



# The Army's Chesapeake Review

July 1997



## Federal Agencies Committee Meeting Highlights

A Federal Agencies Committee (FAC) meeting was held on July 3, 1997, at the Chesapeake Bay Program Office (CBPO) in Annapolis, Md. Announcements and highlights from this meeting included:

- The Department of Defense (DoD) Chesapeake Bay Conference has been set for November 18 and 19, 1997 at the Omni Waterside Hotel in Norfolk, Va.
- The Federal Science Coordination Workgroup wants representatives for its workgroup from each federal agency and plans to hold a workshop in the fall.
- Congress has set aside \$500,000 for the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) to coordinate and conduct research on *Pfiesteria piscicida*. The FAC agreed to be the basis for the federal coordination of this effort.
- The Habitat Restoration Workgroup has broadened its mission and wants to solicit additional members. The workgroup is developing a technical talent directory and a new prioritized project list and related criteria that will include initiatives toward achieving the federal agencies' 200 mile riparian forest buffer goal.
- The Chesapeake Bay Program (CBP) wants to establish a special panel on innovative stormwater solutions for the Anacostia River restoration. This panel will consolidate emerging ideas that deal with toxics, trash, and nutrient loadings to determine alternatives to traditional and expensive engineering methods.
- The U.S. Coast Guard (USCG) reported that over 500 non-indigenous species are in transit around the world daily in ship ballast water. So far, 57 non-native aquatic species have been introduced into U.S. waters. Some, such as the zebra mussel, have had devastating effects. USCG has conducted a number of studies and developed a number of guidelines to prevent the future introduction of such species.

## Implementation Committee Meeting News

An Implementation Committee (IC) meeting was held on July 10, 1997, at the CBPO in Annapolis, Md. The meeting focused on the preliminary results of the 1997 Reevaluation. Announcements and highlights from this meeting included:

- Preliminary results from the Monitoring Subcommittee indicate that nutrient and sediment levels in the rivers entering the Bay are generally improving or holding constant. Nutrient trends in the upper Bay tidal tributaries and the mainstem of the Bay are mixed. The deep waters of the lower tributaries and middle Bay continue to suffer severe oxygen depletion in the summer months. Submerged aquatic vegetation (SAV) acreage has increased 66% over the past 12 years (1984-1996) and has remained relatively constant through several recent high flow years. Annual algal levels are increasing in upper Bay tidal tributaries while decreasing in the upper and mid-mainstem Bay. The Bay's benthic community has not changed appreciably in most areas.
- The Modeling Subcommittee's preliminary results found that septic system loads are an important component to the controllable nitrogen loads. Nitrogen reductions in groundwater have probably not been realized. Atmospheric emissions of nitrogen will decrease over the next decade. The phosphorus reduction goal has been achieved but will be a challenge to maintain beyond 2000. The nitrogen reduction goal is close to being achieved in areas where the tributary strategies have been implemented.
- Cliff Randall discussed the advantages of employing biological nutrient removal (BNR) measures at wastewater treatment plants, which included reducing or eliminating organic chemical addition for nitrogen removal and alkalinity addition; reducing aeration requirements and equipment, waste sludge production, and filamentous growth; and aiding the maintenance of anaerobic conditions in the first zone when combined with BPR.

## State of the Bay: Nutrient Inputs

Scott Phillips, U.S. Geological Survey (USGS), gave a report on nutrient inputs into the Bay at the July 10, 1997 IC meeting. According to Phillips, nutrients enter the Bay either through groundwater or surface water. To date, the Bay Program has focused its nutrient reduction efforts on surface waters. Due to revised practices, recent studies on trends in total nitrogen and total phosphorus indicate that river water quality has improved.

Another study, which monitored 500 points in the Bay's watershed, showed that at least 50% of the water in rivers comes from groundwater. This influx accounts for approximately half of the nitrate load. Generally, the nutrient levels decrease as the water travels beneath the earth's surface.

Groundwater moves slowly and has a lag time of 10 to 20 years before it reaches the rivers. The implications of groundwater's lag time are significant to the Bay Program since the delay period probably means that nitrogen reduction actions initiated by the Bay Program have not been fully realized and accounted for.

Phillips said that the Susquehanna River reservoir system would affect the delivery of sediments and nutrients to the Bay. The system currently traps about 70% of suspended sediment, 40% of the phosphorus, and 2% of the nitrogen. The Conowingo Reservoir could reach its sediment storage capacity in the next 15-20 years, which would increase sediment levels by 250% and phosphorus levels to about 70%.

To improve scientific understanding, Phillips recommended developing a finer resolution of watershed nutrient sources, improving management actions, monitoring SAV responses, linking SAV response to waterfowl populations, and identifying long-term ecosystem responses to both natural and anthropogenic factors.

# Maryland Post Uses Poplar Trees to Clean Up Contaminants

From the 1940s to the 1970s, Aberdeen Proving Ground (APG), Md., used J-Field as a disposal area for chemical weapons and solvents by burning the materials in open pits. Although the disposal was effective, it contaminated the soil and groundwater with the chemical solvent tetrachloroethane (PCA).

J-Field poses no immediate threat to human health or the Chesapeake Bay. The groundwater is not used for drinking and, although the site is a quarter of a mile from the Bay's shores, the ground-water's path flows parallel to the shoreline and is contained by natural barriers.

To ensure long-term human and environmental health, APG began researching various remediation methods and consulted with the U.S. Environmental Protection Agency (EPA) Environmental Response Team in Edison, NJ about their work with phytoremediation. Phytoremediation is an innovative method of removing and/or stabilizing toxic contaminants in soil or groundwater with the use of plants. The EPA has been testing and developing hybrid tulip poplar trees to see if they can clean up sites contaminated with trichloroethylene (TCE) — a chemical solvent similar to PCA.

In the early spring of 1996, APG decided to conduct a 3-year pilot study using the hybrid tulip poplars. With the aid of a contractor, approximately 200 trees, 15 to 20 feet in height, were planted on an acre of the J-Field site. The roots of these trees can grow up to an inch a day and absorb approximately 30,000 gallons of water daily during the summer growing season.

To maximize the hybrid poplar's pumping capabilities, the trees were planted in a special way. Normally, a tree is planted with its roots 1 to 2 feet deep so that the roots can absorb water from the earth's surface. APG, however, planted the trees 5 to 8 feet deep so that the roots could reach the groundwater and start the pumping process. A plastic "sleeve" was planted above the top layer of the roots to encourage new roots to grow down and absorb the groundwater. A long black plastic hose was planted with each tree to act as a snorkel and provide oxygen to the tree's roots.

APG is establishing procedures to track the progress of the trees. They are conducting a variety of monitoring tests to determine if the saplings are reducing the groundwater's PCA levels. They are also in the process of selecting a university to conduct a study to determine the ultimate fate of the PCA.

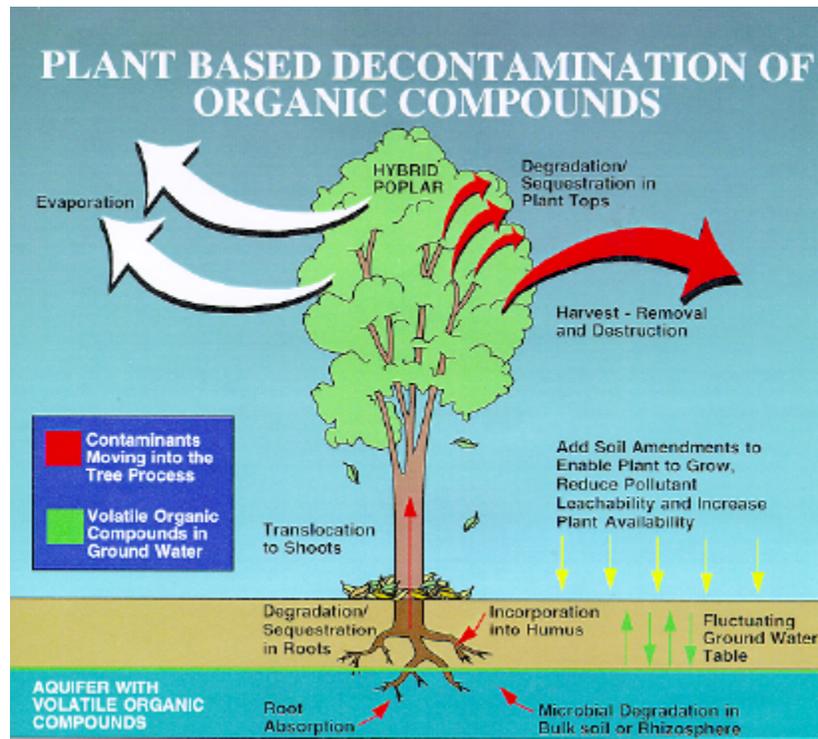
The trees are expected to dispose of the PCA in one or more of the following three ways. One route is called "microbial degradation" where bacteria living along the tree's roots break down the PCA before it enters the tree. Another possibility is that the tree may take up the PCA and incorporate (sequester) it into tree parts, such as bark, leaves, or roots. A third theory is that the tree will uptake the PCA, transform it, and subsequently release it as a less harmful or harmless product.

The hybrid poplars are expected to be a successful addition to the PCA cleanup process. Based on studies conducted by the EPA, the trees are not expected to become toxic or release PCA directly into the air.

If the process works, the benefits will be many. The increased uptake of water by the hybrid poplars will reduce the flow of groundwater and prevent the PCA from traveling off the site. In addition, by cycling the groundwater through the poplars, significant amounts of PCA may be removed from the groundwater.

This natural pump and treat system will also reduce remediation costs. A standard pump and treat system that is typically used to clean up such sites would cost an estimated \$5 million to build and \$100,000 per year to operate. The phytoremediation effort has cost APG approximately \$80,000. If the groundwater were to be used for drinking water, APG would use the trees as an extra filter with a mechanical pump and treatment system, making the process more complete and more efficient.

If the pilot study is successful, the hybrid tulip poplars will probably be used at other installations with PCA contamination. In the meantime, other installations are employing phytoremediation with such plants as sunflowers, algae, and mustard to remove other contaminants like metals and explosive compounds from soil and groundwater.



This newsletter is produced under Contract No. DACA65-94-D-0100 for USAEC. Please contact Janmichael Graine, USAEC, at (410) 671-1234, DSN 584-1234, or sgraine@aec1.ap gea.army.mil with any questions, comments, or installation success stories.

The newsletter is distributed via e-mail or through the Army CBI homepage. The homepage address is [www.hqda.army.mil/acsimweb/env/cbi/index.htm](http://www.hqda.army.mil/acsimweb/env/cbi/index.htm)