

Name _____ Date _____

Chesapeake Bay Watershed Action Plan

Goal: To improve water quality in the Chesapeake Bay

General Concerns

Algae blooms are showing up in various parts of the Chesapeake Bay watershed. We believe nutrients, in particular nitrogen and phosphorous, are polluting the watershed. The Chesapeake Bay watershed shares an airshed with the coal industries of the Midwest. About one-third of the nitrogen that enters the bay comes from rain, usually in the form of nitrogen and sulfur. But additional nutrients and pollutants also enter the waterways through runoff from impervious surfaces in urban areas (such as paved roads), animal waste, and excess pesticides and fertilizers in agricultural areas. We want to reduce the level of nutrients and pollutants in the watershed by following the proposed agricultural and urban management plans. If these plans are followed, then we expect water quality to improve.

Total Budget: \$15 million

For all plans, **riparian buffers** will need to be added along the flow path of all waterways (streams and rivers). Riparian buffers are grass, non-woody, or woody (forest) vegetation that is planted or protected along the sides of streams and rivers. These plants trap sediment and some pollutants from the runoff water before it enters the waterways. The cost of this is **\$17,000/kilometer**.

Agricultural Management Plan

Type of Land Cover	Step to Take	Reason for Step	Cost
Cropland	Plant cover crops (wheat, barley, rye)	Cover crops maintain a vegetative cover on cropland that reduces erosion and recycles unused plant nutrients (such as nitrogen) so they do not get in the waterways.	\$24,000/km ²
Pasture/hay	Add fencing between farm animals and waterways	Fencing will exclude farm animals from accessing the waterways and will help slow down erosion of streamside soil.	\$240,000/km ²
	Animal manure management	Farmers must improve the treatment and/or storage of animal waste.	\$300/km ²

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Chesapeake Bay Watershed Action Plan, continued

Urban Management Plan

Type of Land Cover	Step to Take	Reason for Step	Total Cost
High-Intensity Developed	Storm water management control	Redirect water flow away from the Chesapeake Bay waterways. Add: <ul style="list-style-type: none"> rain gardens to redirect water flow from impervious surfaces to a vegetated area, and green roofs to use rainwater for plants. 	Rain gardens:*\$10,000/km ²
Low-Intensity Developed			Green roofs:*\$20,000/km ²
If High-Intensity Developed + Low-Intensity Developed is more than 40% of land cover	Enhanced nutrient removal	Upgrade wastewater treatment plants so they improve upon the removal of nutrients before the water is returned to the local waterways.	\$2 million/site
If High-Intensity Developed + Low-Intensity Developed is more than 50% of land cover	Remove some impervious cover and plant more trees	This will allow runoff to be redirected away from waterways.	\$5 million/site

*Note: Rain gardens and green roofs would not cover the entire land area. They would only be placed on a selected number of units or yards within the designated area.

What else can be done?

Only one site can be selected to put the plan into place. However, if a site is selected and money is left over after the required steps are taken, there are additional things that can be done to improve water quality in the area.

Chesapeake Bay Watershed Action Plan, continued

Additional Steps to Take	Rationale	Cost
Oyster Bed Restoration	Oysters do a lot to keep the water clean, but their habitat is disappearing. To restore oyster reefs, a large amount of oyster shells are needed.	\$200,000/km ²
Environmental awareness	Spread awareness through advertisements, community meetings, signage, etc. to encourage residents to conserve water and control air pollution by carpooling to work, walking more, driving less, planting trees, and avoiding grass beds when boating and fishing.	\$500,000/year
Add more riparian buffers upstream	The flow path is important, but nutrients enter the waterways from upstream as well. To reduce more sediment deposition, riparian buffers can be added upstream.	\$17,000/km

Your Task

The goal is to improve water quality in the Chesapeake Bay watershed. There are concerns about the low levels of dissolved oxygen in some areas of the watershed due to high levels of pollutants. We want to protect the organisms that live in the watershed, like the blue crab and oysters, and we also want to enjoy healthy water for drinking and recreation. We have \$15 million to spend. ***We need you to help us decide where to put this action plan into place and what steps to take.***