

Department News

Faculty and Student Research

Faculty Research

Edward J. Kaiser, David R. Godschalk, and F. Stuart Chapin, Jr. are revising *Urban Land Use Planning* for publication of a fourth edition. The third edition, by Chapin and Kaiser, has been in print for over ten years and needs substantial revision if it is to continue to be useful as a university textbook and a reference volume in planning agencies. The new version will reflect microcomputer and information system technology, a changed intergovernmental context and societal context, increased participatory methodology, and more emphasis on growth management planning. The companion workbook, *Hypothetical City Exercise*, is being updated as well to allow application of computerized geographical analysis, thanks to the efforts of Wei Qin, a Ph.D. student.

Raymond J. Burby, with Beverly Cigler (Penn State-Harrisburg), Steven P. French (Cal Poly-San Luis Obispo), Edward J. Kaiser, Jack Kartez (Washington State University), Dale Roenigk, and Dale Whittington recently completed *Sharing Environmental Risks: How to Control Governments' Losses in Natural Disasters*, to be published by Westview Press. The research was supported by the National Science Foundation.

Two enormous catastrophes in 1989--Hurricane Hugo and the Loma Prieta earthquake--resulted in billions of dollars of losses to the public and private sector. Those events captured public attention in a dramatic way, but in fact state and local governments every year lose nearly \$1 billion as a result of damages to public facilities from floods, hurricanes, earthquakes, and other natural causes. Most of these losses are not covered by insurance and most are not absorbed by the federal government through disaster assistance, even though damages to public property in natural disasters cost the U.S. Treasury hundreds of millions of dollars per year. This study is about the nature of those losses and policies to ease the perennial hardships that states and localities suffer as roads, water and sewer systems, storm drainage, recreational facilities, and other infrastructure are damaged by seemingly random acts of nature.

Drawing on four sources of data (federal data tapes on losses in Presidentially declared natural disasters between January 1, 1980 and mid-1987; a case study of the Whittier Narrows earthquake of October 1, 1987; and national surveys of local governments conducted in 1987 and 1988), the researchers reached the following important conclusions: (1) losses in natural disasters are very costly to the private sector, but the nature of losses varies considerably by type of hazard and type of government, both of which compli-

cate policy formulation; (2) present governmental policies to deal with disaster losses are inefficient in two important respects: local governments are not taking adequate steps to control losses; and federal funds are used to compensate local governments for small losses for which there are no economic benefits from loss spreading; (3) present governmental policies are inequitable in three important respects: beneficiaries of hazardous locations do not pay the full costs of their locational choices; per capita losses are significantly higher for small jurisdictions, but that is not reflected in federal disaster assistance; and governments experiencing equivalent losses do not have an equal chance of receiving federal aid; (4) those problems can be mitigated by reforming federal disaster relief policy to eliminate aid for small per capita losses; extending insurance coverage from floods to all hazards, and from buildings to other infrastructure; and by increasing the amount of technical assistance and information on hazards given to state and local governments.

Edward J. Kaiser, with Gerard McMahon, Raymond J. Burby, David Godschalk, Harvey Goldstein, David Brower, and Steven Walsh (UNC Geography Department) are doing an impact assessment and land use compatibility study for the nine-county region surrounding Fort Bragg in North Carolina. Its purpose is to provide the basis for joint military-civilian planning to protect both the military's capability to conduct its training missions and the region's economy and quality of life. The study identifies current and potential impacts of Fort Bragg and Pope Air Force Base on the adjacent land and land uses, on the economy, and on the public fiscal base of the communities in the region. The study will also recommend policies to reduce land use incompatibilities and other negative impacts while enhancing positive impacts.

Raymond J. Burby, with Edward J. Kaiser, Michael Luger, Robert G. Paterson, Rooney Malcom (N.C. State), and Lisa Beard (N.C. State), recently completed an evaluation of the North Carolina Erosion and Sedimentation Control Program. This research was supported by the N.C. Sedimentation and Erosion Control Commission.

In 1973 the N.C. General Assembly created the N.C. Erosion and Sedimentation Control Program, a unique state-local effort to control erosion and sedimentation from urban construction. Construction activity in urban areas can increase the amount of soil that washes from a building site into nearby streams, rivers, and lakes. When only one acre is bare of vegetation, up to 500 tons of soil can be lost from the site. Harmful effects of sedimentation include damage to aquatic life, increased potential for

flooding, loss of reservoir storage capacity, reduced navigability of streams and channels, and decreases in the natural beauty of streams and lakes.

The study compares erosion and sedimentation control in North Carolina with programs in other states, and compares the sediment control standards of state administered and local government administered programs in North Carolina. Visits were made to more than 150 construction sites to measure the technical validity of erosion and sedimentation control plans and the actual performance of those plans in the field. The study also measures and compares the efficiency of state and local programs, and includes the results of surveys of state and local agency personnel and of trade, professional, and environmental group representatives. Finally, the study compares program costs and benefits, taking into account research on North Carolina citizens' willingness to pay for a program to reduce sediment pollution in streams and lakes.

Dissertations

The Effects of Floodplain Development Controls on Residential Land Values

James Michael Holway

State, federal, and local governments are failing in their efforts to reduce losses from flooding. Continued floodplain development has increased the losses from flooding despite, or in part because of, large investments in flood control structures. Flood control has protected property from flood damages, but for every six dollars in potential flood damage savings, at least five dollars is lost because of increased flood plain occupancy.

This dissertation (1) examines floodplain development effects of the National Flood Insurance Program (NFIP), a federal effort that requires local governments to reduce the exposure of property to flood damages and resulting insurance losses; (2) considers the history of flood control and floodplain management, discusses the process of residential development, and describes the effects of flood hazard and development regulations; and (3) reviews prior studies (which reached varying conclusions on whether floods affect the land market) and identifies weaknesses that the current research is designed to overcome.

The dissertation further elaborates the discussion of residential development with an economic model of land value and floodplain regulation. Examination of this model leads to a set of hypotheses regarding the expected effects of hazards and land use regulation. The hedonic effect is then used to test those hypotheses and examine land use policy effects on land as a factor in the production of housing in nine different U.S. cities.

The study shows that three policies, (1) zoning floodplains for lower density development, (2) implementing building regulations more stringent than the minimum required by the NFIP, and (3) providing clear local leadership of pro-

grams, each contribute to lowering floodplain land values. From those findings the dissertation concludes that the NFIP is having an effect on land use in localities across the U.S., but its impact can be amplified or subverted by local land use policy decisions. The dissertation recommends that greater emphasis be placed on local land use controls for floodplain management, particularly where government programs subsidize floodplain development.

The Choice of Housing Adjustment Mechanisms by Older Home Owners

Roberto Quercia

This study assessed the determinants of the choice of housing adjustment mechanisms by older home owners. Many older home owners experience discrepancies between the housing they have and the housing they need. They correct this by undertaking housing adjustment mechanisms. Older home owners may have an added incentive to adjust if they have more housing than they need, yet they also have difficulty meeting other non-housing needs--the so-called housing-rich, income-poor phenomenon. Two complementary theoretical orientations were used to develop a revised model of housing adjustment: the model of housing adjustment proposed by Morris and Winter (1978), and microeconomic theory. This study used a nationwide sample of urban older home owners to test the effects of combined levels of housing and neighborhood satisfaction, and the housing-rich, income-poor phenomenon on the choice of both moving and non-moving adjustment mechanisms.

The study provided partial support for the revised model of housing adjustment. Households were expected to adjust their residential conditions if they were experiencing low levels of housing and/or neighborhood satisfaction, or if they were experiencing the housing-rich, income-poor phenomenon. The results of multinomial logit analysis indicate that the combined levels of housing and neighborhood satisfaction do play a role in adjustment decisions. Also, the housing-rich, income-poor phenomenon was found to be a significant predictor of adjustment.

Departmental Papers

Preserving Important Public Views in Urban Areas

Nathan G. Torgelson

Protecting views of important public buildings--state capitols and city halls--and natural features--waterfronts, rivers, and mountain ranges--is one way local governments preserve unique features of their communities. This paper examines the history of this type of aesthetic regulation, analyzes its legal considerations, and presents examples of communities that have adopted view protection regulations. Among these communities are Denver, Austin, Philadelphia, and Washington, D.C., all of which have used

overlay zoning districts with height limits to preserve important views.

Drawing on the experiences used in these and other cities, this paper offers suggestions for communities interested in view protection and recommendations for the implementation of view corridors in St. Paul, Minnesota, a city currently attempting to preserve views of the Minnesota State Capitol and the St. Paul Cathedral. The issue of view protection is currently under consideration because of the anticipated redevelopment of the western edge of downtown. Significant views of the Capitol and the Cathedral from points in downtown St. Paul either begin or cross in this area, and city leaders are concerned that future redevelopment may block these views. Determining which views to preserve, the boundaries of overlay protection areas, appropriate height limits, and potential legal problems are all discussed.

Preventing visual encroachment on public landmarks and natural features in urban areas contributes to community pride, prestige and image, and it helps communities maintain their distinctive features. Preserving views can also support private investment in cities where views are considered a built-in amenity. Finally, views provide relief, contrast, and orientation for the pedestrian in the intensely developed urban environment.

King County Single-Family Home Price Affordability Trends in the 1980s

Gordon Clowers

This study examines trends in single-family home purchase affordability in King County, Washington, during the 1980s. Particularly of interest were variations in price escalation trends among geographical subareas and effects on affordability of housing supply and demand factors. Affordability was measured by comparing average purchase prices to an affordable price determined by average annual interest rates and median household income.

The data indicate that home price increases were moderated by falling interest rates after 1982 with dramatic improvements in affordability through 1987. However, rapid price escalation and slightly rising interest rates in the past two years caused declines in affordability. The countywide average purchase price jumped from about \$116,000 in 1988 to \$130,000 in late 1989. The worst declines in affordability occurred in affluent and rapidly developing areas, while average homes in Seattle and southern county areas experienced little or no decline in affordability.

The time series price data and geographical patterns of price and supply/demand factors suggest that county growth policies had adverse effects on affordability, especially in the rapidly developing eastern portion of the metropolitan area. In conclusion, the study makes several recommendations to assist the county in further analysis of affordability and growth policies.

Changing Uses of Historic Church Buildings in Rural and Small Communities in North Carolina

Trina Gauld

Historic church buildings in rural North Carolina are frequently at risk because of declining church membership, changing demographics, or changing space needs of the congregation. Changing small town and rural demographics coupled with dwindling memberships among mainline protestant churches--frequently the stewards of historic religious buildings in the Piedmont and eastern regions of North Carolina--may be a sad harbinger of the eventual dissolution, abandonment or even demolition of a historically and/or architecturally significant church building.

Although it may be impossible to remedy or prevent these trends from occurring, with careful planning a congregation may be able to preserve the building and eventually deed it to a group with preservation aspirations. This paper focuses on the transfer of church buildings and properties to community or civic organizations for sensitive reuse. Further, a process is recommended for congregations thinking of either entering a shared space arrangement or selling their historic building to a compatible user. Based on case studies, recommendations are made to a specific church in Warren County, N. C. in regard to possible uses for their historic building.

Feasibility of the Use of Paper-Based Litters on the North Carolina Broiler Industry

Sherol Smith Bremen

Recent uncertainty regarding the viability of traditional markets for old newsprint generated in the Orange County and Chatham County recycling programs prompted this investigation into the feasibility of using old newsprint as animal bedding (broiler litter in the local poultry industry). This study identifies potential agricultural users of paper-based litter products, and evaluates the effects of various technological, economic, and environmental factors on the feasibility of local market development.

Most U.S. and North Carolina poultry producers favor the use of white pine shavings and sawdust litters because of favorable impacts on carcass quality, color, bird mortality rates, and reduced disease bearing qualities. Producers typically turn to alternative litter materials only when cost and availability preclude the use of pine litters. The feasibility of using paper-based litter products depends on its performance, availability, and cost relative to current market substitutes such as white pine shavings.

There are many positive effects associated with the use of paper litter products: (1) broilers reared on paper-based litter products have been found to exhibit improved weight gain and feathering; (2) mortality rates and incidence of breast blisters and disease are similar to sawdust reared broilers; and (3) there appears to be little potential for adverse impacts from land disposal of paper-based litter

products. The issue of broiler tissue contamination from the use of colored inserts in paper-based litter products, however, requires further research.

Mechanically shredded paper-based litter products have not been accepted for use in the commercial broiler industry because of inferior performance relative to traditional wood-based litters. The primary reason for grower rejection of paper-based litters can be attributed to excessive caking caused by the high absorbency of the paper-based litters. In addition, paper-based litter products must be suitable for outdoor bulk storage and automatic spreading using accepted industry practices.

If technologic and economic constraints could be overcome to produce an acceptable processed paper-litter product, a market may exist for its use as a topping agent in brood chambers of local broiler houses. Based upon 1987 broiler production in Chatham, Randolph, and Moore counties, the newsprint supplies required for production of a processed paper litter product could reach 6,000 tons annually, greatly exceeding the 1,100 tons of newsprint available from Orange and Chatham county drop-off sites. Actual newsprint demand and litter production levels would, however, depend upon cost, performance, and grower acceptance of the product.

Ian McHarg and the Outer Loop: A GIS Analysis Sarah Burdick

In 1988 public hearings were held in various Triangle area communities for the purpose of obtaining citizen comment on a proposed Durham-Chapel Hill-Carrboro Thoroughfare Plan. Of all the proposals presented in conjunction with the Plan, the thoroughfare which drew the most comment and criticism from Orange County citizens was the proposed Durham Outer Loop. The purpose of this paper was to determine the best possible route, or the least social cost corridor, for the proposed Durham Outer Loop through Orange County.

This project is modeled after an "overlay technique" developed by Ian McHarg. Over the last twenty years, McHarg's method has emerged as one of the elements of GIS (Geographic Information System). GIS is a computer system with analytical and graphic capability, used to manage spatially oriented data.

ARC/INFO, a vector-based GIS, was used to complete this project. The overlays that contribute to the suitability study are soil suitability, slope, hydrography, and historic, community, and natural sites. Information on density and land values were not available for the study area.

The paper includes an examination of Ian McHarg and his work, an introduction to GIS, and the full color maps produced by ARC/INFO. The final composite map showed that the least social cost corridor is already occupied by Pleasant Green Road. At present, the Outer Loop parallels Pleasant Green Road. With the available information,

the best alternative is not to build the Outer Loop at all, but instead to upgrade Pleasant Green Road.

The Impacts of Stormwater Runoff and Policy Recommendations for a Statewide Stormwater Management Program for North Carolina

Mary Elizabeth Binns

This paper recommends a strategy for developing a statewide program of stormwater runoff management in North Carolina. The paper is divided into four sections: (1) a discussion of the problems created by stormwater runoff and the links to both rural and urban land uses; (2) existing strategies to mitigate some of the problems created by stormwater runoff; (3) a summary of typical policies to be considered at the local level; and (4) the recommended approach to a comprehensive stormwater management program for North Carolina.

The paper reviews four existing state programs (Pennsylvania, New Jersey, Maryland, and Florida) for their scope, structure and cost of design and implementation, and discusses federal level involvement and the pending EPA regulations concerning stormwater runoff.

North Carolina has taken action to protect many of its surface waters from degradation. The approach has been incremental, beginning with a program for shellfish waters, and followed by programs for water supply watersheds and outstanding resource waters. A recently enacted law, HB 156, further protects the water supplies of the state by requiring the Environmental Management Commission to "adopt rules establishing water supply watershed classifications and minimum management requirements for the protection of the surface water supplies of the state." The minimum protection strategies apply mostly to stormwater controls.

The paper recommends that the state enact a comprehensive stormwater management program that combines the existing programs dealing directly or indirectly with stormwater runoff. The design and implementation of such a program must be placed in the hands of one departmental division. Through this program, the state should (1) begin to educate all local governments and their constituents about the effects of stormwater runoff on water quality; (2) delegate the planning, monitoring, and enforcement of stormwater management to local governments, but create an approval and enforcement clause as rigorous as that in the Sediment Control Program; (3) provide partial funding, performance standards and design criteria, administrative assistance in the way of model ordinances, and continuing guidance to the local governments; (4) give local governments the option of putting non-structural methods to use (these options include land use or density controls and regional structures such as regional ponds that may also serve as recreational areas or open space). ■