

PRESIDENT'S MESSAGE

By Al Tucker



HAVE WE REACHED THE CARRYING CAPACITY OF OUR ENVIRONMENT?

In the last half-century, land use in Anne Arundel County has been undergoing rapid transformation from agriculture to suburban and exurban sprawl. This sprawl has rapidly reduced the forest cover, increased the impervious surface, and increased pollution from stormwater runoff. It has generally degraded the ability of the environment to absorb and mitigate these adverse effects. Currently, TMDLs (Total Maximum Daily Loads) focus on reducing the nutrient and sediment loading in the Bay so that the Bay's natural ecosystems can return to a sustainable balance. Nutrients and sediments are not pariahs; they are critical

to sustain life. But we humans have caused an oversupply of these nutrients to be injected into the Bay. In an attempt to restore balance, algae and other phytoplankton overproduce leading to the Bay's oxygen depletion problem. Similarly, dams and loss of forests have caused the wrong types of sediments to be transported into the bay. The fine sediments, easily transported in suspension, occlude natural sunlight that produces the bay grasses that provide the habitat for the higher order animals in the food web. The coarse sediments which are critical to sustain and develop wetlands and shallow bay grass habitat become trapped behind the dams. Again the natural corrective feedback mechanisms of the Bay have been thwarted by human development. The recognition that TMDLs are necessary is a tacit admission that the carrying capacity of the Bay has been exceeded. If the capacity of the Bay has been exceeded, it's natural to ask if the carrying capacity of the surrounding land, the watershed, also been exceeded?

This question is being asked more frequently by land and urban planners as they realize that the classical approach to land-use planning, controlled by zoning classifications, has become inadequate and does not promote sustainable environmental and financial development. In a "build-out" or "development capacity" approach, all buildable land remaining in a given zoning classification is assumed to be developed and public facilities will be built to support the additional development. In Anne Arundel, adequacy of public facilities is addressed separately by the Adequate Public Facilities Ordinance (APFO), which restricts development if certain specific public facilities are not available at the time of request to build. However, after a six-year waiting period, development can proceed. So the APFO delays development, but it does not prevent development. A build-out analysis does show shortcomings in the zoning and inadequate infrastructure to support it. However, it does not analyze the "carrying capacity" of the natural systems and built-systems needed to support the development. And, in particular, it does not address the financial carrying costs or the decline in quality of life incurred by added development.

Generally the concept of carrying capacity analyzes four types of limits to carrying capacity:

1. **PHYSICAL CARRYING CAPACITY** – Maximum number of people, vehicles and structures that can be physically accommodated in a given area.
2. **ECONOMIC CARRYING CAPACITY** – Maximum use that enables economic feasibility of resources' potential uses.
3. **ECOLOGICAL CARRYING CAPACITY** – Maximum population that can be indefinitely supported in an habitat without affecting the productivity of that ecosystem.
4. **SOCIAL CARRYING CAPACITY** – Maximum level of use above which there is a decline in the quality of experience sensed by the user.

A build-out analysis will address several of the issues covered in limits 1 and 2, but offers no insight into the impacts 3 and 4. As you can imagine, research into understanding the limits of 3 and 4 is being carried out most actively in China, where population and natural resources are being strained to their limits. However, closer to home, Maryland Department of Natural Resources (DNR) has been a leader in the types of ecological economic analyses that shed light, supported by data, on the issues of limits 3 and 4. DNR maintains the State's Genuine Progress Indicator (GPI), which contains many of the data types that could be used to perform the analyses for limits 3 and 4. The chart gives an overview of the data maintained for the state.¹

<i>Economic Categories</i>	<i>Environmental Categories</i>	<i>Social Categories</i>
Household Budget Expenditures	Services from natural capital	Services from human capital
Defensive Expenditures	Depletion of natural capital	Services from social capital
Household Investments	Costs of pollution	Social costs of economic activity
Income Inequality		
Public Provisioning		
Services from built capital		

This analysis was applied locally to the city of Baltimoreⁱⁱ and focused primarily on the social categories. At the 2016 CEPA Forum on the “Unsustainable Spiral of Growth,” Dr. Elliott Campbell presented a detailed analysis of the ecosystems services in Anne Arundel County. (available online at: <http://cepaonline.org/presentations/CEPA%202016%20ECampbell.pdf>). This type of analysis could be used to pinpoint the most valuable areas of the county that maximize ecosystems services. In this presentation, the ecosystems returned over \$287M per year to the county.

In Anne Arundel we are beginning to sense the limits of ecological and social carrying capacity. For example, on the Mayo peninsula residents are feeling the social pressure of increased traffic, which not only induces physical stress, but also decreases their access to leisure time. Similarly, additional development impacts groundwater availability. The peninsula has experienced localized arsenic contamination and saltwater intrusion. Fixing these issues requires individuals to spend thousands of dollars, which further exacerbates their physical stress – a social cost. At the same time new development reduces the ecosystems services, thus requiring all residents to pay more for stormwater remediation, loss of nutrient absorption and increased infrastructure. These costs are rarely articulated, yet they are real costs for a degraded quality of life. The Mayo peninsula is not an isolated case; similar instances occur across the state.

So the time has come for a new method to assess land-use at the local, almost at the neighborhood scale. If the infrastructure costs exceed the value of remaining lots, then government must retire these lots. This could be done by outright purchase or through innovative programs that transfer development rights to less impacted parts of the county. The unique topography of Anne Arundel County begs for a solution. The undeveloped land on peninsulas is key to providing the “last mile” of protection for the bay. The undeveloped areas of West County – the growing economic center of the County – are much better suited toward implementing advanced technology across to improve our economic, social and environmental quality of life.

ⁱ See Maryland GPI website: <http://dnr.maryland.gov/mdgpi/Pages/default.aspx>

ⁱⁱ <http://sustainable-economy.org/wp-content/uploads/2014/09/Baltimore-GPI-2012-2013.pdf>
