How Dog River Works

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Old-timers tell stories of a pristine Dog River with white sandbars and deep reddish colored water. After a rain, modern day Dog River resembles chocolate milk sprinkled with floating trash and laden with invisible bacteria. The recent dredging of a channel to remove accumulated sediment from the river has been a costly and controversial project. What happened to Mobile's river? Can we do anything to restore it? Before we attempt to answer these questions, we must understand how a river works naturally, and we must learn how Mobile's development as a city affects those natural processes.

All of the water in a river comes from its watershed, the land area that it drains. In the case of Dog River, that watershed is about 95 square miles and extends past Schillinger Road on the west. The upper parts of a river, called the tributaries or headwaters, are small collecting streams fed by runoff from the land's surface and base flow from groundwater. Whenever it rains, some water seeps into the ground to become part of the groundwater, and some runs off into the tributaries. Vegetation and soil permeability control how much water follows each pathway. Abundant vegetation forces runoff water to move more slowly, so more water seeps into the ground and less runs off immediately into the stream. Naturally vegetated areas like wetlands are especially valuable in stabilizing flow because they act like huge sponges that soak up water quickly and release it slowly over time. Vegetation also helps to clean water by filtering out sediment and trash and removing chemicals like fertilizers. Large intact wetlands are especially valuable, but wetland strips along the sides of streams are also important.

If we consider Dog River, the most significant alterations to the watershed have been the loss of wetlands and of vegetated surfaces in general. Old timers remember Wragg Swamp, a huge bottomland hardwood forest that absorbed the flow from the tributaries and then released it slowly into Eslava, Halls Mill, and Rabbit Creeks. That swamp was the reason the water used to be so reddish in color, yet so clear. It was Mother Nature's version of filtered "tea." When the malls and I-65 were built, most of Wragg Swamp was drained signaling the end of those natural filters and that beautiful water. In addition to the loss of both Wragg Swamp and many streamside (riparian) wetlands, Mobile's growth continues to replace vegetated surfaces with roads, houses, parking lots, and buildings. These surfaces are impermeable. When it rains, the water that hits them cannot penetrate into the soil to feed the groundwater. Instead, it runs off quickly into man-made ditches that carry water rapidly to the nearest stream.

The headwaters of a stream usually have a much steeper gradient than the lower part, and this affects the work that the stream does in its different portions. Where the gradient is steep, the water runs downstream faster and has more erosive power. Fast-moving water can transport larger particles than slow-moving water. Near its mouth, the river has a low gradient, the water slows down, and it is no longer capable of carrying the material it transported in its upper reaches. Deposition of sediment occurs naturally in the lower part of a stream.

In the Dog River Watershed, the steepest tributaries are in west Mobile. Unfortunately, that is also where development is rampant. Land clearance strips away protective vegetation and leaves the soil open to the erosive power of water running downhill. When it rains, runoff is rapid, and fast-moving water is an effective mover of sediment. Swollen ditches and streams carry soil away from the hills in west Mobile and deposit it when the water eventually slows down in the lower portion of the river. Included in this runoff is anything that rainwater washes from the streets and parking lots.

To understand how sediment transport works, take a sample of soil, put it into a jar of water, shake the jar, set it down, and watch what happens. As soon as you stop shaking the jar, the coarser particles settle to the bottom. For Mobile soils, these are mostly sand-sized particles. After about an hour, medium-sized particles called silt (about the size of baking soda) settle atop the sand. The finest particles, called clay, may stay suspended in the water for almost a week.

Now think about what happens after a rain in Mobile. Because much of the land is now impermeable and many natural streams are channeled into straight armored ditches, flow is rapid, and streams/ditches carry sediment effectively until they slow down. They easily move sand, silt, and clay out of the hills onto the flat lands that start just east of I-65. When the streams flow onto the flat land (where Wragg Swamp used to be), they slow down some and deposit the biggest particles they carry – sand. Anyone needing sand can find it in the ditches in these areas. The streams carry silt and clay farther downstream and do not deposit them until the flow slows even more. Silt is abundant at the head of tidal influence where a stream's forward progress is opposed by the inflow of tidal water from the bay. Clay, because it stays suspended so long, is carried all the way into the wide part of Dog River where much of it settles out and causes the river to get shallower and shallower.

Clay deposition is made worse in the wide part of the river, not only because the water is moving slowly, but also because of the salt water that comes in from the bay. If you sprinkle some salt in your jar of water and sediment, the clay will settle out much faster. That is because salt overcomes the electrostatic charges that cause the clay particles to repel one another. In salty water, clay particles clump together in a process called flocculation, and they settle out just like larger particles. That increases the buildup of clay sediment in the slow-moving, brackish parts of Dog River.

It is important to understand that the filling in of an estuary like Dog River is a natural process and that urbanization of the watershed has speeded up the process by exposing land and by increasing runoff and speed of flow. Urbanization has also decreased the water quality in other ways. To swim in Dog River today is to accept the fact that the water has come from gutters throughout the watershed. Each rainfall washes cigarette butts, beverage containers, automobile fluids, yard waste, fertilizer, pesticide, sewage, and sediment into the river. Does it really have to be this way? Can we do anything to improve water quality? Some things we have to accept. Halls Mill, Rabbit, and Eslava Creeks will never have that beautiful tea colored water again because we cannot rebuild Wragg Swamp. However, there are things we can and should do.

Wetlands along tributaries are important buffer zones between developed areas and the stream itself. We must put an end to wetland destruction along streams throughout the watershed. Voluntary conservation easements, establishing wetlands in front of bulkheads, and leaving streamside areas as "wild parks" in new subdivisions are

wise investments for future water quality. We can reduce runoff by choosing permeable surfaces over impermeable surfaces. Permeable parking lots are a good idea. Wouldn't it be great to see one of Mobile's large churches invest in a tree-shaded permeable lot? The City of Mobile's landscape ordinance that requires a percentage of any new development to be landscaped rather than paved is a positive step in this direction. We should look toward reducing runoff and slowing the water's speed as it moves downstream, not to speeding it up. Slower water erodes less and has less carrying power. This will require bigger retention areas for runoff for all commercial areas. It might also require some rethinking by our city about how it manages storm water. Wide grassy swales slow and filter water better than rock-lined straight-sided ditches. Stream floodplains, regardless of size, should not be developed. Rather than spend money on bigger better ditches to carry water away quickly, we should just buy out the floodplain property owners. It will be cheaper in the long run and more environmentally sound. Developers should make every effort to clear the minimal amount of land necessary for construction, to stage large projects so that less land is exposed to erosion, and to implement best management practices to reduce sediment runoff. On a personal level, would you throw trash, paint, oil, leaves, dirt into your own bathtub? Probably not. If you don't want to swim in it, then don't throw it down on the street either. Those drains along the side of the road don't go to "never-never-land." If they are within the Dog River Watershed, they go to Dog River.

Finally, will dredging improve Dog River? Since we are dealing with natural processes that tend to fill in the river, and since development in the watershed is ongoing, removing sediment from the river appears to be no more than a short-term recreational project. If, however, by creating a navigational channel, it attracts enough interest in the river as an amenity for all Mobilians, then perhaps all Mobilians will work together to implement long-lasting solutions that will genuinely improve water quality in Dog River.

For more information on Dog River, go to: http://dogriver.southalabama.edu.