Arboriculture & Urban Forestry 2007. 33(4):300–301.

ARBORICULTURAL ABSTRACTS

PROMOTING ECOSYSTEM AND HUMAN HEALTH IN URBAN AREAS USING GREEN INFRASTRUCTURE: A LITERATURE REVIEW

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Europe is a highly urbanised continent. The consequent loss and degradation of urban and peri-urban green space could adversely affect ecosystems as well as human health and well-being. The aim of this paper is to formulate a conceptual framework of associations between urban green space, and ecosystem and human health. Through an interdisciplinary literature review the concepts of Green Infrastructure, ecosystem health, and human health and well-being are discussed. The possible contributions of urban and peri-urban green space systems, or Green Infrastructure, on both ecosystem and human health are critically reviewed. Finally, based on a synthesis of the literature a conceptual framework is presented. The proposed conceptual framework highlights many dynamic factors, and their complex interactions, affecting ecosystem health and human health in urban areas. This framework forms the context into which extant and new research can be placed. In this way it forms the basis for a new interdisciplinary research agenda. (Landscape and Urban Planning 2007. 81(3):167–178)

ARE RESIDENTS WILLING TO PAY FOR THEIR COMMUNITY FORESTS? RESULTS OF A CONTINGENT VALUATION SURVEY IN MISSOURI, USA

Thomas Treiman and Justine Gartner

Publicly owned trees have important environmental and amenity values contributing to the quality of urban life. Community officials charged with managing this resource face a lack of funding and underestimate the value that residents place on street trees. A survey of residents in 44 Missouri, USA, communities included a contingent valuation method item designed to estimate how residents' willingness-to-pay for improved tree care and maintenance varied with community size and location. Residents in communities with a population of 50,000 or more, in the St. Louis and Kansas City suburbs, and in St. Louis and Kansas City show strong support for a ballot issue establishing a tree fund supported by a tax of between $14 and $16 per household per year. The results of this survey, together with recent surveys of community forestry officials and street tree inventories, are used to make recommendations to state agencies charged with managing community forests. (Urban Studies 2006. 43(9):1537–1548)

FIELD STUDIES OF CONTROL OF *ANOPLOPHORA GLABRIPENNIS* (COLEOPTERA: CERAMBYCIDAE) USING FIBER BANDS CONTAINING THE ENTOMOPATHOGENIC FUNGI *METARHIZIUM ANISOPLIAE* AND *BEAUVERIA BRONGNIARTII*

A.E. Hajek, B. Huang, T. Dubois, M.T. Smith, and Z. Li

The Asian longhorned beetle, *Anoplophora glabripennis*, was first found attacking urban street trees in the United States in 1996 and in Canada in 2003. This tree-killing invasive insect has long been a major pest in China and is difficult to control because immature stages live within wood and long-lived adults are often located high in tree canopies. A microbial control product (*Biolisa kamikiri*) consisting of non-woven fiber bands impregnated with cultures of an entomopathogenic fungus, *Beauveria brongniartii*, is marketed in Japan for control of a congeneric orchard pest. Replicated field trials were conducted in Anhui, China to compare *Biolisa kamikiri* with similarly prepared bands containing *Metarhizium anisopliae* for control of *A. glabripennis*. One fungal band was placed at 2–2.5 m height, around the stem or major scaffold branch on each of 40 willow trees (*Salix* spp.) per plot, with five plots for each fungal treatment and five control plots. Adult beetles collected from fungal-treated plots 7–22 days after bands were attached to trees died faster than adults from control plots. Beetles exposed to *B. brongniartii* bands consistently died faster than controls throughout this period, while results from plots with *M. anisopliae* bands were not as consistent in differing from controls. Numbers of adult beetles from plots of each fungal species dying in 3.5-m high in trees, with adults in *B. brongniartii*-treated plots higher within trees than adults in other plots. (Biocontrol Science and Technology 2006. 16(3):329–343)

GEOSPATIAL METHODS PROVIDE TIMELY AND COMPREHENSIVE URBAN FOREST INFORMATION

Kathleen T. Ward and Gary R. Johnson

Urban forests are unique and highly valued resources. However, trees in urban forests are often under greater stress than those in rural or undeveloped areas due to soil compaction, restricted growing spaces, high temperatures, and exposure to air and water pollution. In addition, conditions change more

quickly in urban as opposed to rural and undeveloped settings. Subsequently, proactive management of urban forests can be challenging and requires the availability of current and comprehensive information. Geospatial tools, such as, geographic information systems (GIS), global positioning systems (GPS) and remote sensing, work extremely well together for gathering, analyzing, and reporting information. Many urban forest management questions could be quickly and effectively addressed using geospatial methods and tools. The geospatial tools can provide timely and extensive spatial data from which urban forest attributes can be derived, such as land cover, forest structure, species composition and condition, heat island effects, and carbon storage. Emerging geospatial tools that could be adapted for urban forest applications include data fusion, virtual reality, three-dimensional visualization, Internet delivery, modeling, and emergency response. (Urban Forestry & Urban Greening 2007. 6(1):15– 22)

RELATIONSHIPS BETWEEN URBANIZATION AND THE OAK RESOURCE OF THE MINNEAPOLIS/ST. PAUL METROPOLITAN AREA FROM 1991 TO 1998

Kathryn Kromroy, Kathleen Ward, Paul Castillo, and Jennifer Juzwik

Urbanization was associated with loss and transformation of the oak forest in the Twin Cities (Minneapolis and St. Paul) metropolitan area (TCMA) over a recent 7-year interval. Between 1991 and 1998, urbanization increased based on several indicators: population density, area of developed land, and area of impervious surface—total impervious area and area within three classes of increasing degree of imperviousness (protected, affected, and degraded). We quantified relationships between changes in urbanization and changes in several parameters describing the oak forest at the scale of ecological subsection. Increased total and affected impervious area were strongly correlated with decreased area of oak forest when changes of the urbanization indicators and oak were expressed as percentages of the subsection area. Relationships were reversed when changes were expressed as percentages of the 1991 values. Increased population density was strongly correlated with increased loss in numbers and increased isolation of oak patches, but weakly correlated with loss of oak forest area. This is the first study to quantify relationships between changes in urbanization and changes in a specific forest cover type. Our results demonstrate complexities of urbanization impacts on a metropolitan forest resource, and highlight the importance of selected variables, spatial and temporal scales, and expressions of change when quantifying these relationships. (Landscape and Urban Planning 2007. 80(4):375–385)

GROWTH OF *BETULA PENDULA* ROTH. THE FIRST SEASON AFTER TRANSPLANTING AT TWO PHENOLOGICAL STAGES

Ingjerd Solfjeld and Per Anker Pedersen

The root extension rate of *Betula pendula,* transplanted at two phenological stages, was studied in a Nordic climate. Landscape-size trees were transplanted from the field into root-study boxes (rhizotron) in early and late spring of 1999 and 2000. In early spring, 6 trees were transplanted when the leaves had just started to unfold; likewise, in late spring, six trees were transplanted when the leaves were fully unfolded and the shoot extension was in progress. Root growth was recorded during the first post-transplant season and the tree roots were finally excavated. Results indicate that the root extension rate of *B. pendula* follows seasonal soil temperature. The mean root extension rates at ten days intervals varied from 4 to 11 mm/day with a total average for the growing season of 7 mm/day in 1999 and varied from 4 to 9 mm/day with a total average for the growing season of 4 mm/day for 2000. The average length of new roots was 89 cm and there was no significant difference in length, dry weight or number of new roots between the two transplant times. It appears, therefore, that the phenological stage at transplanting during the period from bud break to fully developed leaves has minor effect on landscape establishment of *B. pendula,* when an adequate amount of water is provided. (Urban Forestry & Urban Greening 2006. 5:101–106)