The effects of urbanization on water quality: Population growth

If you live in a major city you see the effects of population growth every day. When more people move into an area a whole slew of support facilities must be built: housing developments, roads, shopping areas, and commercial and industrial facilities. Not only is land disturbed when development occurs, but the stress on the water resources of the region is increased to supply everyone with water.

The effects of urbanization on water quality: Pesticides

Pesticides are chemical and biological substances intended to control pests, such as insects, weeds, bacteria, and algae. Pesticides are heavily used on farmland, but in urban areas, the main usage is on residential and commercial properties. When storms hit, the runoff from yards and roadsides carry pesticides into local streams, where they may harm aquatic life and enter drinking-water supply intakes.

National Water-Quality Assessment (NAWQA) studies show that pesticides are widespread in streams and ground water sampled within agricultural and urban areas of the Nation. As expected, the most heavily used compounds are found most often, occurring in geographic and seasonal patterns that mainly correspond to distributions of land use and associated pesticide use. The frequency of pesticide contamination, however, is greater than expected. At least one pesticide was found in almost every water and fish sample collected from streams and in about one-half of all wells sampled. Moreover, individual pesticides seldom were found alone — almost every water and fish sample from streams and about one-half of samples from wells with a detected pesticide contained two or more pesticides.

For individual pesticides in drinking water, NAWQA results are generally good news relative to current water-quality standards and guidelines. Average concentrations in streams and wells rarely exceeded standards and guidelines established to protect human health. For aquatic life and wildlife, however, NAWQA results indicate a high potential for problems in many streams, particularly in urban areas, where concentrations of more than one pesticide often approached or exceeded established water-quality guidelines.

In urban areas, the wise usage of pesticides is the key to reducing pesticide problems that are increasingly occurring in our drinking water. Pesticides should only be applied when necessary and as recommended by the product labels. Persons applying pesticides should avoid spreading the product onto pavements, gutters, curbs, and storm drains.

The effects of urbanization on water quality: Phosphorus

Phosphorus is a common constituent of agricultural fertilizers, manure, and organic wastes in sewage and industrial effluent. It is an essential element for plant life, but when there is too much of it in water, it can speed up eutrophication (a reduction in dissolved oxygen in water bodies caused by an increase of mineral and organic nutrients) of rivers and lakes. Soil erosion is a major contributor of phosphorus to streams. Bank erosion occurring during floods can transport a lot of phosphorous from the river banks and adjacent land into a stream,

Phosphorus in surface and ground water

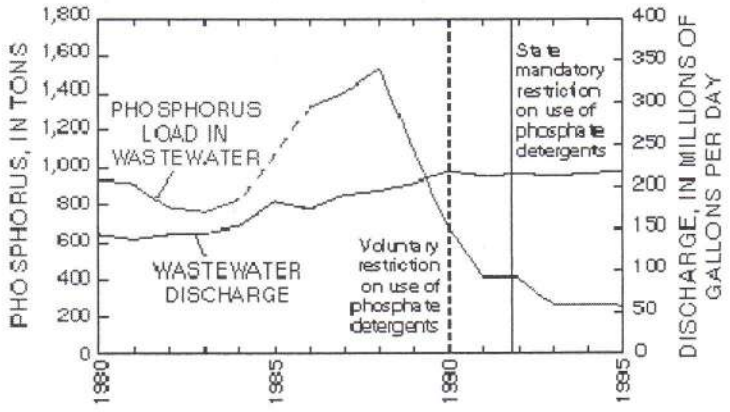
Phosphorus gets into water in both urban and agricultural settings. Phosphorus tends to attach to soil particles and, thus, moves into surface-water bodies from runoff. A research works showed that phosphorus can also migrate with ground-water flows. Since ground water often discharges into surface water, such as through streambanks into rivers, there is a concern about phosphorus concentrations in ground water affecting the water quality of surface water.

Phosphorus is an essential element for plant life, but when there is too much of it in water, it can speed up eutrophication (a reduction in dissolved oxygen in water bodies caused by an increase of mineral and organic nutrients) of rivers and lakes. This has been a very serious problem in the inland waters (in particular the Shatt Al-Arab river and its tributaries), as a major they receive waste water from Basrah city and other Iraqi provinces. However, phosphorus coming into streams from point sources, primarily bsence of awastewater-treatment facilities, have causedl canal joined this water body to become highly eutrophic ("enriched"). A

sign of this is excess algae. Also absence of state laws to reduce phosphorus coming from wastewater-treatment facilities and to restrict the use of phosphorus detergents has caused retarded reductions in the amounts of phosphorus in the Shatt Al-Arab River Basrah and adjusted areas are continuing to expand and upgrade existing wastewater-treatment facilities to handle the increasing volume of wastewater and sewage and to meet stiffer regulations on effluent and river quality.

- Additional control of phosphorus from non-point sources (such as applications of lawn fertilizers and disposal of animal wastes) may be useful to maintain or improve the water quality in streams and lakes near growing urban areas.

The chart below shows both the wastewater discharge and the amount of phosphorus discharged from a given wastewater-treatment plants. It makes sense that the total amount of wastewater would be going up as population increases, but the tonnage of phosphorus has been greatly reduced both by improvements in the treatment process and by restrictions on phosphate detergents.



Nitrogen, in the forms of nitrate, nitrite, or ammonium, is a nutrient needed for plant growth. About 78% of the air that we breathe is composed of nitrogen gas, and in some areas certain forms of nitrogen are commonly deposited in acid rain. Although nitrogen is abundant naturally in the environment, it is also introduced through sewage and fertilizers. Chemical fertilizers or animal manure is

commonly applied to crops to add nutrients. It may be difficult or expensive to retain on site all nitrogen brought on to farms for feed or fertilizer and generated by animal manure. Unless specialized structures have been built on the farms, heavy rains can generate runoff containing these materials into nearby streams and lakes. Wastewater-treatment facilities that do not specifically remove nitrogen can also lead to excess levels of nitrogen in surface or ground water. Two of the major problems with excess levels of nitrogen in the environment are:

- Excess nitrogen can cause overstimulation of growth of aquatic plants and algae. Excessive growth of these organisms, in turn, can clog water intakes, use up dissolved oxygen as they decompose, and block light to deeper waters. This seriously affects the respiration of fish and aquatic invertebrates, leads to a decrease in animal and plant diversity, and affects our use of the water for fishing, swimming, and boating.
- Too much nitrate in drinking water can be harmful to young infants or young livestock.

Increasing Nitrogen Deposition in Lakes

Increasing nitrogen emissions from motor vehicles, energy production, and agriculture are being deposited in lakes throughout the world, directly affecting lake biology and associated food webs.

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