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ARBORICULTURAL ABSTRACTS

GREEN URBAN POLITICAL ECOLOGIES: TOWARD A BETTER UNDERSTANDING OF INNER-CITY ENVIRONMENTAL CHANGE

Nik Heynen

This research uses a Marxist urban political ecology framework to link processes of urban environmental metabolization explicitly to the consumption fund of the built environment. Instead of reinventing the wheel, I argue in this paper that Marxist notions of metabolism are ideal for investigating urban environmental change and the production of uneven urban environments. In so doing, I argue that despite the embeddedness of Harvey's circuits of capital within urban political economy, these connected notions still have a great deal to offer regarding better understanding relations between consumption and metabolization of urban environments. From this theoretical perspective, I investigate urban socionatural metabolization as a function of the broader socioeconomic processes related to urban restructuring within the USA between 1962 and 1993 in the Indianapolis inner-city urban forest. The research examines the relations between changes in household income and changes in urban forest canopy cover. The results of the research indicate that there was a significant decline over time in the Indianapolis urban forest canopy and that median household was related to these changes, thus demonstrating a concrete example of urban environmental metabolization. (Environment & Planning A 2006. 38(3):499–516)

RELATIVE IMPORTANCE OF HABITAT QUANTITY, STRUCTURE, AND SPATIAL PATTERN TO BIRDS IN URBANIZING ENVIRONMENTS

Roarke Donnelly and John Marzluff

Urbanization reduces the quantity of native vegetation and alters its local structure and regional spatial pattern. These changes cause local extirpations of bird species associated with native vegetation and increases in the abundance and number of bird species associated with human activity. We used 54–1 km^2 landscapes in the Seattle, Washington, USA metropolitan area to determine (1) the relative importance of habitat quantity, structure, and pattern to bird diversity and abundance and (2) whether housing developments can be managed to mitigate the negative impacts of urbanization on forest bird diversity. In general, bird species richness was high and many native forest species were retained where urban landcover comprised less than 52% of the landscape, tree density (especially that of evergreens) remained at least 9.8 trees/ha in developments, and forest was at least 64% aggregated across the landscape. These results suggest that the quantity, structure, and pattern of forested habitat affected breeding bird diversity in urbanizing landscapes. However, habitat pattern appeared less influential than other habitat attributes when results from all community- and population-level analyses were considered. Conservation of native birds in reserves can be supplemented by managing the amount, composition, structural complexity, and—to a lesser extent—arrangement of vegetation in neighborhoods. (Urban Ecosystems 2006. 9(2):99–117)

EFFECTIVENESS OF BIFENTHRIN (ONYX) AND CARBARYL (SEVIN SL) FOR PROTECTING INDIVIDUAL, HIGH-VALUE CONIFERS FROM BARK BEETLE ATTACK (COLEOPTERA: CURCULIONIDAE: SCOLYTINAE) IN THE WESTERN UNITED STATES

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High-value trees, such as those located in residential, recreational, or administrative sites, are particularly susceptible to bark beetle (Coleoptera: Curculionidae: Scolytinae) attack as a result of increased amounts of stress associated with drought, soil compaction, mechanical injury, or vandalism. Tree losses in these unique environments generally have a substantial impact. The value of these individual trees, cost of removal, and loss of esthetics may justify protection until the main thrust of a bark beetle infestation subsides. This situation emphasizes the need for ensuring that effective insecticides are available for individual tree protection. In this study, we assess the efficacy of bifenthrin (Onyx) and carbaryl (Sevin SL) for protecting: ponderosa pine, *Pinus ponderosa* Dougl. ex Laws., from western pine beetle, *Dendroctonus brevicomis* LeConte, in California; mountain pine beetle, *Dendroctonus ponderosae* Hopkins in South Dakota; and *Ips* spp. in Arizona; lodgepole pine, *Pinus contorta* Dougl. ex Loud., from *D. ponderosa*e in Montana; pinyon, *Pinus edulis* Engelm. in Colorado and *Pinus monophylla* Torr. & Frem. in Nevada from pinyon ips, *Ips confusus* (LeConte); and Engelmann spruce, *Picea engelmannii* Parry ex. Engelm. from

spruce beetle, *Dendroctonus rufipennis* (Kirby) in Utah. Few trees were attacked by *Ips* spp. in Arizona and that study was discontinued. Sevin SL (2.0%) was effective for protecting *P. ponderosa*, *P. contorta*, and *P. monophylla* for two field seasons. Estimates of efficacy could not be made during the second field season in *P. edulis* and *P. engelmannii* due to insufficient mortality in untreated, baited control trees. Two field seasons of efficacy was demonstrated in *P. ponderosa*/*D. brevicomis* and *P. monophylla* for 0.06% Onyx. We conclude that Onyx is an effective individual tree protection tool, but repeated annual applications may be required in some systems if multiyear control is desired. (Journal of Economic Entomology 2006. 99(5):1691–1698)

SIMULATION OF EFFECTS OF WOOD MICROSTRUCTURE ON WATER TRANSPORT

Craig A. Aumann and E. David Ford

A tracheid-level model was used to quantify the effects of differences in wood microstructure between coastal and interior Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco var. *menziesii* and var. *glauca*) wood on larger scale properties like hydraulic conductivity. The model showed that tracheid length, the ease of flow through a bordered pit and effective tracheid diameter can all limit maximum hydraulic conductivity. Among the model parameters tested, increasing bordered pit conductivity and tracheid length resulted in the greatest increase in maximum conductivity in both the inland and coastal ecotypes. A sensitivity analysis of the uncertainty between parameters governing flow through the bordered pit and air-seeding potential showed that, although decreased pit flow resistance increased maximum hydraulic conductivity, increased cavitation led to lower conductivity over time. The benefits of increasing the number of bordered pits depended on the intensity of the meteorological driving function: in drier environmental conditions, wood with fewer pits was more conductive over time than wood with more pits. Switching the bordered pit characteristics between coastal and interior wood indicated that the conductivity time course of coastal and interior wood was primarily governed by differences in the number of bordered pits and not differences in tracheid dimensions. The rate at which tracheids refilled had little effect on the conductivity time course of either coastal or interior wood during the first two summers when the wood was highly saturated, but had a marked influence in subsequent years once the cavitation profile stabilized. Our work highlights the need for more empirical work on bordered pits to determine whether variation in their number and properties is related to changing environmental conditions. In addition, a detailed simulation model of a bordered pit is needed to understand how variation in pit properties affects the relationship between ease of flow through a bordered pit and its potential for facilitating air-seeding. (Tree Physiology 2006. 26(3):285–301)

A NEW SIMULATOR FOR THE SPREAD OF FOREST ROOT DISEASES BY INDIVIDUAL ROOT CONTACTS

F.G. Peet and R. S. Hunt

A new simulator for the spread of forest root diseases, and the testing of it, is presented. It differs from earlier models in that it represents a first step to incorporate the basic processes of spread by individual root contact. It therefore has a generality that allows its use in different host–pathogen and geographic situations. It stochastically grows individual roots longitudinally outward from the stem. They are tapered, turn, and contact other roots as they grow. The simulator transfers fungus stochastically at points of contact between healthy roots and infected stump or tree roots and moves the fungus along infected tree roots stochastically. The fungus can girdle the rootcollar, move out into other roots, and eventually kill the tree. Growth of roots and fungus movement along infected roots is on an annual basis for up to 200 years. Root growth, fungus growth along roots, disease spread, and stand openings are displayed dynamically in color on the computer screen as the simulation proceeds. Estimates for numbers of infected trees and mortality are provided in tabular and graphical form. Results from the simulator were close to the field data it was tested against. (Forest Science 2005. 51(5):425–437)

COMPARISON OF TWO DIFFERENT APPROACHES FOR ASSESSING THE PSYCHOLOGICAL AND SOCIAL DIMENSIONS OF GREEN SPACES

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Urban forests, trees and other green spaces are thought to contribute significantly to certain psychophysical and social needs of urban dwellers. Recent studies on citizens' perceptions and behaviour toward urban green areas have shown the complexity and the multidimensional character of the man-nature relationship in the city; inhabitants' use of green spaces appears to be motivated by the need for psychological health with relevant social implications. In this paper, we describe two empirical studies that have been independently conducted and recently published by Italian urban foresters and environmental psychologists. By comparing the two studies in terms of approach, materials, methods and results, we seek to find out if urban foresters and environmental psychologists in Italy approach and interpret the psychological and social (P&S) dimensions of urban green spaces differently. Results show that urban foresters have applied substantially different approaches and research methods than environmental psychologists. This can be explained from their different backgrounds and perspectives. We conclude by discussing some basic hints and implications for enhancing the P&S benefits of urban forests through collaborative projects and scientific co-operation between urban foresters and environmental psychologists. (Urban Forestry & Urban Greening 2006. 5(3):121–129)