction of property have increased in recent years (SoE Report 2003). Poor urban planning that doesn't incorporate urban tree planting as a means to earn a livelihood, lack of a policy framework and institutional support for urban

farming and institutional perceptions all constitute constraints to urban farming. Kisumu district has neither gazetted forests nor any forest on Trust land. No area in the district used public utility has been set aside for afforestation purposes. However, pockets of privately owned forests and woodlots are present within the district (SOE Report 2003).

## BENEFITS OF AGROFORESTRY

Urban and periurban agriculture could benefit from including agroforestry technologies ready for application in limited intra-urban spaces as well as open areas characteristic of periurban areas. For example, ICRAF has been working with tree nursery operators who produce a diverse range of tree species on small urban spaces for a diverse range of clientele. The operators have been trained in better nursery practices, marketing and entrepreneurial skills. They now conduct their activities in the form of an association, which helps solve the common challenges they face while conducting their businesses in the Kisumu urban setting.

In addition, food and non-food products from diverse trees and shrubs can improve the nutrition and incomes of poor urban farming households. This could be

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## POSSIBLE SPECIES AND THEIR USES FOR URBAN AND PERIURBAN KISUMU

FRUITS	FODDER	MEDICINAL PRODUCTS	TIMBER, POLES FUEL WOOD
Grafted mango ( <i>Mangifera indica</i> ) varieties	<i>Calliandra calothyrsus</i>	<i>Warburgia ugandensis</i>	<i>Gevillea robusta</i>
Tree tomato ( <i>Cyphomandra betacea</i> )	<i>Leuceana trichandra</i>	<i>Azadirachta indica</i>	Giant Bamboo <i>Dendrocalamus giganteus</i>
Grafted avocado ( <i>Persea Americana</i> ) varieties	<i>Morus alba</i>	<i>Moringa oleifera</i>	<i>Eucalyptus spp</i>
<i>Tamarindus indica</i>	<i>Glericidia sepium</i>	<i>Mondia whytei</i>	<i>Trichillia emetica</i>
<i>Zizyphus mauritiana</i>	<i>Desmodium sp.</i>	<i>Salvadora persica</i>	<i>Albizia species</i>
<i>Syzygium cuminii</i>			<i>Acacia species</i>
			<i>Casuarina equisetifolia</i>

realised by better integrating diverse fast-growing tree species and shrubs in the urban and periurban areas. Already tested and proven tree species that provide fruit, medicinal products, timber and fuel wood could be popularised to enrich existing farming practices.

Many urban residents in Kisumu and indeed other cities in the developing world rely on biomass fuels for cooking and heating. The scarcity of wood in the entire district has indeed led to rapid fuel wood commercialisation.

It is important to note that trees do provide food and non-food needs and also help in correcting urban challenges ranging from impairment of human health, nutrient cycling, damage to the ecosystem and economic losses.

Agroforestry fertiliser trees that are useful especially for the periurban fringe are available to support soil enrichment options. Some species that also offer additional benefits such as traditional vegetables, fodder and firewood include *Crotalaria brevidens*, *Sesbania sesban*, *Leuceana trichandra*, *Calliandra calothyrsus*, *Glericidia sepium* and *Tithonia diversifolia*

### A PILOT INITIATIVE

Recognising the emerging dynamics of urban agriculture, a multidisciplinary and multi-institutional team from the Municipal Council of Kisumu, Ministry of Lands and Settlement and the World Agroforestry Centre (ICRAF) highlighted the potential benefits offered by urban agroforestry and selected Kisumu City for a pilot urban agroforestry project. The pilot project focuses on research, physical planning and policy issues on urban agroforestry and agriculture in Kisumu. The aim is to further promote and integrate agroforestry technologies into present periurban and urban farming practices in Kisumu. This pilot programme

attempts to characterise and investigate the dynamics and map typologies of existing urban and periurban land tenure and agroforestry practices.

Initiatives by the World Agroforestry Centre (ICRAF) to introduce high-value trees within close proximity of the city boundaries appear to have triggered some minimal introduction of such species.



Sammy Carsan

**Selling of traditional vegetable in a peri urban market in Kisumu city.**

Other initiatives include integration of environmental management plans by the Ministry of Land settlement in collaboration with the Green towns' movement.

Several initiatives are currently underway in Kisumu that give strategic consideration to urban agriculture. Some of these are included in the City Development Strategy (CDS), a compilation of priority development concerns and an investment framework reached through a highly inclusive and democratic consensus-building process involving grassroots communities and all development sectors in Kisumu. The environmental report for Kisumu (MCK, SOE 2003) highlighted various priorities to address current environmental challenges in the Kisumu district. The national land policy developed in Kenya provides yet another platform upon which to build consensus on more robust national urban land planning that pays keen attention to a healthy urban

environment.

Many partners are already working together with ICRAF around Kisumu, including Kisumu Consortium (CoSoFaP), Urban Agriculture and Livestock Forum for Kisumu, Municipal Council of Kisumu, Ministry of Planning, Ministry of Agriculture (NALEP), Kenya Forestry Research Institute (KEFRI), Farm Africa, nursery operators, local NGOs and CBOs.

## Make tree planting a priority at the design level, rather than a fill up activity for building sites

The majority of the partners have provided support on project planning and implementation, and have helped to build a common understanding of the possibilities of urban agroforestry. Workshops, seminars and networking will be further used for information sharing and for defining the roles partners can play in more scaled-up project activities expected in the near future. Policy recommendations are likely to emerge on how to incorporate urban agroforestry in land-use plans, strategic plans and master plans developed by the local authorities and the city inhabitants. This project seeks to make tree planting a priority at the design level, rather than a fill up activity for building sites and other urban projects, and by extension to include a social dimension in urban planning. Urban planning has to take into account the dynamics of land use and uncontrolled expansion in the cities. Currently, trees have to be fit in after everything else is included in a proposed design. Newly developed layout maps will also be useful in planning strategies for city development and in sorting out ownership and management rights.

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# Urban Gardening on the Small Islands of the Pacific

Pacific Island countries historically have been almost entirely dependent on subsistence and commercial agricultural, wildland and fisheries production in rural areas as the foundation for sustainable development. Today, however, these small-island states are among the most rapidly urbanising areas of the world.



Craig Elevitch

Planting taro under coconut and bananas in a small clearing near Pago Pago, Tutuila, American Samoa.

Urban gardening is seen as perhaps the most culturally and cost-effective means of simultaneously addressing many of the economic, cultural, nutritional and environmental problems arising out of urbanisation and globalisation.

Increasingly large proportions of the population no longer have access to their traditional inherited holdings. As a result, most Pacific Island countries are

## Trees constitute a particularly important economic and nutritional resource on small, low-lying islands

increasingly, and dangerously, dependent on imports. Food security is a major concern in all of the independent island states and the people of the Pacific Islands have some of the highest rates of nutrition-related non-communicable diseases. Furthermore, trees, cropland and coastal and mangrove forests are cleared for urban expansion, leading to the loss of fuelwood reserves and a wide range of medicinal plants, destruction of habitats for many animals and increased vulnerability to erosion, saltwater incursion and flooding.

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This study is based on several other studies conducted over the past twenty years (Thaman 1988, 2002) in Papua New Guinea, Fiji, Tonga, Kiribati and Nauru, New Caledonia, Solomon Islands, Vanuatu, Samoa, Niue, the Cook Islands, Tuvalu and French Polynesia.

The two main types of Pacific Island urban gardening are categorised here as 1) “houseyard” gardening adjacent to residences, and 2) gardening on idle or undeveloped land within urban areas, but usually at a distance from the residence. The term gardening is used, rather than “agriculture”, because the focus is more on production for subsistence, although some periurban agriculturalists plant crops, such as seasonal vegetables, taro and cassava, on a larger scale for commercial sale.

### HOUSEYARD GARDENING

“Houseyard” or “dooryard” urban gardening is a ubiquitous feature of almost all Pacific Island urban landscapes, even in very densely settled urban areas in the atoll micro-states, such as urbanised South Tarawa in Kiribati or Fogafale Islet on Funafuti Atoll. Even in areas not renowned for agricultural diversity, such as Kiribati, Tuvalu and Nauru, urban gardens contain a wide range of food trees, non-tree staple and supplementary food plants, and non-food plants (see Thaman, 1995).

Random surveys of home gardens in Port Moresby, Papua New Guinea; Suva, Fiji; Nuku’alofa, Tonga; South Tarawa, Kiribati; Nauru Island; and “Location”, the contract-worker settlement on Nauru, indicated that at least 85, 114, 79, 61, 33, and 65 different species or distinct types of food plants, respectively, were cultivated in home gardens in these areas. These plants included: staple root crops, supplementary non-tree fruits and vegetables, a great variety of food trees, spice plants and beverage, stimulant, and depressant plants. Many of these plants were found to be present in a majority of home gardens.

In addition to these plants, there is an almost endless variety of useful non-food plants found in home gardens. These include important handicraft plants such as *Pandanus* cultivars, the leaves of which are treated and used to make mats, thatching, baskets, hats and a wide range of other plaited ware; paper mulberry (*Broussonetia papyrifera*), the treated bast fibre of which is used for bark cloth or tapa cloth; annatto (*Bixa orellana*) and Java cedar (*Bischofia javanica*) (both sources of dyes); *Leucaena leucocephala*, an important renewable fuelwood resource; a great range of medicinal plants; plus countless other plants of considerable technological, economic, social, ecological, and ornamental value. There is a great cultivar diversity among

the more important food and handicraft plants. As stressed by Soemarwoto *et al.* (1985) in their study of Javanese home gardens, true plant diversity is far greater than indicated by species differences, since many species are represented by numerous cultivars. In Tonga, for example, there are numerous distinctly named breadfruit cultivars, the commonest of which are ma'ofala, maopo, puou, loutoko, kea and 'aveloloa. There is similarly great cultivar diversity among other crops such as coconuts, mangoes, yams, , and sweet potatoes all of which add economic, ecological and nutritional stability to urban gardening systems. There are also countless "weed" species, which are important components of urban agroforestry.

The most common plants, in terms of cover abundance, are often traditionally important **staple root crops**. These include taro (*Colocasia esculenta*), cassava (*Manihot esculenta*), tannia or cocoyam (*Xanthosoma* spp.), sweet potato (*Ipomoea batatas*), greater yam (*Dioscorea alata*) and sweet yam (*D. esculenta*), giant taro (*Alocasia macrorrhiza*), and giant swamp taro (*Cyrtosperma chamissonis*). *Colocasia* aro is particularly well suited to urban conditions because it can be grown on small plots, either as a staple for its corms, or for its leaves, which constitute the most common leafy vegetable or "spinach" in many areas. Cassava, by far the most common plant in urban Suva and the most important locally-produced staple food in Fiji, is abundant in houseyard gardens, open lots and along road frontages.

**Supplementary non-tree food crops** are also extremely diverse in Pacific Island houseyard gardens. They include vegetables, beans, sugarcane and corn and constitute a critical nutritional and economic resource. In some areas more temperate vegetables, such as lettuces (*Latuca sativa*), radishes (*Rhaphanus sativus*) and carrots (*Daucus carota*) are occasionally cultivated, during the cooler months.

Although staple root crops are most numerous and cover the largest area in most gardens, **food trees and other useful trees** are commonly the dominant and most permanent plants of urban garden lands especially in long-settled areas. An exception would be at Location,

the contract-worker settlement in Nauru, where little or no space for gardening exists, let alone tree cropping, and where a high proportion of plants are grown in artificial boxed beds or containers. Apart from bananas and scattered coconut palms, other trees found there are commonly non-bearing juveniles.

Trees constitute a particularly important economic and nutritional resource on small, low-lying islands, such as the atolls of Kiribati, Tuvalu and the Marshall Islands, where, apart from giant swamp taro (*Cyrtosperma chamissonis*), generally reserved for special occasions, the main staples are all tree crops: coconut, breadfruit, banana or plantain clones, pandanus, and the native fig (*Ficus tinctoria*). Trees are also very important in home gardens on high islands as well. Falanruw (1985) reports that on Yap, "tree gardens" developed by ancestors of the current generation "for the planting of food and other useful trees about homesteads, and in the drained areas created by the excavation of taro patches and construction of paths between homes and villages involved about 50 species of food trees alone."

Trees of particular importance to the Indian population of Fiji (mostly descendents of indentured labourers, who currently make up over 40% of Fiji's population) include jackfruit (*Artocarpus heterophyllus*), horseradish or drumstick tree (*Moringa oleifera*), curry leaf or Indian bay (*Murraya koenigii*), and tamarind (*Tamarindus indicus*). In addition, they also plant most of the other common fruit trees in towns and in houseyard gardens on smallholder cane farms.

Fruit trees that are common to occasional in houseyard gardens in Papeete, Tahiti and in urban villages on some atolls in the Tuamotu Archipelago in French Polynesia, in New Caledonia and in Port Vila, Vanuatu (where there has been French and Chinese influence), but not normally found elsewhere in Pacific Island urban areas are litchi (*Litchi sinensis*), Spanish lime (*Melicocca bijuga*), longan (*Dimocarpus longan*), inga (*Inga edulis*) and Otahiti gooseberry (*Phyllanthus acidus*).

A wide array of **Non-food plants** used for handicrafts, fuel, medicines, fibre,

The most important food tree species include a range of bananas and plantains (*Musa* clones), coconut (*Cocos nucifera*), breadfruit (*Artocarpus altilis*), edible pandanus (*Pandanus* spp.), a range of citrus trees (*Citrus* spp.), including oranges (*C. sinensis*), tangerines or mandarin oranges (*C. reticulata*), lemons (*C. limon* and *C. medica* x *limon*), limes (*C. aurantifolia*), sour orange (*C. aurantium*), pommelo (*C. maxima*) and Calamondin orange or kalamansi (*C. mitis*), mango (*Mangifera indica*), papaya (*Carica papaya*), guava (*Psidium guajava*), avocado (*Persea americana*), soursop and sweetsop (*Annona* spp.), Malay apple and water apple (*Syzygium malaccense* and *S. aquea*), hog plum or vi apple (*Spondias dulcis*), Tahitian chestnut (*Inocarpus fagifer*), oceanic litchi (*Pometia pinnata*), beach almond (*Terminalia catappa*) and fig (*Ficus* spp.).

dyes, ornamentation, perfumes and deodorants, livestock feed, shade, construction materials and other purposes are also important components of urban gardens. Medicinal plants, for example, are a critical economic, health and cultural resource, given the extremely high, and rapidly increasing, costs and unavailability of some imported medicines. Particularly on the smaller, more densely-populated islands of Tonga and Kiribati most medicinal plants can be found cultivated or protected in home gardens. The importance of sacred or perfumed plants in urban gardens is also considerable. Of some 49 species considered by Tongans to be sacred plants ('akau kakala), 36 were found present in a survey of home gardens in the capital of Nuku'alofa. In addition to their sacredness, such plants constitute a very significant economic resource. Their flowers, leaves, fruits and bark are used in leis and ornamentation for the expanding tourist industry, and they are the main scents used in body oil (coconut oil), perfumes and deodorants, for which there is a rapidly expanding export market. The imported substitutes for these scented products are also extremely expensive and often not as culturally acceptable.

Urban agroforestry systems yield firewood, building material, dyes, livestock feed, insect repellants, handicrafts, fish poison, etc. Of particular note in urban Apia, the capital of Samoa, is the poumuli tree (*Flueggea flexuosa*), a fast-growing tree favoured for use as houseposts in traditional Samoan houses (fale), which can be found in a majority of houseyard gardens.

## CROPPING PRACTICES

In terms of actual area under food crops and their spatial distribution, there is great diversity. Whereas some households have only a few scattered



Craig Eievitch

Taro planted under coconuts on Tongatapu, Tonga.

fruit trees and vegetables, many cultivate food crops on over 50% of their allotments. Trees become increasingly dominant in long-settled areas, as cash incomes increase, soils decline in fertility, and tree seedlings mature and increasingly shade garden areas. Ornamentals are commonly planted closest to the home, often in front yards, as well as in containers, often on front porches. Medicinal plants, sacred or fragrant plants, and other culturally valuable, commonly multipurpose plants, are scattered amongst the food plants and ornamentals.

### URBAN GARDENING ON UNDEVELOPED LAND

Cultivation on idle or undeveloped land in urban areas is also very widespread in the Pacific Islands and provides an important source of produce, including limited commercial production. Undeveloped or idle lands in urban and periurban areas are important sources of food and products such as timber, fence posts, fuelwood, handicrafts medicines, leaves, flowers, fruits and nuts. Such areas include road frontages, empty allotments, river banks and valleys, right-of-ways for proposed or existing paths and roads, and open land in general, including hillsides, swampland, etc.

The most common species in “undeveloped areas” are again the staple root crops. Along road frontages, fruit

trees, such as mangoes and coconuts are common, but ornamental and shade trees, many of which are systematically planted by city councils or the government, as well as by individual households, are dominant. Living fences of fruit trees and other useful species, such as *Polyscias* spp., *Leucaena leucocephala*, *Erythrina variegata*, *Hibiscus tiliaceus*, *Hibiscus rosa-sinensis*, *Casuarina equisetifolia*, and the recently introduced madre de cacao (*Gliricidia sepium*) are harvested, pruned, pollarded, or “grazed” and constitute important sources of food, fodder, firewood, medicines, and flowers, as well as being of considerable ecological importance.

It must be stressed, however, that despite the current importance of gardening on undeveloped urban and periurban land, it is these areas that are most severely affected by wanton deforestation because of insecure tenure and undefined ownership. This scramble for wood and associated deforestation is clearly visible and rapidly increasing in Pacific Island urban areas.

### IMPORTANCE AND CONSTRAINTS

Despite the considerable importance of urban gardening in the Pacific Islands, there are a number of problems faced by urban gardeners. Unfavourable climate, poor soils, cost and availability of land and water, insufficient time and labour, theft, and lack of government assistance were most commonly mentioned by those surveyed.

The problems relating to drought include the high cost of water, distance to community faucets, water cancellations and fear of City Council regulations against the use of water for gardening purposes. The atolls are also periodically affected by prolonged droughts, which commonly lead to the death of a significant proportion of breadfruit and citrus trees and other trees and food plants that are only marginally suited to the atoll environment. Urban gardeners commonly have to contend with infertile poor soils. Continual cropping on small

urban plots also leads to declining fertility and loss of soil structure, unless ameliorative measures are taken. Both water shortage and poor soils, however, often make trees a more attractive proposition than short-term ground crops which require water and higher soil fertility.

Insufficient land and insecurity of tenure are problems in most areas. Insecurity of tenure seems to be a major problem and a strong disincentive to urban gardening. City Council regulations, although not strictly upheld, were also considered to be a disincentive and they discourage cultivation of ground crops and trees along road frontages. Other problems include diseases, insects, birds, rats, dogs, mongooses and noxious weeds; theft of produce, especially of banana bunches and tree fruit.

The importance of urban gardening and its implications for planning are not clearly understood by most planners and policy makers in the Pacific Islands because of a lack of quantitative data on its nature, extent, and cultural and ecological significance. However, increasing interest has recently been shown by some city planners and administrators, like in Vanuatu, Tonga, Kiribati, Tuvalu, the Federated States of Micronesia, and the Marshall Islands, where urban food dependency and increasing incidences of nutritional disorders have become serious problems.

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# Urban Forestry in China: Status and Prospects

Urban forestry management has been accepted by both scientists and policy makers as one important strategy to improve living and working environments (Jiang 2003). In the middle of the 1980s, Shen et al. introduced the term "urban forestry" to China (see Li et al. 2004), and Gao (1984) published the book *Urban Forest in Chinese*. In recent years, research projects have been initiated to better plan the development of urban forests in some cities (Chinese Academy of Forestry Sciences & Huadong Normal University, 2002), education programmes on urban forestry have been launched in some colleges, and a special research journal, *Journal of Chinese Urban Forestry*, was established (in Chinese in 2003).

Over the last 20 years, a rapid process of urbanisation has taken place in China due to increasing economic development. Between 1983 and 2003, the number of cities and towns in China increased 2.5 times to about 50,000, and the urban population reached the level of about 40% of the total population in the country.



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

With the increase in the number of urban areas and in the total urban population, environmental problems have become more and more serious, e.g. in terms of too few outdoor leisure areas for city dwellers, mass destruction of natural landscapes, loss of biodiversity, water source pollution, CO<sub>2</sub> emission, and so forth. This paper gives a brief introduction to the development of urban forestry in China, highlighting common problems and potential ways to solve them.

## HISTORICAL DEVELOPMENT

In historical China, city dwellers primarily used the natural forests and trees within and around a city for hunting, gathering fruits and plants, collecting fuelwood, and the like. On the other hand, in ancient Chinese cities, it was also very popular to plant trees along the rivers and streets and maintain a small patch of tree stands around the houses. These trees and small areas of forest were managed for multiple purposes, e.g., for shade, to serve as a

windbreak, as beautiful scenery, to provide food sources with fruits and leaves, etc. Traditionally, some people also planted trees or a stand around their houses to create or keep a good *Feng-Shui* for the houses. In addition, there is a long tradition of establishing gardens and parks for the imperial family and higher-ranking officials. For instance, in the Summer Palace in Beijing, the most famous imperial park remaining in China, the Wanshou Hill is almost fully covered with two of the most common evergreen conifers in northern China, Chinese pine (*Pinus tabulaeformis*) and *Platycladus orientalis*. Even today, these forests are still important parts of the city's urban forest.

At the beginning of the 20th century, some Chinese scholars who had studied abroad brought the ideas of modern forestry as practised in Western countries to China. With a better understanding of forest functions in terms of environmental protection and recreation, these Chinese scholars began an attempt to establish forests in the areas around

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Several years ago, the Shanghai government started to rent out land for urban forestry purposes to private companies based on a contract. According to the contract between the government and a company, 60% of the land rented by the company must be used to grow forest, and the remaining 40% can be used for establishing a tree seedling and flowers nursery which can bring commercial benefit to the company within a short period of time. In addition, in order to support private companies in establishing urban forests, the government also provides certain economic supplements to the companies according to the area of the land rented. After 10 years, the government will get these forests back from the companies. In this way, the government can solve the issue of a shortage of funds.

Beijing and Nanjing with the purpose of conserving water and soils, as well as to provide opportunities for recreation. Starting in 1949, the new Chinese government launched a movement of massive afforestation in areas near 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 recreation 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% in 70% of cities by the year 2050. Today there are some cities, e.g. Changchun, Nanjing and Guangzhou, with a forest cover of more than 40%.

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 which is based on the need for recreation 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 a 35% 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 means 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 fulfil their potential roles in recreation, water sources protection, biodiversity conservation, atmospheric CO<sub>2</sub> sequestration, air pollution reduction, and so forth. Of course different cities located in different parts

### most of the Chinese urban forests are monocultures

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 kind of commercial activity, which has added a new driving force for urban forest development in China.

**The Yanzhong Green-space with an area of 210,000 m<sup>2</sup>, located at the city centre, is the largest public green-space in Shanghai. For this green-space, 306 units, 165 privately owned enterprises and 6736 households have been moved.**



Chunjiang Liu

The fourth feature of China’s new urban forestry policies is that managing urban forest 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 the like, but provide an opportunity for farmers to sell their agricultural produce, such as fruits, vegetables, and handicrafts mostly made of wood and stone. 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.

### PROBLEMS

In China, the major share of funding for



managing urban forests comes from governments. However, governmental funding alone is not enough to satisfy the urgent need for planting new trees and forests in many cities. Generally, private companies are not interested in forest management, mainly because it does not deliver direct and fast economic benefits.

In order to get a fast “greening effect” along streets or in open areas people prefer to transplant “big trees” rather than plant seedlings. These big trees are usually more than 20 and sometimes even up to 100 years old. Unfortunately, they are at greater risk of dying due to water deficits during the transportation period or because they cannot adapt to the new environment; and even if they survive their growing potential is not as good as that of the trees grown from seedlings.

Due to easier operations in silviculture and a lack of techniques for planting mixed stands, most of the Chinese urban forests, and especially those established during recent years, are monocultures. These pure stands are susceptible to the outbreak of pests and they have a negative impact on the landscape aesthetic. In Beijing, for instance, the urban forest landscape is dominated by the evergreen conifers *Pinus tabulaeformis* and *Platycladus orientalis* and the deciduous broadleaves *Quercus variables* and *Robina pysesdocasia*. During the period from late autumn to early spring, the canopy of deciduous trees looks a bit ugly without leaves. Aside from the natural secondary mixed stands on Sheshan Hill in Shanghai, almost all urban forests established in China during the last 10 years are monocultures, although there are plenty of sources for selecting other tree species in silviculture.

Uneven distribution of urban trees and stands is another problem. In Chinese cities, it is rare to see a large area of forest within a city. More trees and patches of stands need to be planted within the city limits.

#### DEVELOPING URBAN FORESTRY

Developing urban forests in China requires strengthening research on urban forestry theory, technology, and policy making. The following aspects are important: 1) the ecophysiological properties of trees; 2) possible responses

### the most important task is to raise awareness about the role of forests

of urban trees and urban forests to global change, e.g. acid rain, ozone, ultraviolet radiation, global warming, etc.; 3) technology for establishing multipurpose forests; 4) the mixture of tree species in urban forests; 5) control of diseases and insects harmful to the trees and forests; 6) application of GIS (geographic information system), RS (remote sensing) and GPS (Global Positioning System) technology in urban forestry. Policies, laws and regulations concerning urban forestry should be changed or developed to adapt to the current needs and mentioned problems. Studies are also needed on how to account for urban forests' induced economic benefit, and how to levy taxes to compensate urban forestry. In addition, the practice and experience of developing urban forests commercially as done in Shanghai should be studied further in order to find more ways to generate funding for urban forestry.

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. In European and American cities, there is a longer tradition of establishing and managing urban forests as an approach to tackling environmental problems (Konijnendijk, 1997; Hunter, 2001). It is necessary to strengthen the exchange of silvicultural and other knowledge, as well as policy-making experiences between China and these countries.

There is also a need to increase the involvement of the public and 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, etc. In addition, it is also important for researchers and managers to assist with preparing information materials aimed at tourists and local inhabitants such as leaflets or posters about their projects or specific urban forest stands.

In China, generally, one important limiting factor for developing urban forests in a city is shortage of funds, mainly because these forests do not produce direct economic benefits, and they thus do not attract private companies. 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. In addition, as discussed above, the government's policy of providing economic compensation to private companies in Shanghai might be considered for other municipalities as a way of raising funds for developing urban forests.

#### ACKNOWLEDGEMENTS

The authors thank Dr. C. Konijnendijk for his comments on the manuscript and language checking and gratefully acknowledge the help of Mr. Zhiwei Huang for our data collection.

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# Fodder Shrubs for Increasing the Incomes of (Peri)urban Livestock Owners

In Kenya, there are about 650,000 smallholder dairy farmers and most are near cities and towns, where milk demand is high and marketing costs are relatively low. Milk is highly perishable, which is a primary reason why it is produced in and around urban areas.



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Sixty percent of participating farmers in central Kenya were women

**D**airying is an important economic enterprise in urban and periurban areas of East Africa. Approximately 80% of dairy animals in central Kenya are kept in confined systems. The importance of the dairy enterprise in smallholder farms has increased in recent years due to liberalisation in the dairy sub-sector in Kenya, which has resulted in redistribution and an increase of the overall social and economic benefits of market-oriented smallholder dairying (Omoro et al., 1999). In 1997, the dairy sector accounted for 30% of the value of output of smallholder dairy farmers in central Kenya; this proportion has likely increased in recent years with the decline of the coffee industry. Smallholder dairying is also a rapidly growing enterprise in periurban areas of western Kenya and in the highlands of neighbouring countries, such as Tanzania, Uganda, and Rwanda. Dairy production provides the household with cash and improved nutrition, as well as manure for improving crop production.

The farms in urban and periurban areas are small, making the feeding of the dairy animals a major constraint. Most dairy farmers practice zero-grazing, growing napier grass (*Pennisetum purpureum*) on small plots and feeding it to their confined animals. Farmers keep a portion of milk to feed their families and the rest is sold, providing much-needed income for everything from staples like sugar, flour and rice to medicine, clothing and school fees.

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The main feed source for dairy cows is napier grass supplemented during the dry season with crop residues. Research conducted in Embu area by Murithi in 1998 found that 45% of the farmers buy commercial dairy meal (which is composed mainly of maize bran, wheat bran, cotton seed cake, soybean meal, and fish meal and is nominally 16% crude protein) to supplement their cows' diet. However, farmers often complain that the price of dairy meal is high and that they lack the cash to buy it, and that it is difficult for them to transport dairy meal from the market to the homestead. Many also have doubts about its nutritive value, because of scandals in Kenya concerning fraudulent maize seed and agrochemicals sold to farmers (Franzel et al., 2004).

Unfortunately, acute protein shortages reduce milk production and force many farmers to spend some of their precious income on commercial dairy meal supplements. Fast-growing shrubs and herbaceous legumes have the potential to alleviate the farmers' feed problems. Fodder from these shrubs is rich in protein and, unlike the grass species, the shrub leaves maintain their levels of protein even during the dry season.

## FODDER SHRUB OPTIONS

In the early 1990s, on-farm trials started in Embu District by the National Agroforestry Research Project, a collaborative project implemented by the Kenya Agricultural Research Institute, Regional Research Centre, Embu, the Kenya Forestry Research Institute, and the World Agroforestry Centre. Among the indigenous and exotic species tested,

farmers and researchers first identified *Calliandra calothyrsus*, a leguminous fodder shrub originating in Central America, as the most promising species that could be grown on farms and used as a substitute for commercial dairy meal. Other species later introduced and evaluated by farmers include *Leucaena trichandra*, *Morus alba* (mulberry), *Chamaecytisus palmensis* (tree lucerne) and a herbaceous legume, *Desmodium intortum*.

Due to the limited size of farms, researchers and farmers have focused on integrating the fodder shrubs into the existing cropping system, rather than planting them in pure-stand fodder banks. On-farm trials confirmed that the fodder shrubs could be planted between upper-storey shrubs on farm boundaries, in hedges around homesteads, on contour bunds, and in lines in napier grass. On-farm feeding trials have confirmed the effectiveness of fodder shrubs both as a supplement to the basal diet and as a substitute for dairy meal. For example 1 kg of dry calliandra was found to have roughly the same amount of digestible protein as about 1 kg of dairy meal. On a fresh weight basis, 3 kg of calliandra gives similar results in milk production as 1 kg of dairy meal. The effects of calliandra and dairy meal were found to be additive, suggesting that the two feeds are nutritionally interchangeable. Project research indicates that a farmer would need about 500 shrubs to feed one cow throughout the year at a rate of 2 kg dry matter (6 kg fresh material) a day (Roothaert et al., 2001). The average smallholder dairy

farmer in central Kenya has 1.7 cows and those with fodder shrubs have about 340 (Wambugu et al., 2001). In fact, a typical periurban farm of 0.4 ha and one cow could easily find space for 500 shrubs along internal and external field boundaries, along contour bunds, or around the homestead. Researchers and farmers are seeking to diversify fodder sources, by testing other fodder shrubs and herbaceous legumes. In the East African region the extension staff have recently begun disseminating *Leucaena trichandra*, an exotic shrub species, *Morus alba* (mulberry, a naturalised shrub), and *Desmodium intortum*, a herbaceous legume.

### FARMER MANAGEMENT AND INNOVATIONS

Periurban farmers usually produce seedlings of calliandra and trichandra in group nurseries and transplant them onto their own individual farms. Others purchase the seedlings from commercial nursery operators or manage their own on-farm nurseries. The shrubs grow rapidly and by the end of the first year are ready to be pruned for feeding to livestock. Most farmers grow the trees in hedges, cutting them at a height of about 1 metre and trimming several shrubs per day in order to provide leaves for their livestock. Keeping the shrubs at a height of 1 metre or lower ensures that they do not shade the adjacent crops. Calliandra and trichandra leaves may be fed fresh or dried and stored. Mulberry is planted using cuttings.

### BENEFITS FOR FARM HOUSEHOLDS

Planting fodder shrubs does not involve any cash costs; rather, it allows farmers to substitute small amounts of land and labour for cash that would otherwise be needed for purchasing dairy meal. Farmers value the fodder shrubs as a supplement to their basal feeds or as a partial substitute for commercial dairy meal, which they find to be expensive and of unreliable quality. The shrubs are also useful for conserving the soil, for supplying firewood and for providing bee forage needed for honey production. Some farmers earn money from the sale of seed. Calliandra is also appreciated as an ornamental, an important characteristic for urban and periurban farmers. When used as a supplement, fodder leaves may also improve animal health and reduce the calving interval.

On the negative side, fodder shrubs may slightly reduce the yields of adjacent crops. However, if the shrubs are trimmed in a timely fashion, as they are on nearly all farms, then this effect is negligible.

In 2001, farmers in central Kenya with about 500 calliandra shrubs earned an additional \$US 98 to \$US 124 per year from their dairy enterprises by growing calliandra, beginning in the second year after planting. The benefits were the result of either increasing their milk production or in savings from reducing their purchases of dairy meal. The potential benefits if 20% of Kenya's smallholder farmers adopted calliandra or similar fodder shrub species in Kenya's smallholder dairy sector would amount to about US \$ 104-132 million per year. These estimates depend in part on increasing milk demand, which is expected to be strong because of increases in population and incomes. Omore et al. (1999) projected that milk demand would increase by 58% to 73% between 1998 and 2010.

### SCALING UP THE BENEFITS TO REACH MORE FARMERS

During 1999-2001, KARI, ICRAF, and the International Livestock Research Institute collaborated in a project of the Systemwide Livestock Programme (SLP) of the CGIAR to scale up the use of fodder shrubs in central Kenya. A project extension facilitator, working with a range of government and NGO partners, assisted 180 farmer groups comprising 3200 farmers across 7 districts to establish nurseries and plant fodder shrubs. The approach proved to be very effective for facilitating the spread of the practice. By 2002, each farmer had an average of 340 shrubs and each had given information and planting material (seeds or seedlings) to an average of six other farmers (Wambugu et al., 2001). Most of these farmers could be termed urban or periurban, as their proximity to cities and towns provides markets for their milk.

Sixty percent of participating farmers in central Kenya were women. However, surveys showed that female-headed households planted fewer fodder shrubs than male farmers and had lower survival rates, probably because of labour shortages. A project financed by the Forestry Research Program of DFID (UK

Farmer experimentation has been helpful in providing new innovations that have spread to other farmers. In one case, feedback on a farmer innovation has resulted in a change in extension recommendations. Farmers in Kandara Division, Maragua District, Kenya, conducted experiments on soaking calliandra seeds before planting and found that seeds soaked for 48 to 60 hours in water at room temperature had higher germination rates than those soaked for the recommended 24 hours in hot water. Researchers confirmed the farmers' findings and extension staff now recommend the longer soaking time. This has also an added advantage since farmers sometimes kill the seeds by accidentally boiling them.

Department for International Development) and implemented by the Oxford Forestry Institute and ICRAF is helping a range of partner organisations to increase the adoption of fodder shrubs in five countries: Kenya, Uganda, Rwanda, Tanzania, and Ethiopia. Facilitators are helping to train the extension staff of a range of different organisations, including government, NGOs, churches, community-based organisations, farmer groups and private sector firms. The project is also helping to link seed production with demand. Seeds are available in certain rural localities, such as western Kenya and south-western Uganda but demand is highest in periurban areas around cities, such as Nairobi, Kampala, and Kigali, where the dairy sector is rapidly increasing. The project is helping to facilitate the development of private seed producers and dealers, and to help link them to periurban areas where seed demand is highest. The SLP- and DFID-financed projects are providing important lessons about how to scale up the adoption of fodder shrubs. We are confident that sharing these lessons will help increase the contributions that agroforestry makes to improving urban and rural livelihoods.

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# Urban Fodder Forests in The Gambia

There is a growing presence of new animal genetic resources in West African cities geared to boost the local production base for meat and milk. Access to good quality feeds and supplements is becoming difficult for the farmers.



High-density cultivation of *Moringa* in Banjul.

In the Gambia, the local N'Dama breed of cattle, well known for its innate resistance to trypanosomosis, is artificially inseminated with exotic semen to produce hybrids destined for the growing periurban dairy industry. These crossbred animals need to be raised in areas with minimal environmental challenges of health, management and nutrition. The animals are raised on a zero grazing basis for many demographic and ecological reasons (e.g. lack of inner city grazing areas).

Oilseed cakes are available only at export prices and grazing/fodder reserves in the city fringes are declining by the day. Consequently, feeding the urban ruminants (especially the crossbreds) to make optimal use of their potential is a challenge. Urban farmers are therefore obliged to develop alternative feeding strategies for their high-yielding animals. There are currently some 25 farmers rearing 121 crossbred cattle in and around the Greater Banjul area.

## THE URBAN ALTERNATIVE

*Moringa oleifera*, also known as drumstick tree, “never die”, or “miracle tree”, has been systematically investigated for the last three years at the International Trypanotolerance Centre, Banjul (ITC). The *Moringa* plant is well known for its high biomass production. It promises to be the “plant of the future” for urban ruminant animal-feed supplementation. Although not completely strange in the West African biosphere, the plant has a lot to offer as a food and fodder resource in the sub-region. The success of plant as a feed resource is overwhelming.

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Important research questions for the *Moringa* as an urban feed resource are its sustainability and nutritive value. Under high-density cultivation as part of the on-station Market-Oriented System Improvement Programme (MOSIP) at the ITC in Banjul, biomass yields of over 15 tonnes DM/ha in a 60-day growing cycle have been obtained. This volume of high-quality biomass is overwhelming in the semi-arid context of the Gambia. *Moringa* leaves are fondly relished by the human population, *Moringa* will readily address both human and animal nutrition gaps.

## YIELDS

Biomass yield obtained by estimating the dry matter content of the materials recovered in a 1 m<sup>2</sup> area indicated the possibility of obtaining up to 20 tonnes DM/ha in a 50-day growing cycle. However, for the purposes of easy communication to the ultimate beneficiaries, it is recommended that the cutting cycle be rounded to once in two months rather than every fifty days. An added advantage of the 60-day cutting interval is the possibility of harvesting young, readily digestible biomass under optimum agronomic conditions. Data from our on-farm experiences under a rain-fed system are currently being processed. The biomass produced in the rainy season can be used in a variety of ways to address ruminant nutrition issues in the dry and wet seasons.

## RUMINANT NUTRITION

Animal response to *Moringa* as a supplement to a groundnut hay-based diet showed that there is no significant difference in performance when compared with animals supplemented with groundnut cake-based concentrate.

In a short-term animal response study using growing crossbred animals, animals fed with *Moringa* leaves as supplements did attain a higher growth rate of 440 grams per day (g/d) compared to their counterparts that were offered conventional locally available concentrates (1:1 mixture of groundnut cake and rice bran) and that grew at the rate of 385 g/d. However, this difference did not attain statistical significance. As expected, the animals offered either *Moringa* or concentrate supplements outperformed their counterparts that were offered only groundnut hay and that gained only 274 g/d. The growth rate of the control animals was thus significantly lower than those of their supplemented counterparts. The predictions obtained under conditions were positively validated by growing bull calves (Nouala, 2004). The implication is that high-quality plant protein feed resources can be readily produced in a space of two months even in urban backyard gardens.

The findings at the ITC show that *Moringa* can truly be the ‘Miracle Tree’ in urban ruminant nutrition that it promises to be, if fed to the animals at between 20-40% inclusion in a groundnut hay-based diet. Further information on *Moringa* utilisation can be obtained from ITC, the Gambia.

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## ACKNOWLEDGEMENT

The authors acknowledge the financial support of the International Development Research Centre (Cities feeding People), Ottawa, Canada, towards the realisation of this work.

# Grazing Animals as Park Managers? using animals in the management of urban green areas

Interest in using grazing animals in the management of parks and other urban green areas has grown in Sweden in recent years. Through grazing and trampling these animals create the conditions for a rich flora and fauna.

This study was undertaken to document the use of grazing animals for management of urban green areas in Swedish municipalities.

A questionnaire with 40 questions concerning the activities, organisation, results, reactions from the public, etc., was sent to the persons responsible for the management of green areas in 49 (of a total of 290) municipalities that used animals in urban areas.

## COMMON CHARACTERISTICS OF MUNICIPALITIES

Most of the municipalities were in areas with a vegetation period of >190 days and they consisted of cities or larger towns. It is probable that in areas where the vegetation period is shorter, people will have less interest in making all the necessary arrangements to keep grazing animals. The same can also be said of rural communities that have small central urban areas and limited park land and that are moreover surrounded by farms with grazing animals. The grazed areas varied to a great degree but most areas were between 0.3 and 5 ha in size. The primary reason for the activities was a desire to keep the land open, but another important motive was to keep or recreate a certain flora including especially valuable trees.

## CHOICE OF ANIMAL SPECIES

More than 70% of the municipalities in the study used sheep. Some municipalities used more than one species on the grazed area, e.g. sheep and cattle, which often gives a better grazing

result. The choice of animal species and breed depends on the properties of the land that is going to be grazed and the desired grazing result. Since the grazing land is in an urban area it is also necessary to consider the affected public. Smaller animals are perceived as less dangerous than big animals, but on the other hand there are often fewer problems with vagrant dogs and injured animals if cattle and horses are used.

The most common situation was that the animals were privately owned, but in some cases the animals were owned by the municipality or various associations



Inger Ledin  
Seeing the animals makes me happy

such as riding schools. Using privately owned animals was in the short term the most economic alternative and experienced people were available and willing to take responsibility for the animals and observe laws and regulations.

## PRACTICAL PREPARATIONS ARE NEEDED

Most municipalities had done some preparatory work before letting the animals in for grazing e.g. clearing of shrubs and unwanted trees, sowing of special plants, building of fences around especially valuable trees, removal of



Inger Ledin  
More than 70% of the municipalities in the study used sheep

potentially harmful objects like plastic bags or metal pieces and making an inventory of the vegetation.

The type of fencing used for the areas differed depending on the animal species used and the functional and esthetical demands. The fence should be efficient and not dangerous for animals or children. From an esthetic point of view the fence should not disturb the general view of the landscape and it should be fitting in areas of historical interest.

## PLANNING LAND MANAGEMENT

The written management plans generally contained some background description with possible historical aspects, a description of the present character of the area, visions for the future, starting measures, maintenance measures, time plan, and a plan for evaluation and budgeting. The management measures consisted of recommendations for shrub clearing, pasture trimming, species of animals to be used, if the use of fertilisers, herbicides or supplementary feeding were allowed, etc. The visions concerned the number of trees in the area and the look and condition of the sward. The result of the grazing was reported to be satisfactory, even better than had been achieved with mechanical management.

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<b>Grazing result</b>	<b>The animals</b>	<b>Miscellaneous</b>
<p><b>Positive comments</b></p> <ul style="list-style-type: none"> <li>-Beautiful open landscape.</li> <li>-The grove has returned.</li> <li>-Lots of berries now that the area has been opened up.</li> <li>-The landscape is “alive” in a different way.</li> <li>-More flowers.</li> <li>-A pastoral view of the landscape.</li> <li>-Fewer seeds from weeds found their way into the nearby gardens.</li> </ul>	<p><b>Positive comments</b></p> <ul style="list-style-type: none"> <li>-Seeing the animals makes me happy. (A frequent comment!)</li> <li>-The animals give variety.</li> <li>-Seeing animals is relaxing.</li> <li>-To be able to meet, caress and maybe feed the animals is a factor of great satisfaction.</li> </ul> <p><b>Negative comments</b></p> <ul style="list-style-type: none"> <li>-Don’t appreciate the animals’ dung, especially by the gate.</li> <li>-The animals smell and bleat.</li> <li>-The animals attract flies.</li> <li>-The animals are too close when people want to have a picnic.</li> <li>-Negative when the animals break through the fence.</li> <li>-The animals may cause allergies.</li> <li>-People scared of animals are afraid to be in the area</li> </ul>	<p><b>Positive comments</b></p> <ul style="list-style-type: none"> <li>-Get people out in the urban green areas.</li> <li>-Nice place for an outing or a picnic.</li> <li>-Children come into contact with living animals.</li> <li>-Children learn to take responsibility for the animals.</li> <li>-Highly appreciated place for visits for school children and nursery schools.</li> <li>-Combine business with pleasure, teach about animals.</li> <li>-Opportunity to learn about the relation between humans and animals.</li> <li>-Neighbours help each other to look after the animals - creates a feeling of solidarity.</li> </ul> <p><b>Negative comments</b></p> <ul style="list-style-type: none"> <li>-Not nice with barbed wire.</li> <li>-The fence poles are left during the winter.</li> <li>-Difficult to pass through styles and gates.</li> </ul>

**POSITIVE PUBLIC RESPONSE**

Formal evaluations conducted among the neighbours after the grazing season were all positive. Some of the comments expressed are listed in the table below. The positive comments were mainly from neighbours and parents of small children, while the negative comments were made by tourists and senior citizens.

Some problems recorded were vagrant dogs, destroyed fences and molesting or slaughtering of animals. The municipalities that used only sheep or sheep in combination with another species were over-represented among those who had problems.

The majority of the affected public perceived the animals as something very positive; and aside from their effect on the landscape and the environment, the animals, had an important social function as well. To get continuous positive responses from the public it is important that the animals are not only well looked after, but that it is apparent that the animals are comfortable. Contaminated drinking water or lack of feed or shelter are likely to catch the attention of the neighbours and result in negative reactions.



To maintain the positive attitude of the public it is also important to consider and improve facilities for other activities in the area. Discussions should be held with, for example, the health office (allergies, manure), the leisure office (tracks for riding, skiing and running), and the building and planning office for suitable locations of gates and openings in the fence. Informative and easily read signs about the objective of the grazing and the animals will also help to get the support of neighbours in protecting the animals.

**EVALUATING THE METHOD**

It was not considered possible to get the same results with more conventional management methods, and subsequently it was not meaningful to put any price tag on the activities. It was concluded that extensive work at considerable costs would have been necessary to achieve at least similar results. The alternative was often no management at all, and even if this method is cheaper than grazing, a value can be put on keeping the area attractive for people.

**PRACTICAL IMPLICATIONS**

It is very clear from the study that the preparations and the way the grazing project is started are crucial for the success of the project. This concerns the land, the animals, the owners of the animals and the affected public as well as the vision for the area and the desired grazing result. Careful planning and preparations for all aspects, e.g documents concerning management plans and contracts with the owner of the animals, and a clear idea about what should be achieved, will have a major influence on the success of the grazing project.

The present study relates to the situation in Sweden, however, the positive effects of grazing as a management tool for the vegetation can be obtained anywhere. Other factors such as availability of animals, ethical opinions on and interest for animals, interest of the community officials etc. will determine whether it is possible to use the method successfully. These factors are site specific and have to be looked into in each case.

# Multipurpose Plantations as a Tool for Periurban Agroforestry



Anne Oosterbaan

Walnut plantation

Multifunctional plantations offer a valuable contribution to mixed ways of periurban agriculture and forestry. They exist of a combination of trees with agriculture and produce a variety of products, offering a kind of nature citizens ask for.

Quite a radical change in thinking within (urban) forestry in a lot of European countries is that (city) inhabitants have to be involved in the design and management of their green environment. It is important then to know what citizens are asking from forests and other green elements, so as to improve design of the green space. Multipurpose plantations may contribute here, while further tackling another problem: that of negative environmental influences of intensive (mono-cropping) agriculture.

## NEEDS OF CITIZENS

Trees, plantations and forests are mostly established with the following management objectives: amenity, landscape, recreation, habitat for wildlife and economic aspects (timber).

Trees can be arranged in mathematic plantations or in natural patterns like wilderness. Generally people like nature but prefer a certain kind of nature: semi-open landscapes, easily to pass through, with open sight lines and water are often highly appreciated. A clear structure and a great variation are attractive characteristics. Different population groups have different ideas about nature. Differences in appreciation of different types of nature are mostly based upon differences in "roughness". For instance, ecology based management often leads to rough nature, which is not appreciated by everyone in the city. Higher educated people, members of nature protection organisations and young people prefer rough nature. Older people, immigrants and farmers prefer more tidy natural elements

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## MULTIPURPOSE PLANTATION DESIGN

The core of "multipurpose plantations" are multipurpose trees and multipurpose crops, preferably interacting in a positive way. Multipurpose trees are those trees that deliver a variety of tangible products like fruits, leaf, bark, twigs, timber, roots and matters for medicine or other use. Besides these direct products trees have a large scale of non-food products like protection against climatic influences (wind, snow, rain, sun), enhancing biodiversity, C-fixation and erosion control.

Crops are in general less multipurpose than trees, but some species can also deliver different direct or indirect products. Mixed grass/flower vegetations deliver not only fodder, but also a higher biodiversity and a contribution to a nice looking landscape.

Preferably trees and crop should influence each other positively. For example the shade of the trees should be used for the crop (shade asking plant species) or for the animals (cool cows produce more milk). Or the crop has a positive effect on the trees, for example by the weed control.

The concept is not entirely new. In The Netherlands a large area of fruit tree orchard with a grass layer functioned already in that way. But the multipurpose plantation design bears some new characteristics, like an attractive landscape, biodiversity, recreation

According to calculations for a walnut/recreation system in the eastern part of The Netherlands, such a system can be profitable. A comparison of a multipurpose plantation existing of walnuts and grass (mowed or grazed) with grass with subsidies for extensive management showed very good perspectives for the first one.

## Alder landscape

In many parts of The Netherlands Black Alder (*Alnus glutinosa*) used to be the framework tree species in the landscape. In the northern of The Netherlands pilots are being set up to combine education and recreation functions in small towns. By planting "quality trees" and fruit-bearing shrubs along the devastated alder line plantations, in combination with a natural shrub and rough low vegetation zone and a foot-path, several aims can be reached, like higher nature values; recreation; education and recreation and diversity in production. Other aspects under discussion are for example water management.

## LOCATION

The periurban zone is a good place to establish multipurpose plantations, since the system delivers a wide variety of environmental-friendly products. Production processes and products are available and visible to the urban citizens. The most suitable location for multipurpose plantations is the transition zone of the open landscape to the dense forest area. But also in the periphery zone of small forests they should fit very well. Perhaps the concept of "multipurpose plantations" should be tried out in different landscape laboratories.

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## Project Winterswijk

In the surroundings of a this city eight farmers and estate owners established 10 ha of such multipurpose plantations. The trees (mainly walnut) were planted in pastures with spacing of 10-20 meters. On two farms (already involved in agro tourism) fruit shrubs have been planted in otherwise unprofitable corners (red currant, black currant and white currant, blackberry, raspberry, gooseberry, hazelnut and quince) to enhance attractiveness to tourists. Also mushroom cultivation (for example Shi-i-take) on logs has been tried.

# Designing Spaces to Work the Land and Build Communities

The experience described here is part of the inter-institutional and participatory research-action project called “Optimization of the use of vacant land for Urban Agriculture through participatory planning and management programs, to promote food security and participatory municipal governance”. This project has been carried out with the Regional Office for Latin America and the Caribbean of the Urban Management Program, supported by IPES and IDRC.

In this inter-institutional project, the landscape is interpreted as a sphere for dynamic relationships, not only in spatial or temporal terms, but also in cultural and economic-productive terms. This allows the development of concrete scenarios.

The notion of “place” is understood as “the relation between natural and created space over time” (Aguilo, 1999) and has been of great theoretical and practical use. The participatory management of space thus becomes a variable which is crucial in sustainability, and thus in validating collectively agreed strategies. And subsequently, adequate linking of multidisciplinary knowledge with traditional “folk” knowledge is basic in defining criteria for the design, implementation and functioning of interventions. This approach will take into account local available resources, and respond better to the demands for appropriate spaces and equipment for low-income social groups to develop further urban agriculture activities. Furthermore, by paying close attention to

the relationship between productive and recreational spaces, the excluded and marginal urban groups of society may be included in the urban dynamic system.

## URBAN AGRICULTURE AND URBAN PLANNING

The City Master Plan (of the Planning Department) includes the Urban Agriculture Programme, since urban agriculture can play an important role in urban transformation (by virtue of its multi-functionality) if it is adequately incorporated in public policies and the political agenda (which needs a normative framework and guidelines).

The integration of urban agriculture into urban planning in the Municipality of Rosario was facilitated by the extreme economic crisis that has afflicted Argentina since 2001.

Being a diverse and collective production practice, urban agriculture has been (re)valued as an appropriate technology by people with few resources. In addition to contributing to development as an agricultural activity, it can coexist with recreational activities or serve educational purposes, all the while preserving green spaces and providing ecological benefits. In this context the challenge arises to create various productive environments according to the typology of the spaces and the social and functional demands of the population.

The challenge in Rosario at the moment is on the one hand to produce sufficient quantities (of organic products, aromatic and medicinal plants, and natural cosmetics) for the five weekly farmers’ markets and the collective agro-processing businesses, and on the other hand to generate sufficient income to



Municipality of Rosario

## View how it is and how it can be at La Paloma

improve the quality of life of poor families (which in Rosario represent half of the population). This will further strengthen the establishment of urban agriculture as a productive instrument for social inclusion of the poor in Rosario.

## GARDEN PARKS

One alternative for the use of vacant urban land is the development of “garden parks”. Also called “nature belts” they border roadways and waterways, or they are located in the midst of other urban infrastructure systems that offer empty spaces. This alternative combines agriculture and public recreation. Furthermore, garden parks address two important issues for the municipality: the lack of parks and plazas in the peripheral areas of the city and the limited municipal budget, which is insufficient to meet the growing demands for the maintenance of open public spaces.

The diagnostic study for the selection of land destined to become garden parks was based on a typology of existing and potential spaces. It looked at agro-ecological aspects, the zoning and the ownership status of the land, as well as issues related to the location and the profile of actors involved. The five projected garden parks that will soon be installed cover an area of 30 hectares, all on public land.

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Streams and their basins have been underestimated as significant natural elements of the urban landscape in cities of the Argentine flatlands. The role of flood plains has primarily been to support urbanisation, which has been normally (though not always) informal. This practice of land occupation has meant that the hydrological system has been seen as a risk to human settlements, and the natural course and flow of waterways have thus become problems to control and neutralise through public works.

It is important to put the use of this space in a broader context, by appreciating not only the aesthetic and environmental value of the resources to be protected, but also – given the continuing crisis in the country today – their socio-economic (productive) value. In this context, and with a broad and inclusive focus, environments need to be created that respond to these needs. From the socio-productive point of view, a high percentage of the flood plains are not suitable for intensive agricultural production or the installation of technical structures. These areas can, however, with little or no modification, sustain less intensive activities or become recreational areas with minimal investment and maintenance. Both uses are of growing importance in metropolitan areas of this country.

Five garden-parks have been proposed: Constituyentes, on a piece of land located over the Arroyo (Creek); Ludueña, in a municipal land reserve area; Las Flores, on the land of a former settlement that was relocated by the “Rosario Habitat” programme 8 years ago; Molino Blanco, to be installed on land that is not suited for building and that was granted because of the large environmental impact of a neighbourhood upgrading programme of Rosario Habitat; and “La Tablada”, which is planned for the green belts along the extreme southern section of the Avenida de Circunvalación.

Various factors were considered in determining the design and operation of these productive parks, such as the topography, electricity, water, pathways, visual elements, etc. These low-cost typologies of public space contrast with the traditional use of public space, which requires significant investment, and they

present a challenge to the imagination and a space for synergy and participation.

### SPECIES TO CONSIDER IN A GARDEN PARK

Since garden parks are artificial agro-ecosystems, trees, bushes and aromatic, medicinal and other plants can be included in their design to provide multiple benefits: : ornamental, environmental, nutritional and medicinal in addition to protection from wind and rain, nutrient recycling, a refuge for birds and insects, etc.

Aromatic trees and bushes are recommended because of their healthy and beneficial effects on the environment, and trees and bushes of the fabáceas or leguminous family are recommended due to their additional provision of nitrogen to the ecosystem. Trees and bushes will be located around the perimeter of each garden park, forming a living fence and serving as a biological barrier for the protection and preservation of the entire agro-ecosystem. The variety of species should be high to allow for interspersing of perennials with annual plants, native species with exotic ones, and fast-growing plants with slow-growing plants.. The tallest species are planted closest to the exterior, starting with trees, followed further in by bushes, and in the interior the lowest bushes and the annuals. The specifics will depend on the size of each garden park.

### FINAL COMMENTS

The mere possibility of transforming degraded spaces into environments that can be put to productive use by poor families looking for solutions to their daily problems is already a strong validation of the worthiness of the effort. In addition, the possibility for social integration presented by the combination of these collective activities, including public and recreational use of the spaces, represents a concrete and viable opportunity to promote values of solidarity and to recognise the diversity in terms of social status and life opportunities that characterises a city like Rosario.

The experience of different government, academic, intermediate and grassroots institutions working together in the

The design of the garden park in Rosario incorporates the following adapted species (1):

**Tree species:** Laurel (*laurus nobilis*), non-native aromatic evergreen species; Anacahuita (*Blepharocalyx salicifolius*), native aromatic evergreen; Nangapiri o Pitanga (*Eugenia uniflora*), native aromatic evergreen; Sauco (*Sambucus australis sp.*), native aromatic evergreen; Aguaribay (*Schinus molle*-California Pepper tree), foreign aromatic evergreen; Acacia blanca (*Robinia pseudoacacia*- Yellow Locust), non-native leguminous deciduous, Espinillo (*Acacia caven*), native leguminous deciduous; Ybira pita (*Peltophorium dubium*), native semi-evergreen leguminous, Chañar (Geoffrea decorticans), native evergreen leguminous; Tilo (*Tilia sp.*), non-native aromatic deciduous; Cina-cina (*Parkinsonia aculeata*), native leguminous evergreen; Algarrobo Blanco (*Prosopis alba*), native leguminous evergreen; Alamo piramidal (*Populus nigra cv. Italica*-Black Poplar) non-native deciduous; Lapacho (*Tabebuia sp.*), native leguminous evergreen; Almez (*Celtis australis*), non-native deciduous; Casuarina (*casuarina cunninghamiana*-River She-oak), non-native evergreen; Olive (*Olea europea*), non-native aromatic evergreen; pezuña de vaca (*Bauhinia candicans*-Brazilian Orchid) native leguminous evergreen; Roble (*Quercus robur*-English Oak), non-native deciduous; Alcanfor (*Cinnamomum glanduliferum*-false Camphor), non-native aromatic evergreen; Sofora (*Sopora sp.*), non-native leguminous deciduous; Lemon (*Citrus medica*) and Orange (*Citrus aurantium*); Almez (*Celtis australis*), non-native deciduous; Fresnos (*Fraxinus americana*-White Ash), non-native deciduous; Pine (*Pinus sp.*), Cedar (*Cedrus sp.*) and Cypress (*Cupressus sp.*) non-native aromatic evergreens.

**Bush species:** Tomate árbol (*Ciphomandra sp.*), native evergreen; Salvia morada (*Lippia alba*); Burrito (*Aloysia polystachia*); Poleo (*Lippia turbinata*); Cedrón (*Aloysia triphila*) and Palo amarillo (*Aloysia gratissima*) aromaticas, native evergreens; Rosmery (*Rosmarinus officinalis*) non-native aromatic evergreen; Gandul (*Cajanus cajana*); Leucaena (*Leucaena brichicefala*); Crotonaria (*Crotonaria ensiforme*).

### NOTE

1) Spanish common names for species are provided. Where applicable, English common names are also provided along with the scientific names.

framework of the “Optimization of Vacant Space for UA” has had a conceptual impact on the existing model of the city. In fact, the strategic incorporation of urban agriculture - activities and environments - in urban development has facilitated a regeneration of “nature” in the interior and outskirts of the city, as well as solidarity, improved quality of life for its inhabitants and a positive image of the city.



Municipality of Rosario

# Urban Forestry Development in Beijing: A Historical Perspective

Urban forestry is often regarded as a key ecological asset of a city. Each year many efforts are put into urban afforestation in China to make its cities more attractive and liveable. In the case of Beijing, this is even more obvious, particularly since the city is aiming to host 'green Olympics' in 2008.

The authors would like to give special thanks to the Chinese Academy of Sciences for its research grant on periurban development in China (Grant No. KZCX2-SW-318-02) and the RUIAF Programme for its activities in China.



Cecil Konijnendijk

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

According to the city's urban plan, the second green belt will be built before the Olympics in 2008. The first green belt is diminishing due to rapid urban sprawl. In this paper, we shall identify some threats to and opportunities for urban forestry development in Beijing from a historical perspective in an effort to throw some light on its future development.

## TYPES OF URBAN FORESTRY

Beijing Municipality is surrounded by mountains to the west, north and northeast, and it has a typical continental monsoon climate. Annual rainfall is about 370mm, most of which occurs in the summer, and which is less than annual evaporation. Spring is very dry and windy, and the season when Beijing is most likely to be hit by smothering dust storms from the northern desert plains of Mongolia.

The Beijing urban area is rapidly

sprawling concentrically. Given Beijing's historically compact urban core, the spatial development pattern is continuous, rather than the leap-frog development often seen in other large urban centres in the developed countries. Planning and policy efforts in Beijing seek to control this type of expansion by promoting an urban spatial structure of "dispersed constellation" through green belt construction.

There are four types of urban forestry in Beijing in terms of topography and function. The first type consists of forests in the outer suburban mountainous area owned either by central or municipal government. The function of these forests is partly ecological (conservation forestry for land erosion) and partly economic (special fruit growing). The second type, located in the inner suburban plain area, consists of netted woods with the economic function of protecting local farm fields as well as some orchards from wind and sand storms. The third type of urban forestry is the green belts established immediately adjacent to the built-up areas for growth management and environmental improvement. This is a transitional zone, and therefore this type of forestry faces the biggest challenges related to planning, implementation and maintenance. The

fourth type is the green space in residential areas. This latter type of forestation has changed dramatically over time. In the past, the green space in residential areas was usually dominated by large but few squares or parks, but nowadays more and more small gardens are placed in each neighbourhood to provide the elderly and children with more opportunities to make use of green space.

Central and municipal governments have so far played a leading role in Beijing's urban forestry development due to the unique political system and common property nature of urban forestry. Much attention has been paid to urban forestry and great efforts have been made ever since the PRC was established in 1949. During the process of urban forestation, various factors, including the political system, economic situation, market condition and especially the awareness of the local authorities, influence political commitments and practice. The following analysis will focus on the vertical development track of urban forestry policy and practice in Beijing. The discussion on the evolution of the four types of urban forestry will highlight three phases, namely the pre-open period (1949-1978), post-open period (1978-2004) and the perspective period (2004-).

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## BEFORE 1978

The government initiated several projects aiming to ameliorate the desertification and sand storms besetting northern cities. The most famous among them was the “Three-north” (Northeast China, North China and Northwest China) protective forest system, which was the largest ecological project in the world and is sometimes aptly called the “Green Great Wall”. As a part of this project, Beijing focused on forestation in its northern and western mountainous areas. In addition, forest networks were developed in the plains area. Cities such as Beijing and Shanghai are surrounded by farm fields, as part of a strategy of urban food security. But, unlike other foreign metropolises, for example Moscow, Paris and Berlin, where there are vast wild woods in the urban area, Chinese cities are densely populated and structurally compact. The most effective and economical (with regards to land) way to protect the farms in periurban and sub-urban areas from sand storms is to plant trees around plots. Generally, the network includes forests along main rivers and roads, as well as around towns and villages.

As early as 1958, the government put forward the idea that Beijing should adopt a “scattered” pattern. Ten small satellite towns were planned at the fringe of the mother town, the main body of Beijing city. Between mother and satellite towns, green spaces were developed in order to prevent the mother city from further growing and expanding. An accompanying but fairly valuable benefit was environmental improvement. The planning theory of the pre-open phase was very remarkable and innovative. However, despite the intentions expressed, there were no instructions or incentives for the implementation. The achievement was thus quite limited in reality.

Forests in Beijing’s mountainous areas were managed in the form of state-owned forest farms. For all costs, the project was fully dependent on central fiscal support, and plant choices and methods were also controlled by the central government. The policy instruments were nothing but political orders and documentation. Thus forestation was often viewed as a political task of local authorities and villagers. The forestation project failed to stimulate



**Fruit Production Output by Year in Beijing**

new initiatives, and didn’t provide local people with economic or other benefits.

## OPENING-UP PERIOD (1978-2004)

The economic reform and the opening-up policy of the late 1970s were milestones in China’s development in almost all fields, including urban forestry development in Beijing, which was transformed from government-oriented to market-oriented. Peasants began to plant more economically beneficial fruit trees, such as apple and chestnut, in the mountainous or even plain areas. The market promoted the specialisation of several high-quality fruit production bases; and the output of dry and fresh fruit production in the city experienced a fast growth from 1988 (see figure 1) when the market-oriented forestry development policy was well implemented. The model proved to be successful both in forestry construction and in improvement of living conditions. The state-owned forestry farms also developed forest parks or country parks, which are very popular for weekend recreation and the vacation tourism market in Beijing.

The government continued to play a key role in forestry and ecological environment construction. In addition to continued forest network construction, projects with more explicit functions came to the fore, including the “Remediation Project of Five Blown Sand Hazardous Regions”, “Soil and Water Conservation Forest” in mountainous areas and “Water Conservation Forest” upstream of reservoirs.

What is remarkable here is that economic incentive was integrated with policy implementation. In 1994 the government decided to open the green belt to private commercial development in response to rapid agro-land draining. In 1958 when the first green belt was planned, the area was 314 km<sup>2</sup>. But by 1983 it had decreased to 260 km<sup>2</sup> and further to 244 km<sup>2</sup> by 1993 (Yixing and Yanchun, 2000).

With an historically tightly compressed core, the urban area of Beijing kept sprawling outward contiguously beyond the built-up areas. The location of the first green belt is between the third and fourth ring road, which by 1994 was undergoing rapid transition as the frontier of new development and suffering from unstable management. This was also a time when the real estate market was hectic and chaotic.

However, the green belt policy effort proved to be not fully successful. The area of the first green belt kept decreasing and by 1999 had become as small as 241.37 km<sup>2</sup>. Urban land use occupied almost half of the total area.

The reasons for green belt loss are numerous. First of all, the implementation procedure was problematic. The aim to rebuild villages on the remaining land within the planned green belt was actually unrealistic. As the housing and other industrial construction increased, the forest area thus inevitably decreased. The decision by the municipal government to transfer part of the land to real estate developers and manufacturers made things even worse.

Secondly, local officials tend to pursue short-term economic profit without considering the long-run effect. In China, officials are not elected locally, but are appointed by higher level government. So in order to obtain promotions, local officials need to show political performance and local economic growth during their term, which usually runs four years, instead of seeking sustainable development. Land transfer to commercial housing offers a shortcut to visible economic improvements. Thirdly, huge profits from development in this desirable area further stimulate the rent-seeking activities of both enterprises and governmental officials, resulting in problems of corruption and a drain of state-owned assets. The result is thus that green land is converted for other – more profitable – uses.

## ONGOING SITUATION (2004-)

Nevertheless, urban forestry development in Beijing has achieved remarkable progress after decades of effort. According to a recent survey organised by Beijing Forestry Bureau, the total value of the forestry assets in Beijing

is 231.3 billion RMB (28 billion US\$), if one takes into account the direct value (wood), ecological value, water and soil conservation value, environmental value, etc.. By 2002, the overall urban forestry coverage ratio was 45.5%, while in mountainous areas the corresponding figure was 62% and in plain areas 25%. 39% of the urban area was covered by green space, or roughly 42 m<sup>2</sup> per capita. The problem of sand and dust storms has been noticeably ameliorated and more and more green spaces are seen in various residential areas.

More importantly, in 2004 the authorities put forward a detailed scheme for the second green belt. There are many similarities between the first and the second green belts. They are analogous in form, function and background, and in morphological terms they are both ring belts with several wedges that limit

### **the green belt cannot be well managed and protected if it lacks visible economic benefits for the local people**

construction in forestry areas and thus aim to prevent the city from sprawling uncontrollably (see map). The new green belt will be located between the fifth and sixth ring roads, again the most dynamic region of Beijing. While the first green belt segregates constellations from the main mass, the second belt will attempt to restrain the expansion of satellite cities and central towns in inner periurban areas.

The differences between the two green belts reflect the differences between the past and the future. Experiences and lessons can serve as excellent references in constructing the second green belt, and as a result, many amendments in the implementation measures have been made. The first amendment is that raising funds for local revenue will not solely depend on the transfer of land for commercial housing development, since this proved to be a dangerous approach. A new and more sustainable means has thus been devised to ensure that the local farmers can get real benefit from their protection of the green land through various job opportunities.

Another critical difference between the implementation plans of the two green belts is the maintenance of administrative titles for involved towns and villages. In the first green belt the names of former villages were converted directly to urban districts, whereas in the second green belt administrative classifications will remain constant. As a result, farmers can choose for themselves whether to transfer their land to urban use and acquire the agreed upon compensation, or to manage new green industries individually or collectively.

Farmers are exposed to many more opportunities for creating profitable businesses in the new economic situation, compared with when the first green belt was established. On the one hand, the successful experience of the mountainous areas can be cited. The land use limitations established at that time can be viewed as a turning point in promoting agricultural industrialisation and urban agricultural development, e.g. economic forests, fruit trees and agricultural sightseeing. The latter is noticeable in the emergence of the “experience economy” pertinent to megacities and market economics. On the other hand, with the improvement of citizen’s living standards and the emergence of a new consumers’ market, it is wise to develop outdoor recreational and tourism facilities including sport parks, country parks and amusement parks for skiing, excursions, etc..

Real estate development remains a feasible option as previously stated. A case in point is Wenyu River, a low-density villa community in Northeast Beijing between the third and fifth ring roads. It resembles green belts in Australia, which formed spontaneously and consisted of well-planted, high-income communities. The upper classes pay for environmental amenities, resulting in a green belt that is built up steadily without governmental funding.

### **COMMENTS AND FUTURE PERSPECTIVE**

The upcoming 2008 Beijing Olympics and lasting urban development and sprawl further amplify the significance of urban forestry. The authorities boast that the 2008 Beijing Olympics will be a “green, humane and high-tech” event. As a result, the green belt efforts will

certainly be continued and promoted.

Economic development is clearly the main theme of urban forestry in Beijing and good management makes a difference in providing successful and sustainable outcomes. A good balance between ecological and commercial benefits of wood resources management will not only make a great contribution to environmental protection and improvement, but also the green GDP.

What lessons can be learned from the first green belt? The main reason for its failure was its sole ecological function. Located in a transitional region, where land use is very competitive, the green belt cannot be well managed and protected if it lacks visible economic benefits for the local people. They will make every effort to develop the local economy even if it means damaging the environment. The aforementioned Wenyu River villa community is an example of one of the ways that residents pay for their environmental benefits. They are willing to pay a high price for their amenities and at same time they bring a good return to the local economy.

In conclusion, only by associating development with sustainable economical or amenity benefits can we effectively facilitate the implementation of urban planning. The story of two green belts in Beijing provides us with a good example of the importance of economic considerations in city planning and urban forestry development. The second green belt in Beijing can have a promising future if the current policy is well implemented and the local economy is developed through optimal utilisation of the forest. Otherwise, the same threats that gradually undermined the first green belt, i.e. real estate development and other land uses, will also threaten the viability of the second one. In fact, successful development of the green belt or forests depends on maintaining their diversified functions

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# Building a Sustainable Urban Forest

This article was earlier published in Land Development Today (<http://www.landdevelopmenttoday.com/Article102.htm>) and several articles on or related to this subject have appeared in Arbor Age (<http://www.championtreeproject.org/ArborAge/Launch.htm>) and the Florida Urban Forestry Council Quarterly (<http://www.fufc.org/information.html>)

**In the United States it is estimated that 90 percent of the entire population now lives within the boundaries of what is commonly called the “urban forest” - a term used to describe the sum total of all vegetation growing in urban and community areas, including the city centre, city residential, suburbs and suburban fringe.**

**T**he total yearly economic value of urban forest storm water services alone is more than \$400 billion (National Alliance for Community Trees). Many other valuable services furnished by trees are now required due to various government initiatives, to promote energy conservation and reduction of atmospheric and water contaminants. In some instances, the desire for improved social and professional aesthetics is a motivating factor as well.

To achieve sustainability of our rapidly expanding urban ecosystems and deliver the maximum level of benefits to the inhabitants, the urban forest must have all of the following three components: 1) a healthy tree resource, 2) comprehensive management, and 3) community-wide support.

## HEALTHY TREES

As the engine that drives the urban forest, the healthy tree resource is the most important component in the system. As designers or implementers of the sustainable urban environment, land development professionals should be aware of the quality of trees that will be placed into their plans. The remaining tree resource criteria necessary for urban forest sustainability are canopy cover, age distribution, species mix, and soil volume and composition.

Though the ideal amount of canopy cover will vary by climate and region, there is an optimal degree of cover for every

urban area. Geographic information system technology can be used to map and analyse the workings of the urban forest. It can be demonstrated that a 65 percent loss of canopy cover in Atlanta since 1972 has led to a 9 degree rise in average urban temperature (Trees Atlanta). The city of Milwaukee, with only a 16 percent canopy cover, can point to 22 percent reduction in storm water flow and a saving in city taxes of \$15.4 million by not having to build additional storm water retention capacity. At the household level, it is now possible to determine how much canopy cover is needed to cover a family's oxygen need and offset its carbon dioxide emissions.

A mix of young and mature trees is essential if canopy cover is to remain relatively constant over time. Some level of tree inventory is necessary to monitor this. There is tremendous genetic potential for developing superior landscape trees. Unfortunately, few trees currently grown and sold as clones in the nursery trade have been purposely developed and thoroughly tested for resistance to environmental stress. And relatively few native trees have been cloned for landscape use.

Experience with species-specific pests has shown the folly of depending too heavily upon one species, no matter how good the quality. For diversity, the best clones, cultivars should be used, and seedlings of many species and genera should be distributed throughout the city either as scattered strips, uniform blocks or mixtures of individual trees along parkways and in parks. When selecting tree species, it is important to emphasise native trees, which are well adapted to the local climate and support native



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wildlife. *For maximum protection against unusual weather or pests, the urban forest should contain (1) no more than 10 percent of any species, (2) no more than 20 percent of any genus, and (3) no more than 30 percent of any family. This way, species-specific tree death will not cause devastation on the landscape because no more than 5 or 10 percent of the trees will likely be affected.*

## Opportunity lost?

The U.S. Department of Agriculture initiated a noble but ill-fated national project called the Urban Resources Partnership to provide a basis for recognising the value of the natural resources in urban areas and create local actions to care for them. The South Florida Community - Urban Resources Partnership was formed to assist with the restoration of the entire south Florida ecosystem. Before its demise, this four-county Urban Resources Partnership successfully crossed traditional political boundaries and embraced the need for a sustainable urban forest to help the \$8.7 billion Everglades Restoration project achieve regional sustainability. However, in spite of this isolated success, the national programme was terminated due to political bickering.

Urban trees planted in large open volumes of soil have growth and health dramatically superior to trees in contained root zones. Insufficient rooting volume in urban situations often leads to unhealthy trees and/or property damage where roots outgrow the planting pit and spread immediately below the pavement surface, eventually destroying the pavement. Emerging technologies can be utilised to increase rooting volume under pavement without damage, or to replace minerals and trace elements that have been leached away in the past due to erosion, acid rain, and chemical agriculture.

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A sustainable urban forest is fundamentally dependent on the health of the tree resource. The optimal structure of urban forests, both above and below ground, remains the subject of ongoing research.

### COMPREHENSIVE MANAGEMENT

Comprehensive management of the urban forest requires a broad set of activities, including management of single trees as well as large stands, education of the community at large, and coordination between bureaucracies that are accustomed to acting independently. Principles of ecosystem management argue for a natural scale based on ecological boundaries such as entire watersheds. However, political borders do not respect biology. In the rush to make cities modern marvels, nature has been fine-tuned out of the design process, ignoring the ecosystem cycles of energy, nutrients, air and water. To build a new awareness of urban communities as ecosystems, therefore, the natural and man-made infrastructures that make up our communities, the ways they interact, and how the urban forest fits in need to be re-examined.

New policies need to be developed that promote positive environmental actions. Community leaders need better

A project called Transagency Resources for Economic and Environmental Sustainability (T.R.E.E.S.), developed by TreePeople in Los Angeles, proves that there are enormous economic, environmental and social benefits to be gained through a cooperative approach to designing our urban ecosystems as functioning watersheds. Using a sophisticated GIS-based cost-benefit computer-modelling program, T.R.E.E.S. successfully demonstrated that having public agencies, private landowners, the green industry and neighbourhood groups share the same vision of the urban forest is a crucial element of sustainability. (<http://www.treepeople.org/trees/cba.htm>)

information about the costs and benefits of their urban ecosystem: “you can’t manage what you can’t see”. Geographic information system (GIS) technology now assists in mapping and analysing the urban ecosystem and illustrating the benefits provided to the community.

Sophisticated cost/benefit analysis has been designed to produce reliable data on a range of practical, cost-effective measures with the potential to improve the environment while generating non-monetary social benefits, to describe their effects and make maximum use of the best existing information.

### COMMUNITY-WIDE SUPPORT

Trees are important in mitigating carbon dioxide emissions, air pollution and storm water runoff; reducing energy costs, crime rates and medical bills; and enhancing biodiversity by improving liveable conditions for most life forms. It is therefore no wonder that experts promote healthy urban forests as a key environmental component of regional, national, and global sustainability. And yet, USDA Forest Service experts estimate that less than 10 percent of the U.S. population understands or cares about natural resource management.

Recent advancements in tree care and best resource management practices have clearly demonstrated that there is sufficient knowledge and technology to physically build and maintain sustainable urban forests. But how do we generate the collective will to do the job without community-wide support? The simple answer is that we don’t. People take themselves seriously, but concern for oneself does not seem to expand sufficiently to embrace concern for the species — and definitely not for all species and ecosystems. This is why the urban ecosystem holds the key to global sustainability. The urban ecosystem is where the vast majority of people live. If we can’t sell the idea of sustainable urban forests to the people who inhabit them,

### ISA

The International Society of Arboriculture (ISA) is a worldwide professional organisation dedicated to fostering a greater appreciation for trees and to promoting research, technology, and the professional practice of arboriculture. The ISA has served the tree care industry for over seventy years as a scientific and educational organisation. ISA was founded in 1924 when a group of forty individuals, each engaged in a phase of tree work or research, were called together by the Connecticut Tree Protection Examining Board to discuss shade tree problems and their possible solutions. It was during this meeting that the group identified a need for gathering tree care information and for providing a means for its dissemination. The National Shade Tree Conference (NSTC) was founded soon thereafter. Due to its influence and membership spreading beyond the borders of the United States, the organisation changed its name to the International Shade Tree Conference (ISTC) in 1968. Only a few years later, in 1976, in order to more accurately reflect its broadening scope, the name was again changed, this time to the International Society of Arboriculture. ISA continues to be a dynamic medium through which arborists around the world share their experience and knowledge for the benefit of society. ISA, aligned on many fronts with other green organisations, is working hard to foster a better understanding of trees and tree care through research and the education of professionals as well as global efforts to inform tree care consumers (<http://www.isa-arbor.com/home.asp>).

then we have little likelihood of convincing others.

As a critical element of sustainability, the public must gain greater awareness and understanding of, and must be willing to support urban forests and comprehensive ecosystem management. A proactive approach is necessary that employs full-time media and marketing (<http://www.greenmediaonline.com/aa/2003/0302/0302tale.asp>). Creative and frequent messages and innovative educational methods are needed to reach the youth. Sustainable urban forestry holds the key to saving our cities.

New principles and practices have been discovered to reinvent cities in the new century. By following these principles and implementing urban-forest-based best management practices, cities can become economically and environmentally sustainable as well as aesthetically uplifting and enlivening for all who dwell there.

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# Economics and Public Value of Urban Forests

Scientific understanding of how urban trees, forests and green space benefit people has expanded substantially in recent years to include social, environmental and economic domains. Despite increasing scientific evidence, there is a lag in policy response in many municipalities.

Local government policy, regulations and even departmental activities regarding trees and green space are often premised on urban planning and design traditions that regard urban nature as the “parsley around the pig.” There are notable exceptions, but few local governments have developed citywide, comprehensive frameworks for planning and managing urban green to achieve specific purposes or functions.

Too often, parks, urban agriculture gardens, forests and other city green are managed on a site-by-site, haphazard basis. Urban forests (and all urban natural capital) can be thought of as green infrastructure. Research has demonstrated that forest benefits are optimised by citywide, long-term management so that urban forests attain their highest productivity. The term “public value” describes widely held public perceptions regarding the function and service contributions of any public entity (Moore 1995). Perceived public value plays an important role in strategic public services management. Urban forests (and agriculture) will be adequately planned and stewarded only if urban citizens and elected decision makers recognise and understand the full range of services that trees and green space provide. Expanded public value perceptions precede commitments of adequate budget and staff resources for urban forest infrastructure.

**Urban forests are green infrastructure**

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Guy Kramer

Enjoying walking under the trees

## URBAN FOREST ECONOMICS

Economic valuation translates urban forest services and functions into terms that enhance public value. The urban forest is an urban resource system that can be cultivated and stewarded on all lands within a municipality, including private and public property, as well as in all socioeconomic zones. While definitions vary, this paper encompasses all trees and forests in cities, from trees placed in street sidewalks to wooded patches. 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. Industrial forests are managed for market goods. Dynamics of supply and demand establish prices and revenues for resource products, such as timber. In contrast 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 or multiple people doesn’t diminish the encounters of others, which is considered a non-rival situation by economists (Daly and Farley 2004).

There are few private firms willing to invest in public goods, for the nonexclusive and nonrival conditions of the urban forest will rarely generate profits. Government agencies have traditionally invested in public resources that members of society intuitively accept as providing value, such as education or emergency response systems. Sustained political support of such investments is more likely if economic benefits can be demonstrated.

Economists have developed theory and methods for assessing public goods values. Many approaches were first developed to assess the economic value of non-market wildland resources, and are transferable to urban settings. Urban valuations often start with a small-scale scientific study.

*Valuation studies* have addressed many facets of urban forest benefits. Multiple models and methods have been applied to

### Economic valuation approaches:

Economic valuation methods can be applied to a variety of situations, including planning for urban green. Here are a few key concepts about valuation:

- Use value – Goods that are harvested from green space (such as food or fuel) may have market value, or substitute for market goods.
- Environmental services – Natural areas and ecosystems provide services to society (such as stormwater reduction or air pollution mitigation) and the costs of creating such services using built systems are deferred.
- Hedonic pricing – The value of an amenity (such as the effect of a park on a home price) is determined as an increment of purchase price.
- 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.
- 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 walkable.

conditions in North American cities, and adaptation to other regions is possible. Urban forest functions and benefits should be enabled in all districts of metropolitan areas for they are important to the full spectrum of socio-economic groups (Dwyer et al. 1992).

### ECONOMIC DEVELOPMENT SERVICES

Urban forests can be planned to directly affect the economic development of a municipality or region. The most *direct valuation* is to estimate marketable goods, or the value of purchase substitutes. For example, urban agroforestry practices can produce human and animal foods and medicinal materials, thus contributing to urban food security. Localised food production reduces the costs of distribution systems needed if food is transported from rural areas. Useable non-timber forest products include animal fodder, building materials, fuels, and handicraft materials. Aging trees will be removed to prevent injury and property damage; urban wood utilisation programmes provide materials to artists, furniture makers and homebuilders. Diverse forest products can be inventoried across a city, and *use values* then compiled, based on prevailing market prices. Regions with a tourism industry can use visitor surveys to tally expenses incurred by forest and green space users using the *travel cost method*. Users living nearby may spend little,

while others may travel some distance, and their spending on meals, fuel, accommodations and souvenirs can be pro-rated depending on the amount of time dedicated to a park or forest visit as part of a total trip.

*Hedonic or amenity pricing* is the measurement of a price increment that correlates to a desirable condition or situation. Numerous studies (in North America) have concluded that a quality forest or green space has a positive economic ripple effect on nearby properties (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. These values are capitalised by a municipality when property taxes are assessed, or when taxes are paid on a property sale. One study found that rental rates of commercial office properties were about 7 percent higher on sites having a quality landscape, including trees.

Studies on how trees affect shoppers' behaviour in retail business districts employ the *contingent valuation method*. Consumers claim they are willing to pay about 9 to 12 percent more for products in downtown shopping areas with trees, versus in comparable districts without trees. Customer service, merchant helpfulness, and product quality are all judged to be better by shoppers in places with trees.

### ENVIRONMENTAL SERVICES

Ecological systems provide a myriad of services to human societies. Ecological economists have applied valuation models to the environmental services that are provided by the world's forests, wetlands, oceans and other natural areas (Daily 1997). Most of these calculations have addressed non-urban situations, but recent work is city based. Using digital satellite imagery and aerial photographs, the extent of

historic and current levels of urban forest canopy cover have been calculated for thirty North American cities (American Forests 2004). Based on modelling of air pollution and stormwater mitigation and energy impacts the annual values of urban forest services are estimated. For instance, the Urban Ecosystem Analysis of the Washington, D.C., metropolitan area concluded that tree cover had reduced stormwater storage costs by US\$4.7 billion and generated annual air quality savings of \$49.8 million. Micro-scale studies focus on street tree costs and benefits. Costs include tree planting, irrigation, pruning and other maintenance. Calculated benefits include energy savings, reduced atmospheric carbon dioxide, improved air quality, and reduced stormwater runoff. This economic data is mathematically combined to generate per tree net benefits figures. For instance, a 2002 analysis for Seattle (U.S.A.) indicated that per tree average annual net benefits were \$1 to \$8 for a small tree, \$19 to \$25 for a medium-sized tree, and \$48 to \$53 for a large tree (CUFR 2002).

Environmental benefits modelling is often based on deferred costs; that is, if trees were not present, property owners or the government would have to invest in additional engineered infrastructure or equipment to remedy environmental problems. For instance, a tree canopy intercepts rainwater, thereby reducing the amount of water falling to the ground and running off into stormwater collection systems, thus saving a city the construction costs of greater capacity pipes and storage facilities.

Valuation models incrementally include additional environmental functions. Dysfunctional urban natural systems impact the lives of millions of people. Tree planting and management can be

Property values of homes in or adjacent to parks are higher



Guy Kramer



used to stabilise soils, reduce erosion, prevent floods, reduce particulate air pollutants and improve groundwater recharge – all with economic consequences.

### HUMAN SERVICES

Human health can be assessed for economic value in two domains – physical and mental conditions. Urban people lead more sedentary lives, which increases the numbers of urban dwellers who are overweight or obese. These conditions contribute (over the life of the average person) to increases in chronic disease, such as diabetes, and traumatic diseases, such as cancer and heart disease. National health organisations in the U.S. have conducted baseline studies on personal activity levels, and how to motivate people to engage in basic physical activities, such as walking and biking. Other research explores how enabling forms of urban design (such as street layout, the presence of sidewalks and the proximity of parks) encourages activity.

The economic consequences of routine, mild exercise are enormous, when aggregated across entire cities or nations (CDC 2004). Again, deferred costs are possible, as medical expenses are lower for people who engage in routine physical activities and exercise. The youth are particularly at risk in the U.S. Estimates for obesity-associated annual hospital costs for youths averaged about \$35 million between 1979 and 1981, and nearly tripled to \$127 million during 1997-1999. Weight-related medical expense trends for adults are equally alarming. Inactive adults who increase their participation in regular moderate physical activity may save about \$1,000 per year.

Mental health is a second arena of health benefits with economic consequences. The presence of trees and “nearby nature” in

human communities generates numerous psychosocial benefits. Kuo and partners (2003) have found that having trees within high density neighbourhoods lowers levels of fear, contributes to less violent and aggressive behaviour, encourages better neighbour relationships and better coping skills. School children with ADHD show fewer symptoms and girls show more academic self-discipline if they have access to natural settings. Hospital patients recover more quickly and require fewer pain-killing medications when having a view of nature. Office workers with a view of nature are more productive, report fewer illnesses, and have higher job satisfaction. These are important, but often unnoticed, effects for urban people who have views of trees and nature in the course of their normal, everyday activities and experiences. Although much work remains to be done, in theory all of these scientific findings could be translated to economic values.

### GREEN INFRASTRUCTURE STRATEGY

Elevating the status of trees and green space in municipal leaders’ agendas and budgets depends on making the case that nature’s assets, if well managed, provide favourable economic returns for the entire community. This outlook contrasts with the attitudes in many jurisdictions that trees and green space are discretionary spending items, and are of low priority when measured against other municipal needs that are assumed to more directly address human health, safety and welfare. Repositioning the political status of urban forests has to be followed by supportive actions and a consistent supply of resources for implementation. Optimisation of benefits and values requires a comprehensive and systematic, or green infrastructure, approach to conserving, creating and stewarding urban forests.

A citywide assessment of tree and forest occurrence is an essential activity. Even the most rudimentary inventory will enable strategic improvements. Knowledge about forest resources and land use enables planning for multi-purpose use of urban lands to multiply economic returns. For instance, lands that are dedicated to other infrastructure purposes, such as power line corridors, can be managed to grow products for nearby neighbourhoods, from fuel wood to food. In Japan urban green spaces are planned for both recreational use and as staging areas for disaster relief services, if ever needed.

In the best of situations urban forestry involves an ecosystem approach of urban tree management encompassing long-term planning, interdisciplinary professional coordination and local participation. Ultimately the aim is to secure the health and vitality of urban forest resources, and, thereby the sustained delivery of benefits for current and future generations of urban dwellers.

The economics of wild land renewable resources and ecological systems has received much attention in recent years. Valuation of the services of regional and even global ecosystems has expanded social perceptions of nature and of how the production capacity of ecosystems far exceeds the traditional market commodities that may be associated with them. Fewer comprehensive studies have been done regarding the public goods of urban resource systems. While theory and valuation approaches may be similar, city settings can be more complex landscapes, making it more difficult to isolate the specific economic contributions of nature. Yet the effort continues, providing compelling reasons for cities to justify continued and consistent investment in urban trees and green space.

A city would never build a road, water or electrical system piece by piece, with no advanced planning or coordination. Green infrastructure is the idea that nature in cities should be administered in an integrated way, just as grey infrastructure systems have been. Green infrastructure planning includes: identification of elements and functions; needs and desired services; adequate mapping and monitoring; cost/benefit assessment; and strategic planning of nature capital improvements, in phases if necessary (more information at: [www.greeninfrastructure.net](http://www.greeninfrastructure.net))

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# The Policy, Legislative and Institutional Framework for Urban Forestry in Zimbabwe

The mismatch between the huge demand and consumption of forestry products in Zimbabwe's urban areas, and the poor development of urban forestry as an important sector prompts one to take a look at the legislative, institutional and policy framework for urban forestry in the country.

The concept of urban forestry in Zimbabwe is applicable to pockets of forested plots that remain in the urban areas, as well as to newly established woodlots and vegetated parks for recreational and aesthetic purposes. Urban forestry also covers the planting and maintenance of ornamental trees, shrubs and bushes along the main streets, roads and avenues, by private residents to beautify their homes, and in undeveloped areas.

Urban trees and forests provide firewood for energy, timber for use in construction, fruits, medicines and other useful minor forest products. Wood is still the main source of cooking energy, because alternative sources, when available, are unaffordable to the majority of urban residents. It is illegal to harvest and market forestry products without a permit, wherever they are found. Despite the existence of such legislation there has been serious loss of trees within the major urban centers in Zimbabwe. The loss of trees within urban areas has led to another problem, that of long distance marketing of firewood. This has resulted in a number of rural lands surrounding the urban centres such as Harare, Chitungwiza, Bulawayo and Gweru losing trees for firewood.



Urban trees and forests provide many products

## THE (NATIONAL) POLICY FRAMEWORK

The forests that the government is concerned with and that are specifically mentioned in government's policy are not located in the urban areas of Zimbabwe. About 54% of the land area of the country (21 million hectares) is under woodland and forest. None of these recognised forests are located in the urban areas of the country as the draft policy clearly shows. It therefore does not make any specific mention of urban forests or the need to protect, create or conserve them. The policy does, however, give general strategic directions on the management and conservation of forests in the country. Some of these strategic directions can be used from a policy point of view to encourage the creation of urban forests in the country.

These strategic directions include the strengthening of the Forestry Commission's capacity to provide advice and support for implementing sustainable forest management programmes.

## FORESTRY COMMISSION

The Forestry Commission, established in 1954, is the sole government institution that is directly tasked with managing

forestry areas and forestry issues in the country. Its responsibilities include: advice on all forestry matters and making recommendations to the Minister of Environment and Tourism; control, management and exploitation of state forests, forest nurseries and plantations; establishment, maintenance, improvement and renewal of plantations and forest nurseries. Given these wide-ranging powers and adequate resources and capacity, the Forestry Commission in Zimbabwe can play a pivotal role in ensuring the growth of urban forestry in the country.

## THE LEGISLATIVE FRAMEWORK

### National Laws

The Forest Act: Chapter 19:05 is the principal Act dealing with forest issues in Zimbabwe. It provides for the establishment of a Commission for the administration, control and management of state forests. It also provides for the setting aside of state forests, protection of private forests, trees and forest produce, control of tree cutting for mining purposes, conservation of timber resources and the compulsory afforestation of private land. The Act deals extensively with forestry issues in the country generally without specifically touching on the issue of urban forestry.

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There are general provisions in the Act that can, however, be used to address the issue of urban forestry.

#### *Protection of private forests*

Section 37 of the Act states that "The owner of any private land who has placed or intends to place such land or any portion of such land under a system of forest management approved by the Forestry Commission may make an application to the Minister for the declaration that such land or a portion of such land shall be protected under this Act". Most of the titled land in the country is located in the urban, farming and plantation areas with rural land regarded as state land. Only those who hold title to their property can therefore make use of these provisions to establish private forests on their land. Urban dwellers can therefore also take advantage of this provision by making sure that they establish plantations on their land, which will then be protected by the law. A big incentive provided by this provision is that the forest cannot be accessed or destroyed by other persons since it enjoys the protection of the law. The owner of the forest on the other hand is not restricted in the way that he or she may use or exploit the forest and its produce (Section 42 (a)). Indigenous timber on private land is, however, subject to Forestry Commission and Ministerial regulation regarding its exploitation for sale or manufacturing purposes.

#### *Compulsory afforestation of private land*

In its preamble, the Act provides for the compulsory afforestation of private land. This is usually done when the private land is degraded and run down and the owner has made no effort to rehabilitate the land leading to other environmental problems like soil erosion and siltation of public rivers, dams and other water sources. The Forestry Commission is then allowed to force the owner of the private land to afforest his/her land. As indicated earlier, land in the urban areas is usually privately owned and when an owner of urban land is forced to afforest the land, urban forestry will be promoted in the process.

#### *The Environmental Management Act*

This is one of the newer pieces of legislation in Zimbabwe that are regarded as progressive in that they look at issues from different perspectives, i.e

from the environmental, social, economic and developmental perspectives and in relation to global trends. The Act touches on forestry as an environmental issue, particularly the control of invasive exotic species, which will be of relevance to the establishment of plantations in Zimbabwe, usually established using exotic trees. The most popular exotic species that are used in the establishment of plantations in Zimbabwe include the Australian wattle, the pine as well as eucalyptus trees. The three species have not been declared exotic species by the government although the wattle is considered as such by environmentalist and conservationists.

#### **MUNICIPAL BY-LAWS**

Local authorities in Zimbabwe are allowed to make by-laws to govern issues that occur within their areas of jurisdiction. There are by-laws that have been put in place by some urban local authorities to deal with the issues of urban forestry, amongst other things. Harare and Bulawayo are the two largest cities in Zimbabwe.

#### *City of Harare By-laws*

The Harare (Trees and Plants) By-laws Statutory Instrument 141/1987 allow private individuals to plant trees or any other plants in public places as long as they have permission of the Director of Works in the Council. Section 4 (1) states that "No person shall without the consent of the Director of Works plant any tree or plant in or upon any public open space, public street, road, footpath or sidewalk". The reverse of this, however, is that with the authority of the Director of Works, a person can plant a tree or any other plant in the mentioned places in the City of Harare, thereby promoting urban forestry. The planting of the trees or plants is to be supervised by the Director of Works, who is also supposed to determine whether any expense in relation to the planting of any tree or plant shall be borne by the person applying to plant the tree or by the Council. In terms of section 8 of the by-laws, it is an offence to willfully and without the prior written authority of the Director of Works, destroy, damage or remove any tree, tree guard lawn or flower bed from any place where it is planted. The by-laws do not only promote the growth of regulated urban forestry in the city by allowing the

planting of trees but also ensure that the trees are protected in order to sustain the growth of urban forestry.

The Harare (Control of Vegetation and Waste Material) ) By-laws Statutory Instrument 704/1982 require the owner or occupier of any private land to ensure that the vegetation that occurs on their property, whether natural or introduced, is kept in a neat, clean and tidy condition. By implication such owners and occupiers are by law allowed to plant and maintain trees and other plants provided they keep them in a tidy condition.

#### *City of Bulawayo By-laws*

Section 10 of this city's by-laws states that "No person shall cultivate any municipal land or plant, sow, tend or reap any plant, shrub, bush, flower, vegetable, fruit or crop on any municipal land without the prior written approval of the Council" The by-laws clearly allow cultivation of municipal land provided authority has been sought from the Council. The types of plants that can be planted on this municipal land are not limited and therefore forestry can be accommodated in the context of these provisions. The only hurdle is that there are no regulations in this city that specifically provide for the planting and management of trees, which could be used confidently in promoting urban forestry in the city.

#### **CONCLUSION**

Forests and forest produce and resources in Zimbabwe are respected and regarded as immensely beneficial to the country and its people with respect to their cultural, economic, social and aesthetic values. In communal areas people depend on the forests for fuel, food, medicine, pasture for their livestock, poles for building their homes and many other things. In the urban areas on the other hand forests are a way of beautifying the landscape and can be a source of income if managed on a commercial scale. Either way they play an important role, hence the need to revisit the legislative, policy and institutional frameworks for urban forestry in Zimbabwe. There is a need to positively and specifically provide for urban forestry so that forests are established and nurtured in urban areas where they have been destroyed by development.

# Urban Greening and Health: merging the issues in Kenya

**Urban trees protect reservoirs from erosion and siltation, stabilise hilly or sloping areas, minimise air pollution through carbon sequestration and improve health and safety conditions in urban environments. In addition, beautification of cities through tree planting can stimulate investment, develop business and increase opportunities for sustainable industrial development.**

**B**ased on this premise a major actor in Kenyan civil society, i.e. the trade unions affiliated with forestry and the building sectors in Kenya, together with a European partner (FNV-Bouw Netherlands) and under the umbrella of the International Federation of Building and Wood Workers (IFBWW), initiated greening activities in industrial sites/workplaces as a campaign tool to advocate for improved health and safety conditions at the workplace. The three unions, i.e. Kenya Union of Printing, Publishing, Paper Manufacturing and Allied Workers (KUPRIPUPA), Kenya Quarry and Mine Workers Union (KQMWU) and Kenya Building, Construction, Timber, Furniture and Allied Employees Union (KBCTF&AIEU), jointly run this forestry project as a component of an occupational health and safety and environment (OHSE) campaign to advocate for safe working conditions (Opanga, 2003).

Among the challenges that the initiative attempts to tackle are the decreasing health and safety conditions at the workplace, which are caused by the lack of active joint Health and Safety Committees, low income of urban workers (that is insufficient to meet basic living requirements), low participation of industrialists in the forestry and building sector in tree planting activities, lack of wood resources for supplying industrial processes, and last but not least, the

decreasing aesthetic look of industrial sites and hazardous conditions at the workplace.

## APPROACHES

Several approaches are being implemented, including tree planting campaigns, training workshops, and the use of audio visual tools such as videos and posters, all of which are targeted at industrial sites in Nairobi city and in the small urban centre of Webuye in Western Kenya. In Nairobi, two industrial sites have so far been “greened”. These sites were chosen because they constitute a strong membership base for the participating unions. The “workplace forestry” project was launched in Athi River Mining Ltd., whose workers are affiliated with KQMWU. Over 500 trees were planted at this site to moderate temperatures, restore value to the mines and enhance the aesthetic value of the site. Species selection for the quarry rehabilitation depended on such characteristics as hardiness (i.e. resistance to harsh conditions), ability to fix nitrogen, and a spreading root system, among others. At the second site – All Pack Industries Ltd. – 150 trees of various species were also planted. Workers at this company are affiliated with KUPRIPUPA. Trees planted at the sites were selected based on such features as evergreen leaves, deep rooting systems, spreading crown for shade and a physically attractive morphology.

The tree species planted on the two sites include: *Azadirachta indica* (neem), *Schinus molle* (pepper tree), *Grevillea robusta*, *Prunus africana*, *Olea africana* *Bischofia japonica*, *Araucaria angustifolia*, *Cassia siamea*, *Callistemon citrinus*, *Casuarina equisetifolia* and fruit trees such as *Mangifera indica* (mango) and *Persia americana*, among others.

This kind of industrial campaign attempts to lure the management of such companies to participate in urban forestry activities as a way of enhancing their position in matters pertaining to Corporate Social Responsibility (CSR). Training on basic tree management, tree



Dennis Osino

## Tree planting exercise at All Pack Industries

nursery development and silviculture techniques are made available to workers via workshops and seminars organised by the IFBWW. In Webuye, Western Kenya, the initiative has established a tree nursery with a variety of seedlings for urban agroforestry, including fruit trees and ornamentals. These seedlings are used during tree planting campaigns on important calendar days such as the World Environment Day, Workers Memorial Day and National Tree Planting Days. The initiative currently involves hilltop afforestation in collaboration with Webuye Municipality, the Forest Department and gateway communities in the area. To ensure that food security and living conditions are improved, the initiative involves communities in rehabilitating water springs and protecting water catchment areas through agreed partnership arrangements. Posters emphasising the importance of tree planting are frequently disseminated at workplaces to ensure that workers continue to play a key role in the development of their urban environment.

## LESSONS LEARNED

The ongoing initiative is internalising the lessons learned by participating in joint fora organised by policy players, such as District Environmental Management Committees, and by promoting important calendar days such as National Tree Planting Day and World Environment Day. Partnerships and alliance building among trade unions, industrialists, municipal or local councils, the forest department and local communities have enabled the initiative to attain success in areas such as resource mobilisation. Through this joint approach, the programme has developed a participatory

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action plan with defined roles for local communities, trade unions, industrialists and government agencies.

The skills and tact of the trade union movement in organising campaigns can serve as a useful example for the lobbying and advocacy efforts of other actors in civil society involved in environmental issues, such as NGOs and CBOs. The unions brought in key players, i.e. workers, who are definitely affected by the absence of pro-poor policies at national level.

The initiative has revealed that not much information currently exists on the characteristics or features of tree types or species that can support urban agroforestry. The species used for workplace forestry were chosen mostly for their aesthetic value or ornamental qualities, so there is a clear need to introduce more multipurpose trees (MPTs) in urban agroforestry. This initiative further revealed that the concept of urban forestry can be readily sold to industrialists based in urban areas because of their interest in CSR.

The campaigns at industrial sites in urban areas have given the unionists the opportunity to educate workers on the preventable nature of workplace accidents and ill health. Furthermore, the unions have recognised that tree planting campaigns at the workplace give them the opportunity to highlight issues affecting

the health and safety of workers. These campaigns have created fora for discussing ways and means of tackling the AIDS/HIV pandemic at the workplace.

Future partners in urban forestry were also identified, the like World Agroforestry Center (ICRAF) and local authorities, e.g. Kisumu Municipality, with other municipal councils, the forest service, regional authorities, local communities, NGOs and other stakeholders as proposed in the new Forest Policy of Kenya. One such initiative in Kisumu is the Local Authority Service Delivery Action Plans (LASDAP).

### RECOMMENDATIONS

These activities need to be integrated in municipal policies. Urban planners should work closely with industrialists in this era of CSR to put in place an improved urban environment that can contribute to increased food. There is a need to incorporate more specific tree management and multipurpose trees in urban forestry and special programmes within Occupational Health, Safety and Environment (OHSE) education. The proposed Kenya Forest Bill 2004, which stipulates that at least 5% of land under the control of municipal authorities be put under tree cover, is a step in the right direction that will increase opportunities for urban tree planting.

Industries, schools, hospitals and other institutions based in urban areas need to be encouraged to establish tree nurseries.



Sammy Carsan

**At the market of Kisumu: A woman sorts different tree species and raw parts for sale as medicine in Kibuye open air market, Kisumu.**

In addition, workers with landscaping and gardening skills need refresher courses on aspects of urban forestry.

Relevant stakeholders including researchers, academic institutions and the municipality need to disseminate information on best practices that relate to urban forestry to other interested parties such as workers and the community at large.

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Role of stakeholders	
Actors	RESPONSIBILITIES
Trade Unions • KQMWU • KUPRIPUPA • KBCTF&AIEU • FNV Bouw – Netherlands	- Educating, mobilising and creating awareness among workers and the community at large on the importance of a clean, green urban environment - Sponsoring the above three local unions by financing their activities and in solidarity support  - Provision of labour and seedlings for planting - Identification of livelihood support systems, e.g. water points  - Provision of enabling environment and fora for all other stakeholders, e.g. by providing land and access for tree development, institutionalising celebrations such as National Tree Planting Day, World Environment Day, World Water Day and Workers Memorial Day - Technical advice on required tree species  - Provision of opportunities for workers to participate in tree planting and to be trained by unions on OHSE. - Facilitating the creation of joint Health and Safety Committees at their workplaces
Local Communities	
Government Agencies • Municipal Authority • Forest Department	
Industrialists • All Packs • Athi River Mining • Rai Ply • Pan Paper Ltd	

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

The 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% 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.

## Implementation of community forestry requires public involvement

### COMMUNITY FORESTRY IN ENGLAND

The term “community forestry” is applied in a number of different contexts around the world, although its definition and characteristics remain quite similar. The International Institute for Sustainable Development (Winnipeg, Canada) describes it as “including local people in planning and implementing forestry activities”, whereas the South African government sees it as a way of “addressing the national problem of social deprivation, impoverishment, deforestation and land degradation”. According to the UN Food and Agriculture Organisation, community forestry entails the “control, management and use of forest and tree resources by

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

local communities; respect for social, economic and cultural relationships between people and forests; and a decentralised and participatory approach to forest management” (1)

Developed, as well as developing, countries can benefit from community forestry, in urban and periurban areas as well as rural regions. For example, the presence of substantial amounts of brown-field, underused and derelict land is one of the common features of all 12 Community Forests in England. Working with land agents, landowners and landfill agencies, Community Forest partnership organisations are helping to regenerate and restore undervalued areas into wildlife-rich, multipurpose woodlands and green spaces in a periurban setting.

In England, the Community Forests cover large areas around the edges of towns and cities - but unlike the great forests of

old, 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% 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.

### **ACHIEVEMENTS**

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.

### **THE POLICY DIMENSION**

Community Forests have already 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.

In England a process of devolution and decentralisation of decision making to the regions is underway. Already a significant amount of planning and decision making is taking place within the North East region, and the North East Community Forests are contributing to this process of governance through action, research and participation in the development of new regional strategies such as the 2004 North East Regional Forest Strategy. The emphasis on decentralised government planning, in the form of Regional Spatial Strategies as well as Local Development Frameworks and Community Strategies, in conjunction with the long-term Community Forest plans, will help to unlock the potential of those periurban areas termed the rural-urban fringe.

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



Jonathan Scurlock

### **COMMUNITY ENGAGEMENT AND LEARNING**

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.

By promoting and delivering programmes that foster local environmental action, the Community Forests partnership is seeking to create “community forests for all”. This has the added benefit of raising awareness of our activities in areas of society that are not normally affected by the issue of ‘forestry’, such as planning policy, health services, regeneration, transportation and economic development. Tools to involve the community include theatre productions, festivals and events, public transport initiatives, labour market training schemes and conservation volunteering and training.

The periurban environment provides opportunities for hands-on learning in a variety of outdoor settings. The educational sector of the programme supports all parts of the UK national school curriculum, with an emphasis on environmental education and rural

### **The environmental projects translate regional and national policy into practical action.**

studies. Further learning opportunities include vocational training for older students as well as “lifelong learning” for adults, especially in the practical skills needed to maintain the environmental and recreational fabric of these periurban areas. A key dimension in the approach is therefore to employ community engagement and education specialists within the Community Forest teams.

#### **FINANCING AND VALUE ADDED**

Financial support for the Community Forests in England comes from a range of sources. The Department for Environment, Food and Rural Affairs, the Forestry Commission and the Countryside Agency fund forest planting, management, restoration of derelict land and provision of leisure facilities.

Additional support comes from partnerships with local governments and industry, as well as the voluntary sector. A major reason why Community Forest partnerships were established was to “add value” to the individual work of local stakeholders including local government authorities. Evaluations of the North

### **Renewables and Recyclables**

A key new area is the ‘Renewables and Recyclables’ project. This project is facilitating the development of wood and other biomass fuels as a source of renewable energy, helping to meet regional targets for sustainable energy as well as waste management, recycling and forestry policy, and the greening of derelict land. Increasing the use of biomass energy within the region, by sustainable utilisation of the woodland resource and other wood or biomass-derived feedstock, is consistent with the broader aims of the Community Forests. It is only by demonstrating the economic value of forests and woodlands, together with the environmental benefits of biomass fuels (such as offsetting carbon emissions), that the wider value of periurban forestry can be appreciated.

East Community Forests programme in the past year have shown high value-added outcomes.

#### **A NEW PHASE OF SUPPORT AND ACTIVITY**

The timeframe 2004 – 2009 will be a period of new challenges as the Community Forest organisations mainstream their work into new regional structures. The context for this process is nevertheless encouraging, including increasing regionalisation, a growing culture of partnerships, and recognition of the role forests, woods and trees play in sustaining the quality of life in the region.

The Community Forest organisations in North East England have now established themselves as “North East Community Forests Limited”. This a new not-for-profit company, owned and operated by public sector partners, with a tightly defined role as: a strategic partner for the region’s existing Community Forests and their local authority partners; a new delivery partner for the Forestry Commission and Regional Forest Strategy; and an innovative project partner for the regional development agency ONE NorthEast, the Countryside Agency, its successors, and other regional agencies.

North East Community Forests Limited (NECF) aims to achieve its wider goals by accessing investment funds, piloting new initiatives and facilitating land ownership for projects that deliver wide-ranging environmental, social and economic benefits. Some of these new products and services may also be applicable in other

national contexts, including both developed and developing countries, to help bring rural and urban areas closer together wherever community forestry is practised.

#### **CONCLUDING REMARKS**

Community Forests in our country and our region are contributing to the broader modern aims of “liveability” and “sustainable communities”. These are terms which attempt to describe the improved quality of life sought by the citizens of many countries that are caught up in a process of rapid social and demographic change, with the ebb and flow of migration from rural to urban areas and back again. The success of urban and periurban “liveability” policies will be measured by whether they help to produce not only nicer neighbourhoods, but happier inhabitants as well.

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## **CONTINUOUS PRODUCTIVE URBAN LANDSCAPES: DESIGNING URBAN AGRICULTURE FOR SUSTAINABLE CITIES**

Andre Viljoen, Deputy Director, Low Energy Architecture Research Unit, University of North London, U.K. ISBN 0750655437 Paperback 240 Pages. Forthcoming Title (Early 2004). Price: £ 29.99

This book provides a design proposal for a new kind of sustainable urban landscape: Urban Agriculture. By growing food within an urban, rather than an exclusively rural environment, urban agriculture would reduce the need for industrialised production, packaging and transportation of foodstuffs to the city-dwelling consumers. The impact that this would have on the future shape of cities could be immense. Urban design is shown in practice through international case studies and the arguments presented are supported by quantified economic, environmental and social justifications.

## **THE OVERSTORY BOOK, CULTIVATING CONNECTIONS WITH TREES.**

C.R Elevitch and K.M. Wilkinson (eds). 2001. Permanent Agriculture Resources, Holualoa, Hawaii, USA. (<http://www.agroforestry.net>)

This book contains the first 75 editions of The Overstory, the international electronic journal. It distils essential information about working with trees into 72 short, easy-to-read chapters on a variety of subjects including traditional knowledge, environmental protection and other functions of trees, tree seedling selection and urban design. Each chapter shares key concepts and gives useful information.

## **RUNNING PURE, THE IMPORTANCE OF FORESTY PROTECTED AREAS FOR DRINKING WATER.**

Nigel Dudley and Sue Stolton (eds). August 2003. ISBN 2-88085-262-5; A research report for the World Bank / WWF Alliance for Forest Conservation and Sustainable Use.

Protecting forest areas can provide a cost-effective means of supplying many of the world's biggest cities with high-quality drinking water, providing significant health and economic benefits to urban populations. Running Pure - shows that more than a third of the world's 105 biggest cities - including New York, Jakarta, Tokyo, Mumbai, Rio de Janeiro, Los Angeles, Barcelona, Nairobi, and Melbourne - rely on fully or partly protected forests in catchment areas for much of their drinking water. Well-managed natural forests substantially improve water purity by filtering pollutants, such as pesticides, and in some cases capture and store water. According to the report, adopting a forest protection strategy can result in massive savings. To view the full report of 114 pages visit: [http://lnweb18.worldbank.org/ESSD/envext.nsf/80ByDocName/RunningPureTheimportanceofforestprotectedareastodrinkwater/\\$FILE/RunningPure2003+.pdf](http://lnweb18.worldbank.org/ESSD/envext.nsf/80ByDocName/RunningPureTheimportanceofforestprotectedareastodrinkwater/$FILE/RunningPure2003+.pdf)

## **WORLD URBANIZATION PROSPECTS, THE 2003 REVISION: DATA TABLES AND HIGHLIGHTS.**

United Nations, Department of Economic and Social Affairs' Population Division. March 2004. Available online as PDF file [195p.] at: <http://www.un.org/esa/population/publications/wup2003/2003WUPHighlights.pdf>

This revision presents estimates and projections of the total urban and rural populations of the world, its 21 regions and five major areas for the 228 countries or areas of the world. It also provides estimates and projections of the population of urban agglomerations with 750,000 inhabitants or more in 2000. It shows that almost all population growth expected for the world in the next thirty years will be concentrated in the urban areas. The smaller urban settlements (with fewer than 500,000 residents) of the less-developed regions will be absorbing most of this growth.

## **ESTIMATING THE PUBLIC'S VALUE FOR URBAN FOREST IN THE SEOUL METROPOLITAN AREA OF KOREA: A CONTINGENT VALUATION STUDY.**

Seung-Jun Kwak, Seung-Hoon Yoo and Sang-Yong Han. In: Urban Studies, Vol. 40, No. 11, 2207-2221, October 2003: [http://gses.snu.ac.kr/upload\\_files/cyber/plan/env/board/Kwak%20et%20al\(2003\).pdf](http://gses.snu.ac.kr/upload_files/cyber/plan/env/board/Kwak%20et%20al(2003).pdf)

Urban forests have various environmental benefits that contribute to the quality of urban life. These values, however, have been underestimated or have never been reflected in urban development planning in Korea. As a result, a number of forests in urban areas were either partly or wholly destroyed without their public value being assessed explicitly. This paper estimates the value attached by the public to Kwanggyo Mountain in the Seoul metropolitan area of Korea using a contingent valuation survey, aimed at providing policy makers with useful information to make informed decisions in urban development planning.

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

CIFOR and IDRC. Ferroukhi, L. Editor. Bogor, Indonesia: CIFOR, IDRC, 2003. 236 p.

This book presents the first serious attempt to analyze 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 in which more than 30 national and international researchers participate. It will be required reading for anyone concerned with municipal administration and natural resource management.

## **Trees outside forests - "Towards better awareness"**

CIRAD and FAO. FAO Conservation Guide # 35. FAO, Rome, 2002. 218 p. Trees outside forest, together with forests and other woodlands, play an essential role in solving important problems of rural and urban populations. They contribute to the structure of the landscape, generate numerous environmental and social services, and yield important food products for the people and for meeting other domestic needs. People, however, are not fully benefiting 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. It presents the concept and role of trees outside forests, analyses the problems and challenges, and outlines the path of thinking and action towards a better and more complete consideration of the resources and their integration in territorial management policies.

**[www.urbanicity.org/](http://www.urbanicity.org/)**

Urbanicity is a partnership initiative with the UN Habitat Best Practices and Local Leadership Programme, which works in co-operation with Development Gateway, a World Bank initiative. This Web site provides city officials with a platform to explore aspects of urban management. It targets city managers, local level policy makers, urban planners and directors of urban services and infrastructure provision.

**[www.sl.kvl.dk/euforic](http://www.sl.kvl.dk/euforic)**

EUFORIC, the European Urban Forestry Research and Information centre, has moved its Web site. Under [www.sl.kvl.dk/euforic/links.htm](http://www.sl.kvl.dk/euforic/links.htm), you can find some of the key Internet addresses related to urban forestry.

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

This programme, entitled "Local People, Devolution and Adaptive Collaborative Management", run by the Centre for International Forestry Research, applies adaptive management to 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. These include the collaborative software packages Co-learn and Co-view, which are designed to help stakeholder visioning

**[www.fao.org/forestry/index.jsp](http://www.fao.org/forestry/index.jsp)**

Here you can find the urban forestry pages of FAO. The FAO publications mentioned can be accessed electronically. An annotated bibliography was collected from the FAO Forestry Department, the TREE Data Base of CABI and AGRIS. Upon publication in 1995 it contained 557 references, but the Web version is currently being updated:  
[http://www.fao.org/documents/show\\_cdr.asp?url\\_file=/DOC/REP/005/V5480E/V5480E00.HTM](http://www.fao.org/documents/show_cdr.asp?url_file=/DOC/REP/005/V5480E/V5480E00.HTM)

More databases under:

**[www.msue.msu.edu/msue/imp/modb1/masterb1.html](http://www.msue.msu.edu/msue/imp/modb1/masterb1.html)**

and

**<http://forestry.lib.umn.edu/bib/urban.phtml>**

Provide bibliographic references to literature on urban forestry. The first of the Michigan State University and the second is maintained by the University of Minnesota.

**[www.elsevier.de/ufug](http://www.elsevier.de/ufug)**

This site provides access to an important electronic periodical on urban forestry: the Journal on Urban Forestry & Urban Greening.

**[www.nufu.org.uk](http://www.nufu.org.uk)**

Some of the national sites are worthwhile visiting. The UK National Urban Forestry Unit Web site, for example, serves as an information broker within national urban forestry. Some of the most state-of-the-art research in the world is done by the various research stations of the USDA Forest Service:  
<http://www.fs.fed.us/>

**[www.attra.ncat.org](http://www.attra.ncat.org)**

ATTRA, the National Sustainable Agriculture Information Service funded by the US Department of Agriculture, is an

information service on sustainable agriculture. It provides information and technical assistance to farmers, ranchers, extension agents, educators, and others involved in sustainable agriculture in the United States.

**[www.isa-arbor.com/home.asp](http://www.isa-arbor.com/home.asp)**

The International Society of Arboriculture is a worldwide professional organisation dedicated to fostering a greater appreciation for trees and to promoting research, technology, and the professional practice of arboriculture (see also on page 30). Under [www.isa-arbor.com/publications](http://www.isa-arbor.com/publications), one can also find information about one of the major international periodicals within urban forestry, the Journal of Arboriculture.

**[www.urbanage.org/magazine.php](http://www.urbanage.org/magazine.php)**

The Urban Age Newsletter has been re-launched and is now also available electronically. Nine articles appear as a special "CityPlanet" theme issue on this Web site as part of the latest issue of the magazine. The Spanish language version of "Urban Age Magazine" is available at: [www.pgualc.org/](http://www.pgualc.org/)

**[www.agroforestry.net/overstory/index.html](http://www.agroforestry.net/overstory/index.html)**

The Overstory is a free e-mail agroforestry journal for practitioners, researchers, professionals, and enthusiasts. One issue is sent every two weeks focusing on a concept related to designing, developing, and learning more about trees and agroforestry systems. Each edition includes project development strategies, brief book recommendations, species highlights, internet links to helpful information for agroforesters, etc.

**[www.trees.org.za](http://www.trees.org.za)**

Food & Trees for Africa (FTFA) is South Africa's national greening organisation that develops, manages and promotes greening and permaculture for sustainable natural resource management, food security, poverty alleviation, improved environments and skills development. It is the first (and still only) national non-government, non-profit, greening organisation in South Africa.

**[www.worldbank.org/wbi/urban/cityroundthree.htm](http://www.worldbank.org/wbi/urban/cityroundthree.htm)**

The World Bank Institute is bringing mayors and city managers from key Chinese cities together in Beijing. They will be debating the value of best practices in urban development, as they've evolved inside the West's global cities. Urban Age has helped to shape the programme and will be the only magazine to publish the conference's presentations and conclusions.

**[www.rlc.fao.org/prior/segalim/aup](http://www.rlc.fao.org/prior/segalim/aup)**

This page of the Web site of the Regional Office of FAO for Latin America provides information on the Programme on Urban Agriculture. All information on the CD-ROM on Urban Agriculture (in Spanish) is also available here.

**<http://joa.isa-arbor.com>**

This is the journal of the International Society of Arboriculture. In six issues per year it publishes peer-reviewed papers on arboriculture and urban forestry. The full text of papers, starting with the 2002 issues, will be available online in html or PDF format. The contents and abstracts of all issues since 1996 are also available.

**Nature at your service, 2005 National Conference On Urban Ecosystems (Charlotte, North Carolina, USA)***17-18 November 2005*

The urban forest is an untapped resource—one that can help cities meet regulatory requirements for clean air and water, revitalise neighbourhoods, and reduce the costs of building and maintaining infrastructure. The 2005 National Conference on Urban Ecosystems, Nature at Your Service, will show how to reconnect people to their city's natural resources. Contact: [info@amfor.org](mailto:info@amfor.org), more info at: [www.americanforests.org/conference/](http://www.americanforests.org/conference/)

**IUFRO World Congress (Brisbane, Australia)***8-13 August, 2005*

The 22nd International Union of Forest Research Organizations (IUFRO) World Congress will be held 8-13 August 2005 at the Brisbane Convention & Exhibition Centre. The theme for the 2005 Congress is Forests in the Balance: Linking Tradition and Technology. Contact: [iufro2005@ozacom.com.au](mailto:iufro2005@ozacom.com.au). More info: [www.iufro2005.com](http://www.iufro2005.com)

**Agricultural and Horticultural Aspects of Ecological Sanitation - Post-Conference Seminar (Durban, South Africa)***27 May 2005*

The seminar is organised by Sida through EcoSanRes ([www.ecosanres.org](http://www.ecosanres.org)) in cooperation CSIR ([www.csir.co.za](http://www.csir.co.za)). The purpose of the seminar is to gather persons with experience and/or interest in the reuse of urine and faeces for crop production. The focus is to network and exchange experiences on demonstration activities promoting reuse. Posters as well as papers are encouraged, within the routine of the Third Ecological Sanitation Conference. For more information on the conference, please visit [www.buildnet.co.za/ecosan](http://www.buildnet.co.za/ecosan)

**8th EUFORIC/IUFRO European Forum on Urban Forestry: "Urban Forests: A different trademark for cities and forestry" (Celje, Slovenia)***9-13 May 2005*

This is one of the premier conferences for those who are interested in both the practice and the science of urban forests, their values and management. The meeting will bring together urban forest experts from around Europe under the flag of EUFORIC (European Urban Forest Research and Information Centre). The European Forum on Urban Forestry (EFUF) is an initiative of the International Union of Forest Research Organizations (IUFRO) and the European Urban Forestry Research & Information Centre (EUFORIC). It is a unique venue where urban forestry professionals meet scientists and policy makers within the field. The forum meets yearly and each meeting is hosted by one of the members.

More information at: <http://www.efuf.org> or [www.celje.si/efuf2005/strani/stran%201.html](http://www.celje.si/efuf2005/strani/stran%201.html)

**EFARD 2005, European Forum on Agricultural Research for Development (Zurich, Switzerland)***27-29 April 2005*

The tri-annual meeting of the EFARD will be organised by the Swiss Forum for International Agricultural Research (SFIAR). The Mission of EFARD is to strengthen the contribution of European Agricultural Research for Development to poverty alleviation, food security and sustainable development in developing countries. EFARD conferences provide a platform for information exchange and development of joint activities for interested stakeholders in ARD, such as researchers, policy makers, NGOs, farmer organisations and others.

For more information on the conference, registration and submission of contributions, please see the conference website: <http://www.efard2005.org/>

**Second International Workshop on Education on Food Security (Havana, Cuba)***6-9 April 2005*

The National Botanical Garden of the University of Havana is organising this workshop to discuss themes such as the ecological kitchen, biodiversity and sustainable technologies. For more information contact Madelaine Vázquez Gálvez and Lidia Villalonga Machado: [hajb@ceniai.inf.cu](mailto:hajb@ceniai.inf.cu); [leivajbn@ceniai.inf.cu](mailto:leivajbn@ceniai.inf.cu)

**Cabernet 2005 - The International Conference on Managing Urban Land (Belfast, Northern Ireland, UK)***13-15 April 2005*

The International Conference on Managing Urban Land will be presented by CABERNET (Concerted Action on Brownfield and Economic Regeneration Network) ([www.cabernet.org.uk](http://www.cabernet.org.uk)) and Laganside Corporation ([www.laganside.com](http://www.laganside.com)), in association with University of Nottingham, UK, and Umweltbundesamt (Federal Environment Agency), Germany. The aim of the conference is to share good practice experience, problem-solving knowledge, and the application of new techniques and tools. The outcomes of the conference will formally feed into a number of European research and policy initiatives.

For more information contact Dr. Kate Millar: [cabernet2005@nottingham.ac.uk](mailto:cabernet2005@nottingham.ac.uk) or visit: <http://www.cabernet.org.uk/conference2005>

**Planning for the Food System (San Francisco, California, USA)***19-23 March 2005*

The American Planning Association is organising its 2005 conference. Over the past decades, the food system has been virtually a stranger to the planning field. For the first time in the history of APA's national conferences, a special track of sessions will be devoted entirely to topics pertaining to how planning connects to and can contribute to improving the food system.

Please visit:

[www.planning.org/2005conference/index.htm](http://www.planning.org/2005conference/index.htm)

Or contact: Deanna Glosser

[dglosser@insightbb.com](mailto:dglosser@insightbb.com) or Jerry Kaufman

[jlkaufma@wisc.edu](mailto:jlkaufma@wisc.edu).

**Emerging Issues Along Urban/Rural Interfaces: Linking Science and Society (Atlanta, Georgia, USA)***13-16 March 2005*

The overarching theme of the conference is linking human dimension aspects of urban/rural interfaces with ecological aspects. Such linkages offer the promise of new, powerful insights for understanding the forces that shape, and are shaped by, urbanisation and offer more compelling understanding of the causes and consequences of urbanisation-related policies. The

conference is hosted by Auburn University and organised a.o. by USDA Forest Service and IUFRO. For more information contact: Dr. David Laband at [labandn@auburn.edu](mailto:labandn@auburn.edu) or visit: [www.sfw.s.auburn.edu/urbanruralinterfaces/](http://www.sfw.s.auburn.edu/urbanruralinterfaces/)

### **Course on Natural Preservation of Foods and Aromatic Plants (Havana, Cuba)**

7-11 March 2005

This workshop will discuss basic techniques for the conservation of food and aromatic plants for small and medium producers. For more information visit: [www.medioambiente.cu/cursosy talleres/](http://www.medioambiente.cu/cursosy talleres/)

### **3rd EURAGRI Citizens Conference (Brussels, Belgium)**

3-4 February 2005

This conference is entitled Science for Society - Science with Society, and will look at how to adapt and use the knowledge base for an optimal functioning of the "Land-Food-Health system" in the European Union. The rationale and the preliminary programme of the conference can be found at the EURAGRI Web site [www.euragri.org](http://www.euragri.org).

As the conference is co-organised by EURAGRI, the European Commission and the European Economic and Social Committee, participation is free of charge, but participants will be responsible for their own travel and accommodation costs.

### **International Seminar "Water for Food and Ecosystems" (The Hague, the Netherlands)**

31 January-5 February 2005

The prime objective of the conference is to help governments identify management practices, practical lessons learned and the necessary enabling environments that lead to sustainable water use at the river-basin level and the harmonisation of food production and ecosystem management, with a view to implementing existing international commitments on sustainable water use in relation to food and ecosystems. Between November 21 and December 16, a virtual debate will take place over the major case studies. The conference will cover three major themes. Fostering Implementation: Know-how for Action; A "New Economy" for Water for Food and Ecosystem; and the Enabling Environment.

More information: [www.fao.org/ag/wfe2005/index\\_en.htm](http://www.fao.org/ag/wfe2005/index_en.htm)

### **3rd scientific meeting of the Benelux Society for Horticultural Science (Wageningen, the Netherlands)**

10 December 2004

The theme of the meeting, which will take place at the Wageningen International Conference Centre (WICC), is Chains in Horticulture - Theory and Practice. The programme and more information can be found on the symposium Web site:

[www.dpw.wageningen-ur.nl/hpc/bshs2004](http://www.dpw.wageningen-ur.nl/hpc/bshs2004)

### **International Course, "Design, Analysis and Management of Urban Agriculture for Resilient Communities" (Wageningen, The Netherlands)**

6-17 December 2004 **CANCELLED**

This two week international course which RUAFF-ETC was organizing together with the International Agricultural Centre, unfortunately had to be cancelled due to a lack of paying participants. We had a large number of interested persons from all over the world, but just not enough who were able to fund the

course themselves nor sufficient donors willing to fund participants to the Netherlands. We do consider some follow up to this interest in training on urban agriculture and definitely will keep you briefed. More information: [r.van.veenhuizen@etcnl.nl](mailto:r.van.veenhuizen@etcnl.nl)

### **Water, Sanitation and Hygiene for all - Building Coalitions for the Millennium Development Goals (Dakar, Senegal)**

22-26 November 2004

This "Global WASH Forum 2004" of Water Supply and Sanitation Collaborative Council (WSSCC) is held at time of printing Visit the web address for more info: <http://www.wsscc.org/dakar>

### **Asian-European (ASEM) workshop on Urban Forestry (Suzhou/Beijing, China)**

29 November - 3 December 2004

ASEM Symposium on Urban Forestry has been organised as an important activity of ASEM forest scientific and technological cooperation. It is of significant importance for promoting further cooperation and exchange among ASEM members in the rapid urbanisation process and for advancing urban ecologicalisation and sustainable development.

More information: [www.lknet.ac.cn/asemforestry.htm](http://www.lknet.ac.cn/asemforestry.htm)

### **International Workshop "Urban Agriculture, Agro-Tourism and City Region Development" (Beijing, China)**

8-12 October 2004

The conference presented and discussed the Chinese experiences with urban agriculture and tourism to assist local governments in making development policy and promoting creative research in urban agriculture. Contact Information: Dr. Cai Jianming, E-mail: [caijianmingiog@263.net](mailto:caijianmingiog@263.net)

### **World Urban Forum 2004, (Barcelona, Spain)**

13-17 September 2004,

An international panel on credit and investment for urban agriculture was held on September 16<sup>th</sup> of this year. Experts in urban and financial issues, researchers and decision makers shared information and experiences about innovative forms of UA financing. The views of international agencies and local actors about public financing of urban agriculture, micro-credit systems, and farmers' cooperatives were presented. The presentations were divided into three parts: part 1 Innovative local approaches for financing urban agriculture; part 2 From local practice to an urban development strategy; part 3 The way forward. The panel was organised by IDRC, CIGU and IPES. It was supported by the RUAFF. More information can be found at [www.unhabitat.org/wuf/2004/default.asp](http://www.unhabitat.org/wuf/2004/default.asp)

### **World Congress on Agroforestry (Orlando, USA)**

27 June - 2 July 2004

Visit the congress web site for further details: <http://conference.ifas.ufl.edu/wca>

## AGROPOLIS AWARDS PROGRAMME

AGROPOLIS is an awards programme that supports innovative masters, doctoral, and post-doctoral research. It aims to add to the body of knowledge of urban and periurban agriculture, and thereby to support interventions that address critical areas in the "industry". The programme supports graduate-level field research that is designed and implemented in collaboration with non-academic partners, which could include, for example, community-based organisations, NGOs, city councils and departments, national governments, bilateral and multilateral development agencies, and so on. THEMES FOR 2005 for Masters, Ph.D., and Post-doctoral research proposals: \* Youth and UA, \* Training Methods and Materials for Capacity-Building in UA, \* The Role of Organisations of the Urban Poor in UA, \* Ecological Production Systems for UA, \* Green Urbanisation (sustainable, ecological, and equitable urbanisation in the public, private, and community sectors), \* The Contribution of UA to Post-Conflict/Post-Crisis Reconstruction. For more information on the AGROPOLIS awards programme and/or to obtain an application form, please consult our website at: [http://web.idrc.ca/en/ev-4714-201-1-DO\\_TOPIC.html](http://web.idrc.ca/en/ev-4714-201-1-DO_TOPIC.html)

The application deadline is JANUARY 31, 2005.

## BEST PRACTICE AWARD

The experience with urban agriculture in the city of Rosario (reported on elsewhere in this issue) received the Dubai International Award for Best Practices to Improve the Living Environment (DIABP). The aim of this award is to recognise and enhance awareness of outstanding and sustainable achievements in improving the living environment as per the criteria established by the Second United Nations Conference on Human Settlements (Habitat II) and the Dubai Declaration (see <http://dubai-award.dm.gov.ae/awards2.html>). Congratulations!

## GERMAN AWARDS

The Federal Ministry for Economic Cooperation and Development (BMZ) has designated two urban agriculture projects as the winners of the nationwide competition designed for communities, educational institutions and NGOs who are particularly successful in implementing the goals of the Agenda 21 on the local level. In total 171 projects applied for the award. One of the winning projects is the EU-funded Asia Urbs Project in the Philippines: the "GIS-based Urban Environmental Resources Management and Food Security Project". Together with the cities of Schelklingen in Germany, Dinant in Belgium and Cagayan de Oro, in the Philippines, three Universities - Xavier Agricultural College in the Philippines, University of Freiburg in Germany, and University of Namur in Belgium - worked on this awarded project. (See also the UA Magazine no. 10.) More information and contact addresses can be found on the project homepage: <http://www.puvep.com/asiaurbs.htm>

## WORKSHOP ON GENDER AND URBAN AGRICULTURE

In September 2004 this workshop entitled "Women Feeding Cities" was organised in Accra, Ghana, in cooperation with CGIAR-Urban Harvest and IWMI and with the financial support of CTA. During this workshop, participants critically reviewed the 15 cases submitted, establishing key issues and making recommendations to overcome obstacles, optimise existing opportunities and create new ones. Discussing the outcomes of the case studies on UA that applied a gender differentiated framework led to the identification of improvements needed in that framework and related tools for application in the urban setting as well as the identification of critical issues regarding gender in UA. In addition, a priority agenda was developed for gender in UA research, capacity development, policy development and action planning. Participants discussed the concept of mainstreaming gender and identified effective strategies for mainstreaming gender in their own projects. The proceedings will be published on the RUAFA Web site, along with the papers ([www.ruaf.org](http://www.ruaf.org)).

## URBAN AGRICULTURE ON THE DEVELOPMENT GATEWAY

The site [www.developmentgateway.org](http://www.developmentgateway.org) is run by the not-for-profit Development Gateway Foundation in collaboration with a variety of cooperating organisations. Since December 2003, this includes RUAFA. ETC agreed with the Development Gateway to add short thematic information and links to events, Web sites and books to the thematic sections of Urban Development and Food Security. This submission of information is coordinated three times a year by the UA Magazine Editor. Upon entering the development gateway you enter "urban" in the search engine on this site to view a wide range of materials, amongst others on urban agriculture. You can also sign up for updates on new content, access a database containing many projects and practitioners on urban development and food security, and post resources of your own.

## ROLE OF URBAN FORESTRY AND AGRICULTURE IN SUSTAINABLE DEVELOPMENT OF CITIES, INTERNATIONAL WORKSHOP IN LATIN AMERICA.

The Technology and Development Association (TECNIDES), together with the Postgraduate School of the Federico Villarreal National University, organized this first international workshop in light of the social changes occurring in the urban sector. In total 98 national and international experts of both public and private sector participated, including the INIFAT of Cuba, EUFORIC of the European Union, Urban Harvest-CGIAR, through the International Potato Center (CIP), UNDP and universities like the University of Guelph, Canada, the Universities of Bari and Florence, Italy, the Universidad Nacional Mayor de San Marcos, and the Universidad Nacional Federico Villarreal. The event took place from 21 to 23 January, 2004 in the Municipality of Chaclacayo - Lima.

### The objectives were

Exchange, analyze and discuss strategies around the role of urban forestry and agriculture in maintaining a sustainable balance between the development of a city and its environmental conditions.

Identify the expected demand for green areas and agriculture in urban development, based on experiences in other countries and the reality of the city of Lima. Propose joint actions to incorporate urban forestry and agriculture in the sustainable development models of the major cities of Peru.

The 98 attendees agreed to hold annual meetings, under the direction of the Commission, presided over by Barbara Leon H. It was agreed to publicize the results of the workshop in the press and promote workshops in the various entities linked with social and environmental programs. The establishment of a royalty for the use of municipal green areas by telecommunications, energy, water and sewer companies will be pursued. Participants agreed to promote the creation of a national agency to supervise the appropriate use of green areas which have been established through municipal ordinances but which to date have often been used for other ends.

## LAUNCHING A POLICY INITIATIVE IN BOTSWANA

Alice J. Hovorka, Department of Geography, University of Guelph, Canada, ✉ahovorka@uoguelph.ca

Daphne Keboneilwe, Ministry of Agriculture, Botswana, ✉dkeboneilwe@gov.bw

*The government of Botswana recently took a significant step towards the promotion of agricultural production in urban areas. On June 23rd, 2004, the Honourable Minister of Agriculture, Johnnie Swartz, officially launched the Urban and Peri-Urban Agriculture (UPA) Policy Initiative at the Gaborone International Conference Centre.*

The ceremony aimed at raising public awareness on the potential benefits of the activity, including enhanced food security, nutrition, and poverty alleviation. If promoted, supported, and properly institutionalised, urban agriculture can assist also with income generation and employment creation, as well as conservation and management of natural resources. It may ultimately revitalise an agricultural sector that has seen a steady decrease in productivity given unfavourable climatic conditions, poor farming practices and marketing channels, rural-urban migration, and most recently the HIV/AIDS pandemic, which is taking a toll on labour reserves. Minister Swartz emphasised the importance of developing agricultural policies that can respond to shifts in population and socio-economic trends. The launch featured practitioners and representatives of NGOs as guest speakers. Amongst representatives from the government, non-governmental, private, and academic sectors, the Minister officially stated that the government of Botswana recognises urban and periurban agriculture as an important constituency of the agricultural sector and is committed to policy development and support of this activity.

Mr. Masoko, an urban backyard gardener, disclosed to the participants that his family is dependent on this practice for both food and income. A periurban poultry farmer, Mrs. Motshwane, also noted the vital role that her project has played in employment creation and income generation. She participates in contract farming and has over time been able to increase the number of people employed in her project. Another speaker, Mr. Gareth Paul of Dream for Africa, a faith-based humanitarian movement, indicated to the gathering that his organisation intends to work together with the people of Botswana to plant 10,000 “never ending gardens” in and around the city of Gaborone in order to address HIV/AIDS and poverty alleviation.

The official launch of the Urban and Peri-Urban Agriculture Policy Initiative reflects the growing interest, enthusiasm, and momentum around urban and periurban agriculture issues in Botswana, which have been triggered by a series of events organised by the Ministry of Agriculture and supported by FAO and MDP. The culmination of academic research has also facilitated discussion. Urban agriculture in Botswana is not as plentiful or as visible as in other Southern African countries. Past studies have revealed that a relatively small amount of “backyard” or subsistence-oriented agriculture takes place in and around Francistown, Gaborone, Jwaneng and Lobatse. A recent study by Hovorka on commercial agriculture in and around Gaborone in 2000/01 revealed that, amidst rural to urban transformation in Botswana, commercial agriculture has emerged in and around the capital city of Gaborone and is increasing steadily as a

notable urban economic sector. The activity is a largely unintended outgrowth of a national political economic agenda, aimed in part at local economic development and agricultural diversification, which has taken on an urban expression. Government measures to address economic and food insecurity have merged with urbanisation trends related to demography, socio-cultural identity and land-use planning, and Greater Gaborone has become a pivotal site of agricultural activity for urban entrepreneurs. Although these contributions may seem relatively modest, commercial urban agriculture is enhancing food security, land use, and employment generation in Botswana.

A first National Workshop on Urban and Peri-Urban Agriculture held in May 28-29, 2001 generated discussion and debate on farming in and around cities. It also sparked momentum for future policy formulation and implementation. Specifically, the Task Force on Urban and Peri-Urban Agriculture was established in 2001. It includes representatives from the Ministry of Agriculture (coordinator), non-governmental organisations, Department of Lands, Department of Town and Regional Planning, Water Affairs Department, and Gaborone and Francistown City Councils, in order to provide further impetus and mobilisation of UPA activities in Botswana. The main objective of the Task Force has been to facilitate the development and inclusion of UPA in the mainstream national development plans for the realisation of accelerated diversification of the economy and the creation of a secure and healthy society as envisioned in Botswana’s Vision 2016. The process culminated in a second National Workshop on Urban and Peri-Urban Agriculture, hosted by the Ministry of Agriculture on July 2-3, 2003, where again key stakeholders were consulted and provided insights on relevant issues. Pilot projects were also proposed to begin in these two cities and later be extended to cover other urban areas of Botswana. The Task Force has also formed partnerships with regional and international bodies, specifically the Municipal Development Partnership for Eastern and Southern Africa and the Food and Agricultural Organization of the United Nations. A major component of Botswana’s initiative is the Glen Valley Horticultural Site in the capital, Gaborone. The government, through the Ministry of Agriculture, has already included policy statements on development of urban and periurban agriculture in its current National Development Plan 9 and is determined to see this process through to fruition. UPA is seen as one of the means through which the government can achieve its objectives of pursuing food security, as well as the Vision 2016 tenet of building a productive, innovative and prosperous nation.

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## RUAF ENTERS ITS SECOND PHASE

We are pleased to announce that the Netherlands Ministry of Development Cooperation approved our application for support for a second phase of the RUAF programme. This means that for the coming four years the work of the RUAF partners in their respective regions can be continued and further strengthened.

The new phase of the programme has been given the title: **Cities Farming for the Future**

The main aim of the RUAF-CFF programme is to contribute to urban poverty reduction, urban food security, improved urban environmental management, empowerment of urban farmers and participatory city governance. RUAF hopes to achieve this by means of the following **strategies**:

### KNOWLEDGE MANAGEMENT AND NETWORKING

- ❖ Facilitation of local data gathering and analysis on urban agriculture
- ❖ Maintenance of databases (in English, French, Spanish, Chinese; accessible on Internet and on CD-rom)
- ❖ Promotion of networking, cooperation and exchange of research and project results between researchers, policy makers, urban farmers and other stakeholders
- ❖ Publication of *UA Magazine* (English, Spanish, French, Portuguese and Chinese)
- ❖ Production and translation of books, policy guidelines, fact sheets, manuals and other materials of relevance to various types of local stakeholders in urban agriculture

### LOCAL CAPACITY DEVELOPMENT

- ❖ Consolidation of the six regional resource centres
- ❖ Creation of regional training capacity on urban agriculture (development of training materials and training of trainers in cooperation with local universities)
- ❖ Regional and local training courses on urban agriculture and multi-stakeholder planning for senior staff of municipalities, governmental organisations, universities and non-governmental organisations

### FACILITATION OF MULTI-STAKEHOLDER POLICY DEVELOPMENT AND ACTION PLANNING

- ❖ Organisation of policy awareness seminars on urban agriculture
- ❖ Assistance in the establishment of local multi-stakeholder platforms on urban agriculture and provision of process support for the diagnosis of the local situation regarding urban agriculture and food security and the participatory formulation of local policies and action plans
- ❖ Establishment of monitoring systems and provision of feedback to policymakers and urban planners on the social, economic and ecological impacts of their urban agriculture policies and projects

### PILOT AND DISSEMINATION CITIES

The RUAF partners have selected in each region 3-4 **pilot cities**, 20 in total, that have shown willingness to integrate urban agriculture into their local policies and planning. It is in these pilot cities that RUAF-CFF will concentrate its main activities in the coming four years, including capacity development of local stakeholders, provision of support for local diagnosis and participatory action planning, and monitoring of changes in policies and actions of local stakeholders, focusing particularly on impacts these have on the livelihoods of the poor.

In addition, 6-10 **dissemination cities** have been selected in each region, 46 in total, that will participate in certain capacity development activities and in the exchange of the results with the pilot cities. Aside from technical and training support each pilot city will receive some matching funds for one or more small pilot projects. The dissemination cities may also apply for co-funding of pilot projects: each year a maximum of five pilot projects in dissemination cities will be co-funded.

### ORGANISATION OF THE RUAF PROGRAMME

The RUAF partners have jointly established the **RUAF Foundation**, which is the recipient and administrator of the donor contributions received. The RUAF programme is coordinated at global level by ETC Foundation and at regional level by IPES for Latin America and the Caribbean, MDP for Southern and East Africa, IAGU for francophone Africa, IWMI-Ghana for Anglophone Africa, IWMI-India for South and East Asia and IGSNRR for China. Overall strategic decisions are prepared by the **RUAF Programme Committee** consisting of the regional and international RUAF coordinators. The local partners in the RUAF pilot and dissemination cities jointly form a **Regional Advisory Board**.

*More details on the Cities Farming for the Future Programme will be published soon on the RUAF website [www.ruaf.org](http://www.ruaf.org)*

*Ir. Henk de Zeeuw Coordinator RUAF (International Network of Resource Centres on Urban Agriculture and Food Security)*

# Forthcoming Issues

## THE UA MAGAZINE IN 2005

The second phase of the RUAF programme has been approved, which will start in January 2005 under the title: **Cities Farming for the Future** (see on page 47 for more information). This means that the work of the RUAF partners in their respective regions will be continued and further strengthened, and that we will continue to publish the *UA Magazine*. Contrary to previous years, only two issues of *UA Magazine* were published in 2004 (in addition to the CD-rom with information on urban agriculture, which came to you with the last issue). The RUAF partners decided to use this last year of the first phase to look back and document in book form the state-of-the-art in urban agriculture, as well as the achievements and challenges ahead. You will soon hear more about this project. For the coming year we are planning to publish three issues again, for which we welcome your opinion and ideas (see).

As you know, production *UA Magazine* is financed by the RUAF Programme, which is bound by a limited project duration and budget. Therefore we are continuously looking for additional support and funding to seek continuation of the magazine. One source is the subscription fee that we are asking of subscribers from the northern countries. Another is the co-production of special issues. This issue has been produced with the kind support of the Forestry Department of FAO and Euforie. The next issue of *UA Magazine* (no. 14) will focus on urban aquaculture, and will be a collaborative effort with the Papussa Network (see call for contributions).

## No.14 Urban and Periurban Aquatic production February 2005

Deadline for submissions is 1 January 2005.

Urban aquatic production captures a broad array of activities, varying from catching fish by using nets in the Kolkata wastewater fed wetlands and lagoons to high tech Tilapia culture or large scale cultivation of edible aquatic plants in Ha Noi and Phnom Penh. There are various environmental and social benefits, like additional food provision and income to urban livelihoods, low-cost wastewater treatment, the creation of social sustainability, the development of tourism and recreation; reducing food miles - transportation costs; and relieving the pressures on depleted ocean fisheries. Urban planners and policy makers need adequate information on these issues and on how stakeholders value aquaculture in the city.

Contributions from different parts of the world are invited that discuss: benefits: actors and their role; management systems; wastewater control; (health) risks; access to and the control over resources; urban Planning producers; marketing; environmental and leisure aspects; and policy, legal and partnership arrangements.

PAPUSSA is a collaborative research project of European and Asian partners and is funded by the European Union. The PAPUSSA partners are seeking to better understand the importance and nature of the aquatic food production that occurs in and around some of the major cities of Southeast Asia. The project, which started in January 2003, is working with partners in Hanoi and Ho Chi Minh City in Vietnam, Phnom Penh in Cambodia and Bangkok in Thailand. (see [www.ruaf.org/papussa/index.html](http://www.ruaf.org/papussa/index.html)) But of course we welcome contributions from

### Future issues of *UA Magazine*

Planning for the first issue in 2005 is thus well underway, and new ideas have already been suggested for subsequent issues (urban design; multistakeholder processes; urban food systems; legislation; the Millennium Development Goals; urban farmer groups and organisations; production chains; etc.). But at the start of this new phase, we would first like to know what our readers think about the *UA magazine* and the direction it should take. So before planning the topics for 2005 and 2006 we would like to ask you the following question.

### What are the major topics or questions that you would like to see discussed in *UA magazine* in the coming years?

Please indicate **why** you would like to have these topics discussed. Perhaps you could do this by sending us a few lines describing your involvement in urban agriculture, your role or job, and whether you are involved in a project or development activity in your city, policy making, etc.

The responses we received will be compiled in an article in the next issue of *UA Magazine*.

Of course other suggestions and comments on *UA Magazine* are also welcome.

Please take a moment to send an e-mail to the editor at [ruaf@etcnl.nl](mailto:ruaf@etcnl.nl), or write a letter to the editor.



## Urban Agriculture Magazine

TREES AND CITIES GROWING TOGETHER

ISSN 1571-6244

No. 13, December 2004

*UA Magazine* is published three times a year by the Resource Centre for Urban Agriculture (RUAF), a programme co-ordinated by ETC Foundation and financed by DGIS, the Netherlands, and IDRC, Canada. It is also available on [www.ruaf.org](http://www.ruaf.org).

*UA Magazine* is translated into French, Spanish, Chinese and Arabic, and distributed in separate editions through regional networks.

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