3.0 ACCOUNTING FOR GROWTH

In terms of the eight elements of a Phase I Plan defined in EPA guidance, this section addresses Element 3: "Accounting for Growth" in loads.

In determining the pollutant load reductions to meet the interim and final target loads, it is necessary to account for the growth in future loads. Broadly speaking this can be done in two ways. First, future loads can be estimated and included in quantitative load reduction analyses. Second, policies and programs can be adopted to ensure all future load increases are off set by commensurate load reductions on an as-needed basis.

This Plan uses both approaches. The Plan uses future projections of loads in the calculations used to set strategies for achieving the interim target loads by 2017. This is described further in the Section 4 on the gap analysis.

The Plan also offers a schedule for adopting nutrient offset programs for septic system and land development loads. This program will build on the existing nutrient trading policies and programs.

3.1 Background: Smart Growth and Managing the Growth in Loads

Maryland has long recognized the impact of growth and development on natural resources and has instituted policies and implemented strategies to reduce that impact. The Priority Funding Area law reduces growth impacts by focusing growth in areas with a certain density and infrastructure. Maryland uses State *Priority Funding Areas* (PFAs) to direct state investments in infrastructure to areas with existing development of certain densities and where infrastructure already exists. State investments in infrastructure reduce overall costs and make these lands more attractive to developers. Growth within the PFAs helps preserve agricultural and resource lands by developing other lands inside urban areas instead. PFA growth also helps minimize stormwater pollution by reducing the amount of land consumed to accommodate new growth, and reduces the nutrient pollution from septic systems by sending household waste water to treatment plants instead of into a septic system that discharges directly into the ground.

In 2009, a new State law required local governments to track certain measures and indicators to measure the level of smart growth occurring in local jurisdictions. The law also establishes a goal to increase the percentage of growth within the PFAs and decrease it outside PFAs. Local governments are also required to set growth goals to keep pace with the State goal and report annually on ordinances and regulations that support the goal.

The State has also enacted other measures to help direct growth and development to areas that reduce impacts to the environment. The *Sustainable Communities Act of 2010* broadened an existing tax credit focused on historic structures to one that emphasizes the importance of dense, sustainable development near mass transit in a variety of urban centers throughout the state. This tax credit supports the goals of the Main Street Maryland Program that aim to strengthen traditional downtown business districts. The Sustainable Communities Act also supports Transit-

Oriented Development that allows Marylanders greater choice in how they move between home, work, and play.

Land Conservation, the practice of preventing land from being developed, is an important component of Smart Growth. While the goal of Smart Growth is to direct as much growth to appropriate areas as possible, some growth will inevitably occur outside of the PFAs. Maryland works hard to protect valuable forests and farms from being developed. Once a property converts to a developed use it rarely, if ever, is returned to its previous state of field or forest. Organizations including the Maryland Agricultural Land Preservation Foundation (MALPF), the Maryland Environmental Trust (MET), Program Open Space (POS), and others work diligently to make sure that these lands remain in their current state into the future to protect the Bay and to make certain that future generations can enjoy them.

Governor Martin O'Malley required the Departments of Environment, Natural Resources, Planning, Agriculture, and Transportation to create systems to track progress in meeting goals for development, land preservation, and water quality restoration. Following the model of CityStat, the agencies have supported BayStat, GreenPrint, AgPrint and the soon-to-be released GrowthPrint to quantify and report on progress towards goals.

Local government implementation of the aforementioned laws is crucial to reducing harmful sprawl and associated increased nutrient and sediment pollution reaching the Chesapeake Bay. Article 66B of the Maryland Annotated Code provides local governments with land use management authority, and requires that local governments write and update plans for future growth and development. These plans are referred to as Comprehensive Plans. Comprehensive plans in Maryland must include numerous "elements" that address specific areas of public responsibility, such as land use, transportation, community facilities, mineral resources, development regulations, sensitive areas, water resources, and implementation. The water resources element and a municipal growth element were recently added to the required comprehensive plan content, signaling a change in the way that planning considers the effect of growth on the natural environment. This concern is echoed by the creation of the Chesapeake Bay TMDL and the requirement that state and local governments collaborate to create Watershed Implementation Plans to identify how to reduce pollution entering the Bay and prevent increases in pollution from future development.

3.2 Key Issues

Nutrient caps on Waste Water Treatment Plants (WWTPs), without similar constraints on loads from septic systems, create imbalanced incentives for development. Presently, caps on nutrient loads from WWTPs constrain development in sewered areas. There are no similar pollution limits on development using septic systems. This imbalance is at cross purposes with water resource goals (see Figure 3.1). The figure, provided by the Maryland Department of Planning, shows that, per household, the load from new development on well and septic is almost 5 times as great as new loads from sewered areas. This is due in part to average lot sizes being larger in unsewered areas.

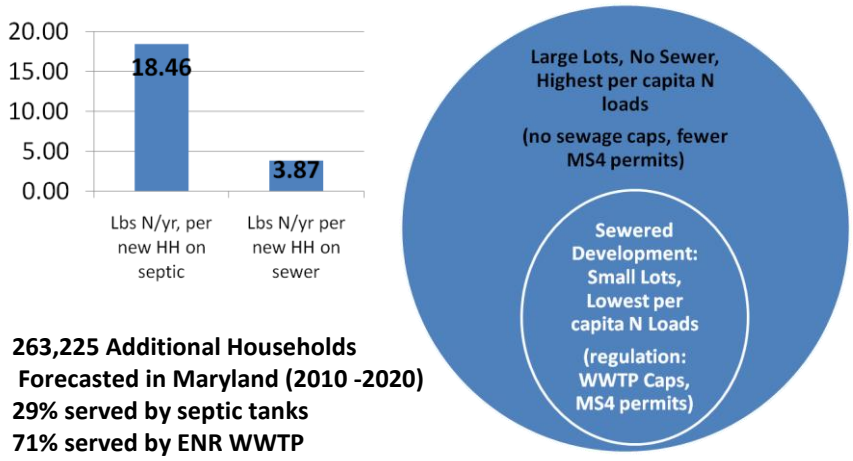


Figure 3.1 Regulatory Constraints: An Uneven Playing Field for Development

The amount of pollution from new sources can be effectively managed by using both of EPA's options for accounting for growth referenced in the opening of this section. If current trends continue, it is estimated that Maryland will add another 264,000 households from 2010 to 2020, or 430,000 from 2010 to 2030. About 72% will be served by WWTPs and 28% by well and septic.

Total nitrogen loads from the new development projected on sewer (counting both point and nonpoint source contributions) will be on the order of 727,000 lbs N/yr (188,000 households) by 2020 and 1.2 million lbs N/yr (309,000 households) by 2030. Loads from expected development on well and septic will be on the order of 1.4 million lbs N/yr by 2020 (75,000 lots) and 2.3 million lbs N/yr by 2030 (124,000 lots)[1] (see Figure 3.2). Per household, the load from new development on well and septic is almost 5-times as much as new loads from sewered areas (See Figure 3.1). Thus, while the number of new households projected on sewer is roughly 2.5 times that on well and septic, the nitrogen load from new development on well and septic may be almost twice that from new development on sewer. Under EPA's guidelines, the total 3.5 million

[1] All numbers represent reasonable, best estimates provided by MDP's Growth Simulation Model. These estimates could also be made using a range of figures which may better capture varying economic conditions that would either stimulate or depress anticipated development. Household growth and load estimates are based on regional cooperative forecasts, zoning, current trends, and generalized data from the Chesapeake Bay Watershed Model. New development on sewer is assumed to be in the form of ¼-acre lots that contribute nonpoint source loads of 3.28 lbs TN per acre per year, served by ENR WWTPs discharging effluent at 4.0 mg/l TN (the vast majority of development on sewer will be served by one of 67 major WWTPs, all of which are being upgraded to ENR). New development on septic tanks is assumed to be in the form of 2-acre lots that contribute nonpoint source loads of 3.15 lbs TN per acre per year (from the land), with an additional discharge of 12.16 pounds of TN per year (EOS) from the septic system.

lbs of nitrogen from new development by 2030 must be accounted for in future load projections and reduction strategies, or offset on a case-by-case basis, or some combination of the two.

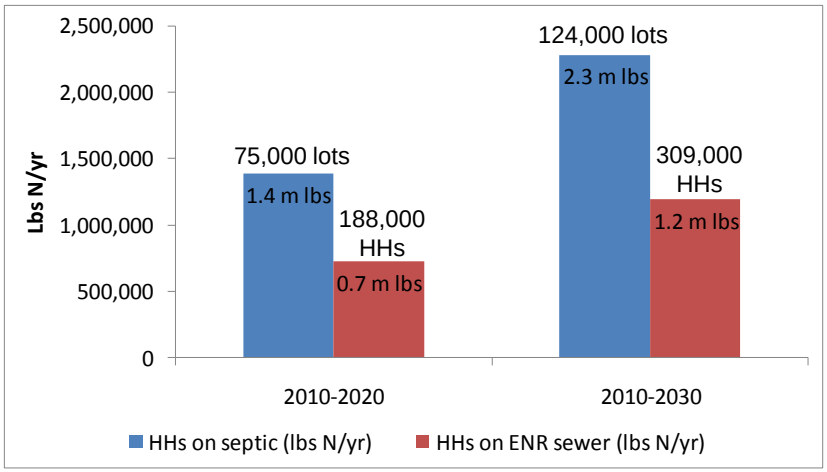


Figure 3.2 Estimated N Loads from New Development

The more development that occurs in sewered areas served by advanced WWTPs, the less the total nitrogen load increase from new development will be. For example, if all projected new development expected on well and septic by 2030 was, instead, on ENR sewer, the total new or increased load from development would be 1.7 million lbs N/yr rather than 3.5 million lbs N/yr. This would limit loads from new development to a level that could be accommodated by current WWTP allocations above current flows. There is no realistic way this could happen, but it is clear that the greater the percentage of future growth directed to sewered areas, the less pollution has to be offset through additional load reduction by other source sectors. The following Table 3.1 further illustrates this[2].

[2] Targeted agricultural load reductions by 2020 are assumed to be equal to those listed in the September 2004 Maryland Tributary Strategy Executive Summary (10.57 million lbs N reduction).

Table 3.1 New/Increased Nitrogen Loads From Development 2010 – 2030, Current Trends

New/ Increased Nitrogen Loads from Development 2010 – 2030, Current Trends		
Source	Target Load Allocation or Offset Required	
	As % of Ag Target Reduction required by the Tributary Strategy	As % of Total Remaining WWTP Allocation under the Tributary Strategy (capacity beyond current flows)
Development on Well & Septic (28%)	22%	120%
Development on Sewer (72%)	11%	63%
All Development	33%	183%
If All On Sewer	16%	88%

Source: Maryland Department of Planning

We currently have few well established BMP options to cost-effectively achieve substantial load reductions beyond those already targeted for the agricultural sector, yet that is what is necessary to generate offsets of the necessary magnitudes. Offset generating activities other than farming BMPs must be part of the solution – such as nitrogen reducing septic systems, more stormwater retrofits, upgrades to non-major WWTP, etc. – but many will cost more per pound of nitrogen reduced than targeted options. Targeted agricultural practices might also be used to generate offsets on farms that have achieved target reduction levels, but can benefit from additional implementation. Relatively recent or innovative practices targeted for relatively low implementation levels may have considerable potential as offset generators in this way. Examples include Manure Transport (e.g., pelletizing and distributing), Decision/Precision Agriculture, Water Control Structures, Phosphorus-sorbing Materials, Poultry Litter Treatment and Alternative Crop Production (e.g., switchgrass). An effective offset strategy should acknowledge these realities.

Future development on well and septic and the associated loads could exceed estimates, depending on how quickly WWTPs reach their caps. For example, growth on sewer by 2020 in some counties is expected to exceed current permitted WWTP capacities by around 40,000 households[3]. If all of this growth was diverted to sewered areas served by other WWTPs with adequate capacity, possibly in other counties, the additional load from development would be 121,000 lbs/yr. If it was all diverted to non-sewered areas, the load would be 730,000 lbs/yr. Reality will undoubtedly fall somewhere between the two extremes. The goal is to ensure the number is closer to 121,000 lbs/yr, to better support pollution reductions needed to meet the Bay TMDL.

3.3 Accounting for Growth and Offset Strategy

Based on the key issues discussed above, Maryland is using seven objectives to guide its strategy to minimize and offset growth in loads:

[3] If zoning and other policies improved to support a Smart Growth scenario, there would be more sewer demand by 2020 (i.e., in some counties the sewer demand would be expected to exceed current permitted WWTP capacities by around 62,000 households).

1. Account for nutrient loads from new development.
2. Encourage development that will result in relatively small increases in loads to accommodate future growth.
3. Ensure an adequate supply of offset generators and help achieve targeted load reductions of the agricultural sector.
4. Balance incentives between development in and outside of sewered areas, commensurate with their relative impacts on the TMDL, to minimize increased loads from future development;
5. Provide local government the ability to use land use decisions to contribute directly to TMDL goals;
6. Recognize State and local governments accountability for impacts of land use decisions on TMDLs; and
7. Ensure that management of land use and the regulation of pollution are mutually supportive.

The first three of these goals also serve as action steps to implement a strategy to offset growth in loads. These are elaborated upon in the next three subsections.

3.2.1 Account for nutrient loads from all new development

New development must be accounted for under the strategy to account for growth, whether the development is within or outside sewered areas. The State will rely on local governments, who regulate land use, to participate in and support this accounting. This can be accomplished through a statewide approach or a local alternative that achieves the same ends. This will be a significant subject for consideration in during the Phase II Plan development process. See Section 3.4 for a preliminary schedule for development and implementation of offset policies and procedures.

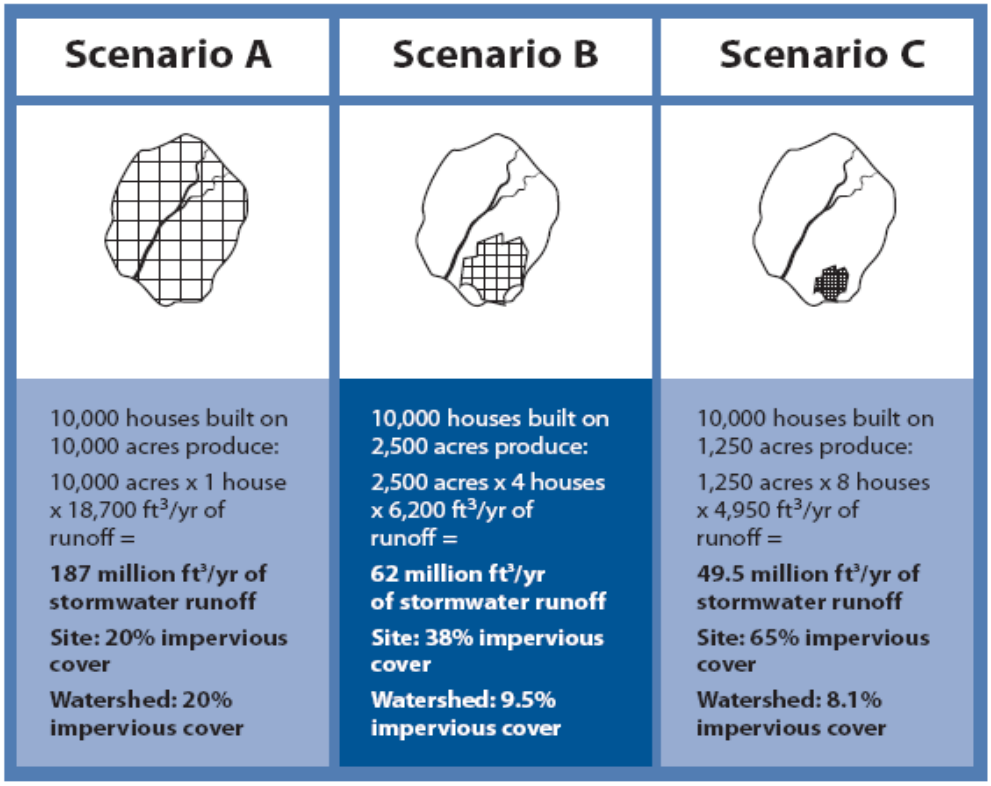
3.2.2 Encourage development that will result in relatively small increases in loads to accommodate growth

This is an essential aspect of the strategy to account for growth. It is essential that incentives be established to prevent loads from increasing, because it is difficult and costly to offset loads. Furthermore, the potential for offsetting loads has technical limitations discussed above relative to Table 3.1.

The proposed statewide approach for offsetting future growth in loads is designed to prevent loads so as to minimize the need for offsets. Any alternative strategy proposed should also establish incentives to avoid loads.

Statewide Approach to Offsetting Future Loads: Generally speaking, areas served by sewer accommodate additional development at substantially lower per capita nitrogen loading rates. But, as discussed in the key issues section above, sewer service or lack thereof is not the only important determining influence. Zoning and other land use management plans and programs also shape the nature of development and its post-development loading rates. Maryland is

proposing to designate target loads for some new or increased sources and establish offset requirements for others in light of these factors that determine the nature of development and its post-development loading rates.



To illustrate, consider three alternative ways to accommodate 10,000 residential units in a 10,000 acre watershed, at densities of one dwelling per acre, four dwellings per acre and eight dwellings per acre. These alternatives are compared here graphically to illustrate relative implications for stormwater runoff, impervious cover at the site and watershed scales, and percentage of land use affected at the watershed scale (graphic from "Protecting Water Resources with Higher-Density Development", U.S. Environmental Protection Agency, Smart Growth Program, January 2006, http://www.epa.gov/smartgrowth/water_density.htm). As already illustrated in the discussion of "Key Issues" above, the implications for nitrogen loads from developed sources are similar in relation to these scenarios: the more a given amount of development is concentrated and served by advanced WWTPs, the lower the total point and nonpoint source nitrogen load.

To accomplish this, areas served by sewer and unsewered areas within each jurisdiction will be classified into Low, Moderate and High Per Capita Loading categories. "Per capita," as used here, means nitrogen loads per total number of residents plus jobs accommodated within a given geographic area. Classification will be based on estimates of total residential and employment populations and total nitrogen loads (point and nonpoint source components) from development in each area.

The number of residents and jobs in each area will be estimated using Maryland Property View, Census data, and the Department of Labor, Licensing and Regulation's ES202 employment data, with the last of these supplemented by data local governments will be asked to provide for Phase II local Watershed Implementation Plans. Local governments will also be given the opportunity

to demonstrate reasonable expectations of increased future residential and employment population. If demonstrated, these estimates will be incorporated to adjust the State's estimates of residents and jobs.

Point and nonpoint source loads from development will be estimated using inventories of point sources, developed land uses and septic systems in conjunction with Chesapeake Bay Program Watershed Model data on loads from development-related sources by County-Segment. Per capita loading rates calculated from these data will be used to classify areas into Low, Moderate and High Per Capita Loading categories.

Target loads for new and increased sources will be designated for new development and redevelopment in Low Per Capita Loading areas – those likely to accommodate it at the lowest per capita nitrogen loading rates. These will generally be areas served by ENR WWTPs and accommodating relatively high densities of residents and jobs. Offsets will be required in all other areas.

More specifically:

- Development and redevelopment in Low Per Capita Loading areas and Moderate Per Capita Loading areas will not be required to offset increased point source loads from wastewater.
- Redevelopment (defined per State Stormwater Management Regulations) within Low Per Capita Loading areas will be required to meet established stormwater management requirements (relating to impervious cover, Environmental Site Design (ESD) to the maximum extent practicable (MEP), or watershed management plans) as provided in the approved local ordinance. Redevelopment projects in these areas will not be required to offset post-development non-point source loads.
- New (or Greenfield) development within Low Per Capita Loading areas will be required to satisfy stormwater management regulations and offset post-development non-point source loads above the standard forest loading rate established by MDE.
- All development in Moderate Per Capita Loading areas would be required to offset increased point and post-development nonpoint source loads (including septic system loads) in excess of the standard forest loading rate established by MDE.
- High Per Capita Loading areas may be subject to greater offset requirements, i.e., development may be required to offset point and post-development nonpoint source loads in excess of the standard forest loading rate established by MDE, at a ratio that is higher than that required in Low and Moderate Per Capita Loading areas.

Local Alternative Approaches to Offsetting Future Loads: Local governments will have the opportunity to propose other approaches, provided they satisfy EPA's guidelines and are judged to be as or more effective in supporting the TMDL than the statewide strategy. To that end, they need to effectively address the seven objectives, listed above, to develop the statewide strategy as the guiding framework for local alternatives.

3.3.3 Ensure an adequate supply of offset generators and help achieve targeted load reductions of the agricultural sector.

The offset requirements proposed need to result in a net decrease in non-point source loads by requiring each development, except redevelopment in a sewered area, to offset its own nonpoint source load in addition to a safety margin. In most cases this will be based on the forest loading rate threshold used to compute offset requirements.

The safety margin is intended to:

- Compensate for unknown shortcomings in expected load reduction achievements in the development sector, should they be indicated by new data or changes in our understanding of loading rates, BMP efficiencies and implementation rates, and
- Contribute to our ability to achieve targeted load reductions in the agricultural source sector, so it can function as an "offset generator" for the offsets needed to facilitate development.

Offsets under the trading policy must be generated through load reductions beyond those targeted in the base strategy to reduce existing loads. Possible generators include farms that have already implemented targeted reductions, septic system nitrogen upgrades outside targeted areas (e.g. Maryland's Critical Area), upgrades to non-major WWTPs, and other source reductions beyond those needed to meet water quality standards.

Starting with the Phase II planning process, strategies need to be developed. The strategy should address both target load reductions and an adequate supply of offset generators. The strategy needs to be designed to work in concert with the nutrient trading policy; take advantage of the ability of market forces to find innovative solutions to the problems involved; and incorporate the essential role of outreach and delivery of assistance to the farm community. Maryland's trading program has not generated credits but based on the Caroline County Phase II WIP Pilot exercise there should be eligible farms with an adequate supply of offset generators.

3.4 Preliminary Schedule for Developing Offset Policies and Procedures for Septic Systems and Land Development

As of the date of this Plan, Maryland has not determined how to structure or quantify offsets, but will do so according to the following schedule. This will be initiated in the Phase I planning process.

2011 Research and develop more detailed approaches for offsets. Evaluate the need for legislative and regulatory changes for the strategy. Obtain stakeholder and public comment. If needed, seek necessary authority to undertake research, the appointment of a task force, and/or authorization to implement elements of the offset procedures.

2012 Finalize the development of the offset policies and procedures.

2013 Initiate the implementation of the offset policies and procedures.

An essential element to offset policies and procedures will be finding opportunities for load reductions that are above and beyond reductions needed to meet the Chesapeake Bay water

quality standards. Maryland is developing a nutrient trading program, which is currently oriented primarily toward reduction opportunities from the agricultural setting.

3.4.1 Tasks and Options for Developing Offset Policies and Procedures

A variety of issues must be addressed as part of the strategy for offsetting future growth in nutrient and sediment loads. Many of these issues were emphasized in public comments from stakeholders in response to the draft Phase I Plan. Accordingly, Maryland will work collaboratively with local governments and stakeholders during 2011 and 2012 to complete key tasks needed to meet the 2013 implementation date.

1. Complete a statewide inventory and classification of high, moderate and low per capita loading areas (PCLAs) with appropriate input from local governments
2. Provide outreach and assistance for appropriate activities to local governments. For example:
    a. Evaluate the supply of offset credit generation within qualified geographies
    b. Assess potential for growth under alternative scenarios to support economic development and local comprehensive plans
    c. Provide jobs data to support PCLA classifications;
    d. Determine if estimated future development should be used to make PCLA classifications
3. Determine how institutional and market mechanisms for offsetting loads will be implemented in subsequent years. This will require a framework to address issues of supply, transactions, regulatory accountability and perpetuity in ways that will be practical and effective.
4. Investigate options through which the State or local governments can better achieve the seven objectives of the growth and offset strategy, in consultation with other stakeholders. These options may include the following:
    a. Per the Phase I Plan, consider and, if appropriate, develop differential offset ratios for high, moderate and low PCLAs
    b. Ensure that offset ratios outside of low PCLAs compensate for low, or no, offsets inside of PCLAs.
    c. Develop incentives for individual development projects in low and moderate PCLAs to maximize jobs/residential densities and FARs (floor area ratios) in appropriate locations.
    d. Determine how and when Water Resource Elements of local comprehensive plans should be revised, to reflect the Bay Watershed Implementation Plan Target Loads.
    e. Explore creation of new offset generator supplies that go beyond implementation of BMPs on individual sources. These might include establishment of a fees-in-lieu mechanism to support collection, processing and distribution of pelletized

livestock and poultry manure; upgrades to additional major-minor WWTPs; and retrofitting existing septic systems.

f. Strategically reserve the supply of cost-effective offset capacity to encourage development in low PCLAs; for example, make portions of the offset generator market accessible only to offset consumers in Low PCLAs.
g. Determine if offset requirements can be effectively used to help achieve targeted load reductions. This would create a supplemental revenue stream to support target reductions where funding may otherwise be inadequate.
h. Minimize or eliminate factors that could encourage the private offset market to convert farmland to forest, in ways that would contradict State and local goals for preservation of agricultural land and the industry or compromise land capacity to support local food production.

Ecosystem Services Markets and Private-Sector Involvement

Maryland has several existing programs which could provide significant opportunity for allowing private investment in mitigating and enhancing ecosystem services. These include Maryland's Nutrient Trading Program, forest banking through the Forest Conservation Act requirements, Critical Area regulations, wetland banking to meet requirements for wetlands mitigation and State and regional greenhouse gas reduction goals. Maryland's Nutrient Trading program is described in more detail below.

Currently, however, private ecosystem market involvement and activity in these programs is low to non-existent for a variety of reasons. Nonetheless, the potential exists for incentivizing the considerable funding power of the private marketplace to assist Maryland in meeting its TMDL and other environmental goals and to increase economic development. Already, several private entities exist and are operating in the region (Bay Bank, Restore Capital, and GreenVest as examples) that are positioned to facilitate the valuation of ecosystem services, tracking, and connecting buyers (developers) with sellers (private landowners).

In June 2010, the Governor's Green Jobs and Industry Task Force recommended establishment of a working group to assess the existing programs and make recommendations on how to incentivize private, ecosystem markets in Maryland. In response, DNR has established an "Ecosystems Services Working Group" (ESWG); which members include State environmental, planning, and economic development agencies, environmental restoration and investment companies, and non-profit organizations that specialize in ecosystem markets and financing. The ESWG is on schedule to make an initial set of recommendations by mid-December, 2010. It is expected that this initial report will recommend further exploration of a short-list of identified issues with a mandate to report back by June, 2011 with specific, actionable items. The goal of these recommendations will be to identify changes in the existing programs designed to actively promote the private sector and landowners to play a much larger role in conservation and restoration by reducing government barriers, increasing market incentives, providing financial income to landowners, and recovering the 'true costs' of ecosystem services lost through land conversion and infrastructure development.

Maryland's Existing Nutrient Trading Program

The Maryland Nutrient Trading Program will play a critical role in enhancing water quality in the Chesapeake Bay and its tributaries by providing economic incentives for the reduction of nitrogen and phosphorus loads. In the development of its nutrient trading program, Maryland defined the role of water quality trading as an offset to accommodate both population and economic growth under a cap structured to produce no net increase in loadings and uses the local water quality standard of the TMDL as the baseline that applies to all sources.

MDE, through a public process, has developed a Policy for Nutrient Cap Management and Trading (Policy), which took effect on April 17, 2008. One aspect of Maryland's approach is unique. Other states allow trading in lieu of upgrading a WWTP. In Maryland, upgrade of major WWTPs is required and the Bay Restoration Fund (BRF) was instituted to fully fund these upgrades. Trading is not available as a substitute for the upgrades.

Nutrient reductions achieved through the upgrades must be maintained to meet Bay water quality goals. The Policy addresses both the need to achieve early nutrient load reductions from point sources through enhanced nutrient removal (ENR) upgrades and the need to address new or increased point source nutrient loads associated with a growing population. The need to address planned growth is met through various environmentally sensitive offset/trading options and requirements outlined in the Policy. Facts about the Nutrient Cap Management/Trading Policy (Phase One) are available with a summary of the Policy and frequently asked questions on the MDE website. For further information see the Policy for Nutrient Cap Management and Trading website: http://www.mde.maryland.gov/programs/Water/Pages/water/nutrientcap.aspx

Maryland nonpoint source trading policy supports offsets between point sources and nonpoint source, primarily from the agricultural sector. This nonpoint source framework allows trades to offset permitted point source loads and trades for other purposes, for example, environmental advocacy organizations purchasing loads to retire.

The Maryland nonpoint source trading platform, an on-line system, incorporates both the Chesapeake Bay Program models and the national Nutrient Trading Tool (or NTT) developed by USDA's Natural Resources Conservation Service. This system will initially begin with nutrient trades, but is designed with the capacity to add or "stack" both sediment and carbon. This same platform could also serve as the base for trading supplementary environmental credits generated by other ecosystem services such as wetland mitigation and habitat restoration.

Although much work has been put into the development of Maryland's Nutrient Trading Program, no trades have taken place to date. The ESWG described above is evaluating the current program and will likely make recommendations to allow this program to realize its design potential.