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Testing for Nitrates in Well Water  
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# Testing for Nitrates in Well Water

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COOPERATIVE EXTENSION SERVICE • MICHIGAN STATE UNIVERSITY

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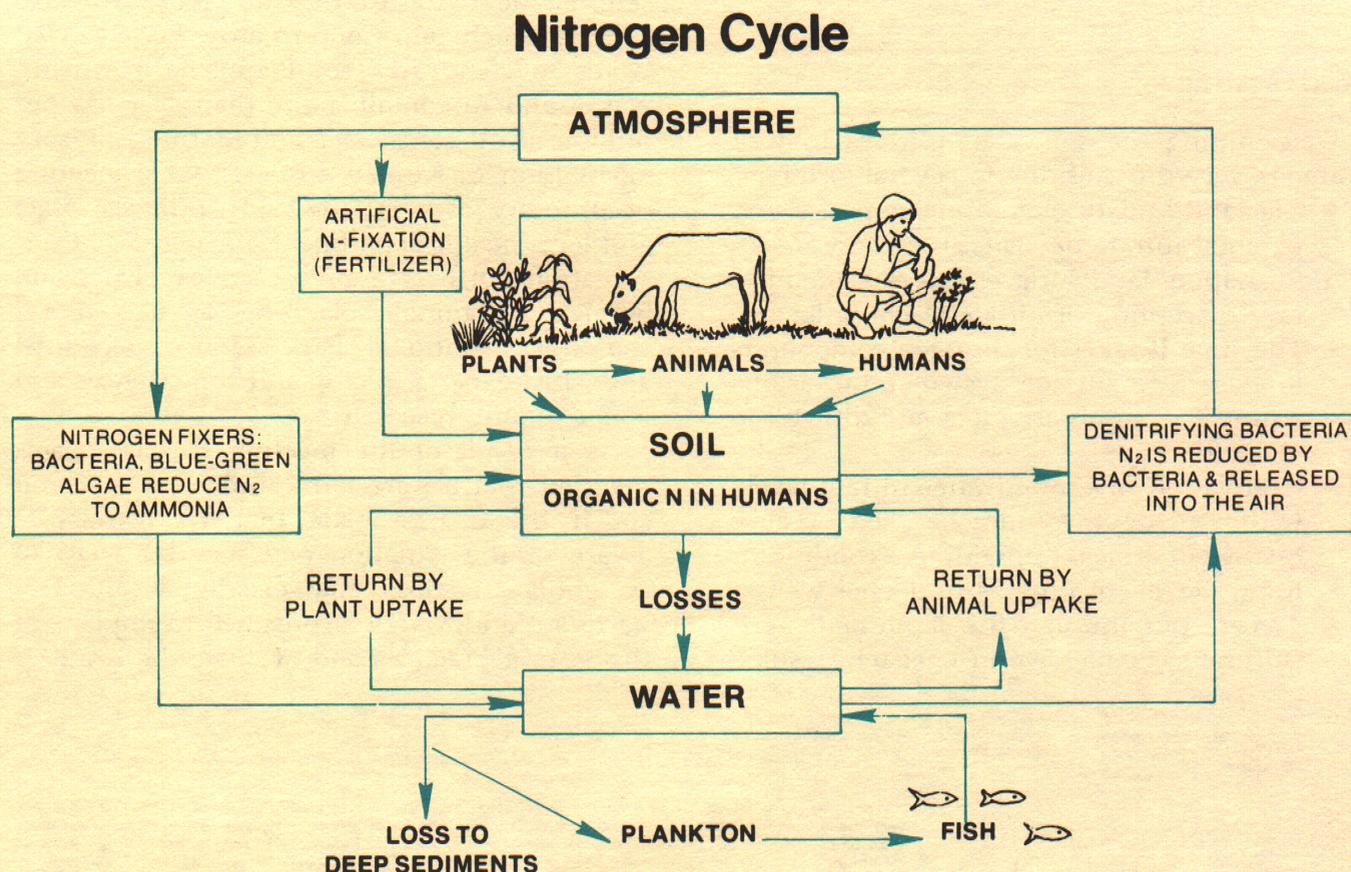
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In some areas, nitrate levels in well water exceed 45 parts per million (the minimum safe water standard set by the U.S. Dept. of Public Health in 1972). Because a reliable knowledge of the concentration of nitrate in groundwater

is vital to residential zoning, sewerage and water system extension, the following information may be useful when attempting to determine the source of the pollutant.

## Nitrogen Cycle

The amount of the various forms of nitrogen in ground water is affected by the rate and extent of its movement through earth, air and water. The nitrogen cycle describes movement of nitrogen through plants and soil by the action of living organisms.



## Movement of Nitrogen

1) Once dissolved in water, nitrates move whenever and wherever water moves.

2) The speed and direction of nitrates as they are cycled depends upon the following geologic structures:

- type and texture of soil
- degree of permeability of soil
- depth of soil, subsoil and bedrock formation.
- presence of rechargeable aquifer
- amount of rechargeable water
- well depth and construction of well
- depth of well casings

3) Leaching of nitrates into the soil also depends upon:

- types of plant cover
- cropping methods
- irrigation methods
- climatic changes
- number of organisms present which convert ammonia to nitrates.
- pressure effect of large bodies of water
- various other influences of a particular location.

## Well Testing

Determining the source of nitrates in well water is very difficult due to several factors:

- Glacial till mixtures may create pockets or perched nitrate deposits in certain areas.
- Reshaping land surfaces can cause temporary disruption of nitrate leaching levels.
- The time it takes for nitrogen compounds to pass through the system into various aquifers is highly irregular and difficult to measure.
- Correlation of groundwater nitrate levels with well depth cannot be used because casings often leak, providing a conduit for higher levels of nitrates in deeper wells.
- Tracers put through the septic and agricultural systems have inconsistent results.

## Surface Testing

By testing soil samples, it is possible to determine the amount of nitrates which are percolated into groundwater from the surface down. This testing should include:

- Accumulation of the following background information:
  - historical well records
  - geologic data
  - soil and water character data
- Testing surface source possibilities such as ag activities, septic systems, etc.
- parallel testing of all land use practices in related situations including:
  - inland sites
  - different fertilizer application rates
  - natural undisturbed areas
  - urban/rural areas
  - long term studies carried out over several years.
  - enough studies in enough different places to allow statistical prediction
  - making use of the studies to determine future land use management recommendations.

\* \* \*

The preceding information is the result of a seminar held August 1979, in Grand Traverse County, Michigan. Concern arose because well water in some areas of Peninsula Township was found to contain more than 45 parts per million of nitrates. Extension Marine Advisory agent John McKinney arranged for a meeting of property owners, township officials, state and local health department officials, Soil Conservation District representatives, Extension Service personnel, planning agency representatives, National Park Service personnel and MSU experts in crop and soil sciences and water quality research.

As a result of the meeting it was recommended that a long term study of water and soil in the area be made, that well owners be aware of the situation and monitor wells to accumulate records, that existing Health Department and MSU be consulted to implement the testing practices and evaluate the results.

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