Who's Drying Up The Creek?

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NORTH CORNWALL (Lebanon Co.) — Charles Wertz, manager of the Lebanon County Conservation District, said he received a complaint Monday morning from a concerned citizen about an irrigator who allegedly had pumped dry a local stream that does or did harbor aquatic life.

According to Wertz, "It's not the first time that we received concerns about it being dried up, (but that was) during drier weather. And as I understand it ... (the irrigator is) required to maitain certain flows that sustain aquatic life."

While *Lancaster Farming* will not reveal the identity of the people and the stream involved in the situation, the issue is related to the efforts by the Susquehanna River Basin Commission to manage the use of water resources within the basin. (See story page 1.)

In this case, the Lebanon County conservation district manager said he's received more than one complaint of that specific stream being pumped dry.

However, Wertz also said that earlier complaints were made during the drought years of the 1980s.

He said this complaint is out-of-the ordinary because drought conditions don't apply as a quick justification.

In addition, it was expected that heavy snows and subsequent groundwater recharge should have been sufficient to feed the stream flow to normal levels.

At the same time, Wertz said he considers the specific farm operator alleged to have pumped the stream dry as historically practicing good soil and water practices with the district.

According to Wertz, what may be happening to this specific stream is the increased taking of water from the aquifer feeding it by increases in development in the watershed.

Could It Be New Neighbors?

In many areas, homeowners individually or collectively draw from groundwater sources feeding a stream.

It sets up a scenario of a system of water use that can leave considerable gaps in normal stream-flow patterns:

- Water is drawn ready to drink from the ground (headwaters of the stream) and that which is not "consumed" is used for household activities which contaminates the water with soaps, and nutrient-laden debris;
- The water is sent to a treament plant located far downstream from where the groundwater was taken;
- The treated water, a pollutant, rejoins the flow of the traditional stream much farther downstream in the streambed, returning a portion of the flow taken from the ground to that point.

("Consumed" water means water that is made no longer available to the stream flow. It includes a portion of drinking water, water turned to steam or vapor such as in drying clothes, and water used to irrigate household plants, such as lawn grasses and trees.)

The effect of the residential well withdrawls, in this more recent and growing system of residential water use, is to deprive that portion of the stream flow between the residential wells and the treatment plant from historic flows.

Further, since groundwater is basically protected from evaporation, drawing it to the surface and returning it downstream to a surface discharge exposes it to a higher chance of evaporation.

Over time, while a constant amount of water may be tied up in a specific cycle, certain phases of the water cycle become depleted, while other phases, such as that in the atmosphere become increased.

The result is that more water is lost for use during dry periods because the use of the system of taking groundwater (a natural water storage) and discharging it from treatment plants as surface flow results in higher evaporation rates at all times and much less stored water available during drought.

What it means to the portion of stream going past a farm located between the two points is significantly less water.

Residential developments also do not recharge the groundwater storage system efficiently, because rainfall is carried away by storm sewers.

It is not known what the effectiveness of storm water collection swales and similar water storage devices are in recharging groundwater, compared to pre-development conditions. That is more of a site-specific determination.

In other words, anyone living along an original streambed, between the well-supplied homes upstream and the treament plant downstream, could be deprived of very significant flows of water depending on the size of the aquifer and the amount of water being extracted from the groundwater upstream.

In the case of the recent allegation that an irrigator pumped a stream dry, Wertz noted that there have been some significant amounts of residential development near the farm since the droughts of the 1980s.

Wertz said he wasn't sure that the residential homes in the specific area are in fact creating the natural-streambed bypass system of aquifer-home, home-to-treatment plant, to-downstream discharge system.

However, he said it's definitely a possibility.

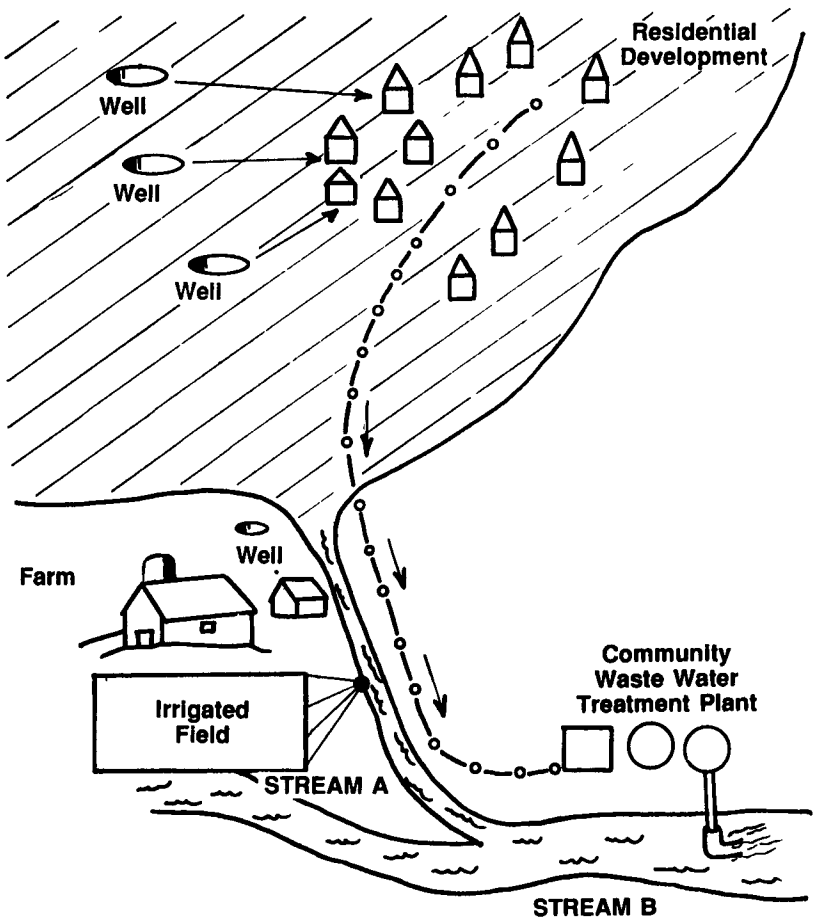
While such a situation would seem to call for some sort of correction, such as requiring the treament plant to pump the effluent for discharge at a single or multiple points back upstream, near the point of original water extraction, in order to preserve the historic uses of the stream, such is not the case.

In other words, the farm operator who has been a regular irrigator may appear to be the culprit in the low flow of a stream, where in reality, it is the residential development and treatment system which is depriving the stream of its natural flows.

If the waste-water treatment facility were to be required to return its effluent to a point upstream that would allow a significant portion of the water withdrawn for residential use to be returned to the historic streambed, the irrigator conceivably would have access to a more normal and consistant flow.

Furthermore, the farmer wouldn't have the general public pointing fingers at him because all they see is a dry streambed and irrigation equipment.

But dealing with the real-world situation of the complaint that Wertz has received, he is not in a position to point fingers at anyone except the farmer, if the farmer is technically in violation of the wording of a permit.



While the hypothetical farmstead located along Stream A in the diagram has historically drawn water to irrigate fields during time of low flows, the aquifer feeding the stream is tapped by residential development. The groundwater in any aquifer feeding surface flows is the long term storage for that stream. Release of water from the aquifer may normally takes weeks, months and years, depending on what part of the aquifer is studied. However, the aquifer provides long term storage that maintains a surface stream flow. Without the long term storage, streams run dry, or surface flows become too insignificant to support the aquatic life that has historically been present. Residential communities seeking water sources have actually been encouraged by the Pa. Department of Environmental Resources to avoid surface water sources for potable water and to draw from aquifers. In the meantime, the DER has also pushed for the construction of waste water treatment plants. The effect has been that more and more of the natural long term water storage for a stream is diverted into homes long before it would have normally been released into the streambed. Furthermore, the result is a bypassing of flows from the natural streambed. The arrows indicate the flow of aquifer water through homes, through community sewage to the waste water treatment plant, and into the natural streambed at Stream B, well below where flows are needed in Stream A. However, the public, and the law, only sees the low flow in Stream A, and the farm.

In many cases, there is no substantive data to support claims of reduced water flow, because a normal flow (over a significant amount of time) has never been recorded.

Recording Flows And Keeping Streams

It raises a question of doubt that effective control of a stream's flow could be supported without having records that establish normal flow.

This situation is also reasoned to be occuring more frequently over a greater area than generally considered.

A problem with this type of situation is that there hasn't been an effective system of water flow monitoring or regulation at the small feeder stream level. The SRBC has called attention to the fact that it intends to increase such efforts.

Though charged with the responsibility, agencies such as the state Department of Environmental Resources or the Pennsylvania Fish and Boat Commission, have not concentrated funds adequately for field personnel or for equipment dedicated to monitor stream quantity or quality.

And federal agencies, such as the U.S. Geological Survey, which have established and maintained a number of water flow monitoring points within the Susquehanna River Basin, are looking at cutting efforts, because of reduced funding.

Other problems with managing fresh water streams is the general public's lack of knowledge about what they are and how they work.

Similar to farmers' complaints that, if consumers knew more about how their food was produced, they would appreciate agriculture more, water experts have to deal with a public largely uneducated about from where their water comes and the factors which affect its safety, dependability and quantity.

Healthy Streams Clean Water

While many may not understand the specific features of aquatic life in a fresh water stream (or system), it is such that the benefit to people of a "healthy" stream is its ability to absorb and treat pollutants such as excess nutrients from human waste without the expensive costs of creating a treatment system to the point of achieving similar purity.

In other words, "healthy" streams are self-cleaning and can offer dependable sources of clean fresh water.

In fact, all waste-water treatment facilities operate on the premise that whatever can't be cleaned out of the water at the treament plant (because of level of treatment and funding) will be cleaned out by the stream.

Aquatic plants and animals function very similarly to composting operations, but provide clean potable water, instead of a ready-to-use healthy soil amendment. In addition, the products of both systems can support a vast array of living organisms and thus, produce significant amounts of human food.

The range of ability of a stream to recover from extreme conditions, such as heavy doses of nutrient pollution, low flow, excessive heat, siltation, chemical contamination, and severe flooding has limits, based on the nature of each stream's surrounding watershed and the types of aquatic plants and animals occupying the area of moving water.

As a general rule of thumb, all that is required to essentially "kill" a stream of its ability to purify water is just one day of exceeding one of several of the stream's limits.

For example, overheating a stream, through the removal of shade trees or brush over an extended length, by widening, or by removing a significant amount of the stream flow during hot weather, can result in the long term "death" of any stream.

The ability of a stream to recover naturally from such treatment depends largely on the health of "sister" streams, headwater flows, and the body of water to which the stream of concern flows.

In effect, what happens is that a portion of a stream can be temporarily sterilized until conditions improve to the point that surrounding life forms can recolonize.

If no local source of aquatic life is available to recolonize the sterilized area, the stream effectively can never again regain its ability to

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