

THE HEAT IS ON

Regional Development Strategies for a Better Future

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Construction and growth make the Atlanta region the most dynamic in the nation. While the City of Atlanta has the two of the largest and most visible and public projects – the airport and the sewer, the City is also leading with some of the most innovative work. The *green roof* on top of City Hall and a recently completed parking facility are leading examples of building techniques to reduce excess urban heat. Atlanta's Mayor Shirley Franklin deserves much of the credit for addressing infrastructure needs and promoting examples of high quality growth. But while we have some outstanding examples of individual signature projects, the region lacks a coherent vision for what makes greater Atlanta the Capital City of the South.

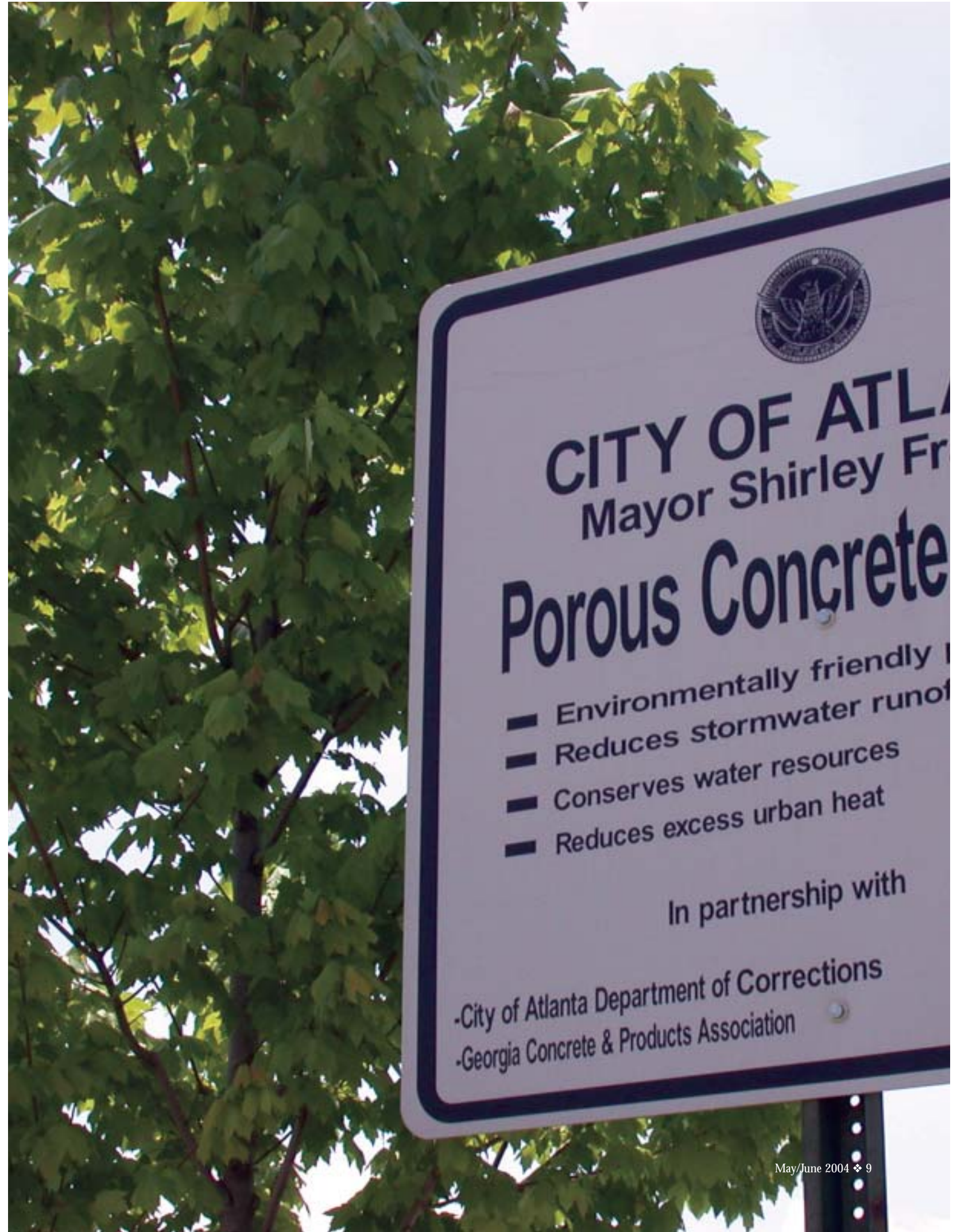
Finding regional consensus on issues of growth, development, and quality of life is surely among the most challenging tasks of our time. This is especially true in the Atlanta region where too many local jurisdictions create a crazy-quilt patchwork of bewildering rules, requirements, and a changing landscape of elected and appointed officials, not to mention community and market preferences. The business community, especially developers who earn their living by planning and taking risks on new projects, is the most urgent force for development. The initiatives of developers create a reaction of zoning, school and sewer construction, and commission and citizen action in response to development proposals. Sometimes identical proposals will be welcomed in some communities and bitterly contested in others. While there is general agreement that growth is a necessary and good thing, the devil is certainly present in the details of development.

One of the major reasons that we lack a common vision for growth and development is that the big fragmented region that we know as metropolitan Atlanta has no identifiable *touchstone* or frame of reference that creates a common denominator for other regions. For example, in the mid-Atlantic the health and viability of the Chesapeake Bay is a value that all must respect and it has the effect of creating certain limits of acceptable development. In many coastal communities, similar environmental or quality limits are agreeably respected as a kind of *cultural norm* on the limits of development. In the Pacific Northwest, the salmon habitat is pretty universally respected as a touchstone of acceptable development – if the fish can live with it, fine let's talk about it. If on the other hand, it's bad for the fish, then it's out of bounds and we won't go there.

Atlanta, as a region without any natural features or boundaries limiting development, lacks any unifying environmental limits on what constitutes acceptable growth. We know our air quality is marginal, but we keep expanding the size of our non-attainment area and getting extensions and new compliance deadlines – bad air quality hasn't stopped us yet. We know that the water quality in our streams and rivers is marginal and that our development patterns are stressing the limits of available supply, but our response is largely one of praying for adequate rainfall, setting new compliance targets, and mounting a legal defense that will allow us to continue the same development patterns we have seen for the past forty years.

In spite of our Southern self-proclaimed love of the land and sense of place, we have scarred our region pretty badly. It is now hard to distinguish our *geography of nowhere* from any other sunbelt boom town. Our future is clearly not sustainable in terms of water and air quality, and our fractious bickering is fueling a "my way or the highway" mentality.

Being apparently unable to define what constitutes *quality growth*, perhaps we should look to science and technology to help us define what is not acceptable. Some recent studies led by NASA, in partnership with the Georgia EPD and GRTA, are giving us some new insights about the effects of regional growth without limits. Using remote-sensing technology and a new approach to integrate land cover into air quality modeling, we now have good evidence that Atlanta's sprawling development is itself responsible for some of our air quality problems. It also seems clear that the hardscape portion of the region's built environment creates not just stormwater problems, but also a microclimate that costs money in the form of excess energy demand and a rapidly growing heat island with even more serious future consequences. Urban heat islands are well-researched phenomena in which ambient air temperature increases over developed areas due to the absorption of the sun's heat by building materials, particularly large expanses of dark surfaces like roofing and paving. The heat islands in developed areas are typically four to eight degrees Fahrenheit warmer than surrounding less developed areas where tree canopy and vegetation create a cooling effect through shading and evapo-transpiration. The excess heat contributes to the formation of ground level ozone, creates greater demand for energy usage for cooling, and exacerbates stormwater problems by producing heated runoff into our streams. With much of the tree canopy in the region being replaced by asphalt pavement, treeless subdivisions, and dark roofing, the significant growth of Atlanta's heat





This parking lot built for employees at the Atlanta Bureau of Corrections is constructed with pervious concrete pavement. During most rainfall events, this 55-car parking lot produces no stormwater runoff because rainfall percolates through the pavement and into the soils.

island is a definite indicator of environmental degradation.

NASA and their Georgia state government partners have applied cutting edge research tools to define the heat island effect in Atlanta. As with many research findings there is good and bad news in the (early) research conclusions. The bad news is that excess urban heat is pervasive, has adverse consequences for both air and water quality, and a strategy to reduce Atlanta's heat island must be an ambitious, substantial, and sustained effort in order to be effective. The good news is that the solutions are relatively easy to implement and could be a unifying principle for quality development. Most important, this strategy is easy to understand and mostly cost-neutral to implement. Our basic challenge is this: Can the built environment be made to respond to heat and hydrology in the same way as the natural environment? The answer is clearly "yes," and to do so we need make only minor adjustments to traditional development practices. By using heat island mitigation principles as a regional touchstone for quality development, Atlanta could begin to move in a more sustainable direction and create a more unified standard of what is recognized as quality growth.

Land Cover and Air Quality Modeling – an Emerging Science

Without getting into the technical details of how NASA and the Georgia EPD have taken air quality modeling to a new dimension of opportunity, suffice it to say that we can say with some certainty that albedo (reflectivity) of the urban fabric matters, and vegetative cover also matters. More specifically, it is clear that changing the reflectivity of the region's hardscape (roofing and paving) to about 20 –30 percent lighter color we can reduce ambient summertime temperature and consequently, air pollution. Adding tree canopy to the Atlanta region also has a definite cooling effect that likewise improves air quality. The modeling, along with market penetration analysis, predicts with some certainty that heat island mitigation is an effective air pollution control technique that will also produce other environmental benefits. Further model runs using both land cover changes and some more precise inputs are expected to yield more specific results.

Although the computer models and some aspects of the science are

still too new yet to have undergone peer review, it is clear that there are definite environmental benefits and energy benefits to heat island reduction policies. The extent to which these measures could become part of a regional air pollution control strategy is also yet to be determined. Our air quality regulations were written with other measures in mind – specific emissions inputs and attainment demonstrations with short, relatively near-term horizons. But even with the limits of scientific certainty, the time needed for peer review, and the confounding problem of regulations that do not encourage innovative and alternative strategies, an urban heat island mitigation policy still makes sense for our region because not only does it make intuitive good sense and benefits the environment, it could become a unifying principle of quality development – a regional touchstone that everyone can understand.

Because of the astonishing growth of the Atlanta region, a heat island policy must be comprehensive enough to include all of the urban counties as well as the suburban and exurban counties – our 21 county non-attainment area is a good start. Our heat island policy should also have multiple components in recognition of the fact that this is a new concept to many residents and must involve both public and private development strategies. Rather than a traditional command and control approach, a sensible heat island policy would rely first on public awareness and education. Secondly, government adoption would provide some leadership and models for success. And, finally and gradually, incentives and local ordinances would address development and building codes and other practices consistent with quality growth.

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This green roof constructed with donated materials covers part of the fifth floor at Atlanta City Hall. The roof serves as a demonstration of good environmental practice to reduce heat and stormwater runoff and a pleasant spot adjacent to the snack bar for municipal employees to break for lunch.

Elements of a policy

In much the same way that Georgia communicates about the role of the automobile in creating air pollution, public awareness is a critical element of a successful heat island policy. But because heat island mitigation is fundamentally an engineering strategy as opposed to a behavior change campaign, public awareness will be a much easier sell. In effect this campaign is aimed at public support for better development practices – an easier message to accept. Other elements to communicate about a heat island policy would be targeted to design professionals, engineers, public officials, and other target groups, such as the business community of developers and building owners /managers.

The critical element of a heat island policy is that it be comprehensive across the widest possible spectrum of partners – chambers of commerce, environmental groups, trade associations, retailers and merchandisers, neighborhoods, community and non-profits, utilities, local governments,



With the airport expansion, water-sewer infrastructure, and ongoing capital projects, Atlanta will spend about \$10,000,000,000 over the next decade. In addition to the big projects there are also some very innovative environmental projects.

and, of course, state government. A coordinated state government policy led by the appropriate state agency could ensure that government sets a leadership role and provides some easy-to-understand examples that could be followed by local government and the private sector. The following are some of the obvious opportunities that state agencies have available to them as a common sense approach to improving land cover for environmental benefit:

Department of Transportation:

- Review landscape policies that would support additional canopy trees in medians, interchanges, and along state right-of-way land;
- Offer incentives to local government to install concrete pavement on key state road corridors and at intersections that carry higher volumes of traffic or transit;
- Evaluate park ride lots and, rest stops, and other DOT parking areas for additional landscaping and the use of pervious pavement;
- Insist on concrete surfacing of interstate highways both to enhance reflectivity and reduce maintenance cost and time and associated congestion.

Department of Community Affairs:

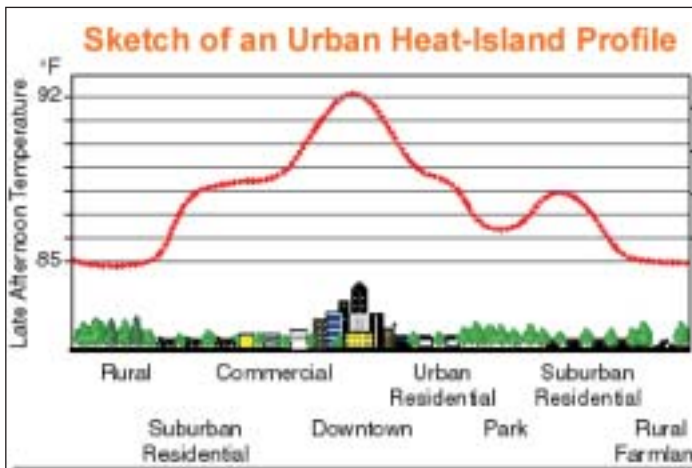
- Establish more effective mechanisms to ensure implementation of comprehensive development plans submitted by counties and local jurisdictions;
- Evaluate and recommend alternate designs for narrower secondary streets, parking space maximums (rather than minimums), expanded floodplain, and stream buffer protections;
- Promote use of alternative parking surfaces especially for overflow and event parking sites;
- Promote use of street trees along urban streets and model tree ordinances for parking lots, tree protection strategies for areas of new development, and design seminars for local officials.

Georgia Regional Transportation Authority:

- Use alternative parking surfaces to reduce stormwater runoff from park-ride lots;
- Plant canopy trees extensively in and around park-ride lots to be constructed;
- Use concrete paving for all bus lanes and loading areas.

Public Service Commission:

- Promote an energy conservation and demand management strategy that would offer a rebate on cool roofing installed on commercial buildings;
- Establish a shade tree planting program that would provide free shade trees planted near the west side of residences and commercial



buildings (similar to a program in Sacramento, California and elsewhere).

Pollution Prevention Assistance Division:

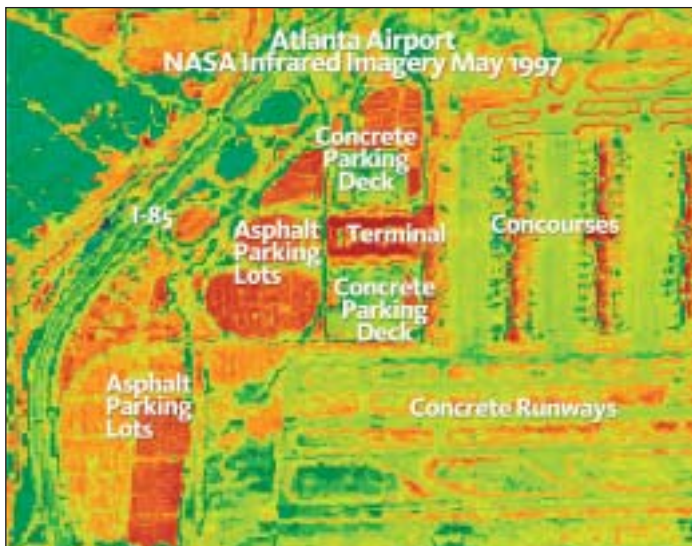
- Advise commercial and residential building owners on the benefits of strategic shading;
- Integrate communications of heat island mitigation benefits into water quality and conservation, energy savings, and other environmental messages.

Department of Agriculture:

- Provide free seedlings of native hardwood varieties and advice on how to plant and care for trees for maximum survival rates;
- Provide larger trees to schools and organizations meeting appropriate criteria.

Environmental Protection Division:

- Coordinate overall state policy oversight;
- Develop a reporting and evaluation mechanism;
- Seek grants and technical assistance from federal agencies and others.



Similar roles exist for local governments and associations, such as the Association of County Commissioners and the Georgia Municipal Association, as well as private-sector and non-profit organizations. Targeted promotional and public awareness campaigns through the Regional Business Coalition and Chambers of Commerce coupled with an aggressive retail strategy to promote the value and sale of trees are essential components to galvanize interest and understanding of the issues and challenges. Above all, this campaign will have to be sustained for several years in order to accomplish the market saturation needed and to accomplish the very large number of trees that will be necessary to increase regional vegetative canopy cover.

Investing in our Future

While the components of a UHI policy present challenges, they also present significant opportunities and benefits that enhance the environmental quality of the region without compromising the goals of economic development and quality growth. As we look to the future, it is essential that we take actions now to protect our quality of life for the long term.

Population projections for 2030 indicate we will have another 2.6 million people in the 21-county metro Atlanta region. That's roughly equivalent to the entire population of Arkansas or only slightly less than that of City of Chicago. While some may argue the numbers, the trend can't be ignored and we don't have an option of putting up a "Do Not Enter" sign. The Atlanta metropolitan area is one of the fastest growing regions in the country, with dispersed suburban development that continues to transform tremendous amounts of forest and agricultural lands into urban areas with significant amounts of impervious surface. These population forecasts are likely to be very conservative; the region has significantly exceeded every population projection made for the past forty years.

A Georgia Tech study, commissioned in 2003 by the non-profit Cool Communities organization in partnership with NASA and GRTA, used population and employment projections over the next 27 years to determine the extent of impervious surface that will accompany suburban development to accommodate these projections. This analysis predicts that, under *business as usual* scenarios, there will be 28.4 billion square feet of impervious land cover in 2030 – an increase of 45 percent from the current amount.

Looking to the future, we have an enormous opportunity to make a difference by employing heat island mitigation strategies now as we strive to formulate better plans to accommodate our growth. In order to make this happen, there must be a strong political will and private sector commitment. Otherwise, we may be facing a real meltdown situation in terms of excess urban heat, with far-ranging impact on air and water quality, stormwater management, energy consumption, and health issues. As the saying goes, "It's not rocket science." But in this case, there's plenty of good scientific research on which to base a sound heat island policy aimed at mitigating the environmental, economic and human health consequences of overheated cities. ❖

For more information about Cool Communities and NASA's Project ATLANTA, visit the web site, www.coolcommunities.org or e-mail us at info@coolcommunities.org.