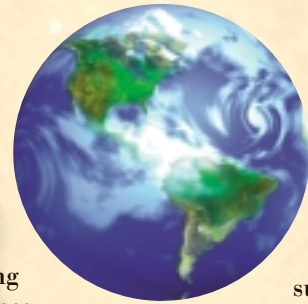


Watershed Hydrology

Water is Delaware's most valuable natural resource. It is critical to our existence, provides habitat for wildlife, and makes possible numerous recreational opportunities in the Inland Bays/Atlantic Ocean Basin. Water is constantly recycling and changing its state through the processes of evaporation, condensation, and precipitation, commonly referred to as the *water cycle*.

The water in our streams and ponds is warmed by the sun's rays, causing it to evaporate and enter the atmosphere as a gas. As these water molecules collect in the atmosphere, the humidity increases until the air mass can no longer hold any more moisture. At this point, the water vapor condenses and falls back to the Earth in the form of snow, rain, sleet, or hail. Some of this precipitation is filtered through the soil and ends up as ground water. If more precipitation falls than the soil can absorb, it becomes runoff. Both runoff and ground water eventually reach a stream, bay, or other water body, and the water cycle begins all over again.

Surface water bodies, such as rivers, lakes, bays, and oceans, are the most visible expressions of water in the water cycle. These reservoirs act as "barometers" for measuring the health of the waters in the cycle. For example, diverse aquatic habitats and fish popula-



tions are representative of a healthy water body. An excess of nutrients can lead to a reduction in the diversity and populations of these living resources.

Rehoboth Bay, Indian River Bay, and Little Assawoman Bay are the major surface water bodies in the Inland Bays/Atlantic Ocean Basin. These estuaries provide important habitat for migrating birds, finfish, and shellfish. However, the bays are becoming increasingly urbanized with encroaching development.

In the sediments underlying the Inland Bays are several shallow *aquifers*, or water-bearing zones, which inexpensively provide 100% of the region's drinking-water and irrigation supplies. These aquifers also feed streams, rivers, and the bays themselves. The basin's ground water, generally available within 10 feet below the surface, is an invaluable asset to development and commerce. Yet the very availability of ground water and its continual movement through the water cycle make the basin's water resources extremely vulnerable to contamination.

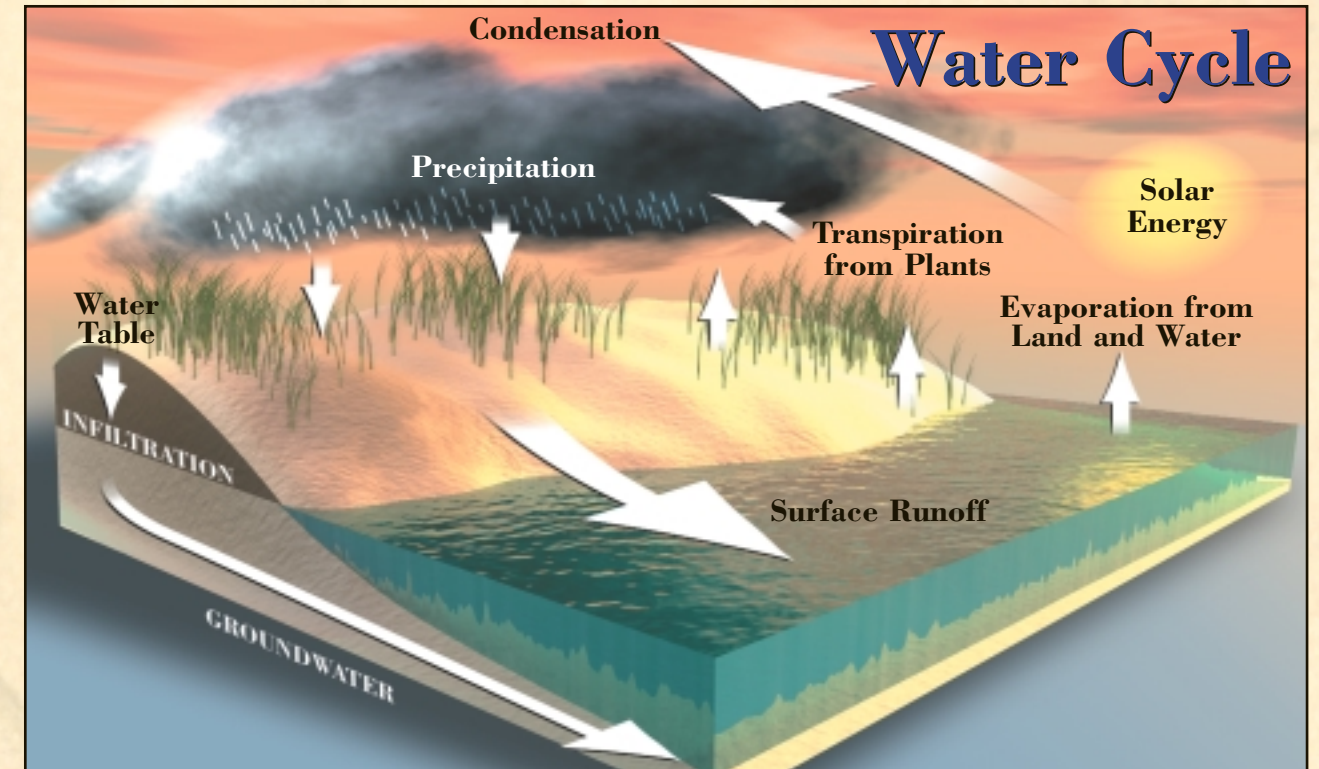
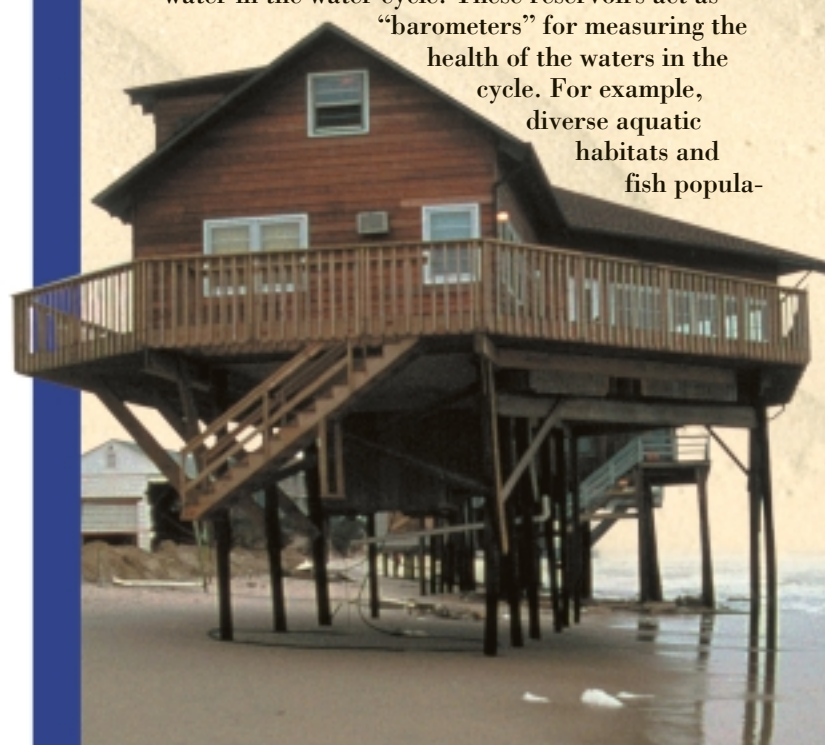
SHORELINE

More than 11 miles of Delaware's ocean coast are developed with homes and businesses. The majority of them are located on the barrier island — the thin strip of land separating the ocean from the Inland Bays. Sea-level rise, storms, and other natural coastal transport processes are causing the barrier island system to migrate in a landward direction. The current rate of sea-level rise is 1 foot per century.

Keeping up with rising waters and storm effects requires continual vigilance and management. State efforts to maintain public beaches and dunes include planting beach grass, erecting sand fence, and repairing storm damage. Beach nourishment projects restore wide beaches for recreation and protect inland areas by replacing sand lost during storms.

Some communities have chosen to harden the shoreline by constructing bulkheads and other structures that provide localized wave protection;

Delaware's coastline is steadily migrating landward due to sea-level rise, storms, and other natural processes.



Human activities can have a significant impact on the water cycle. When forests and other vegetation are removed and roads and buildings constructed, less precipitation can infiltrate the soil, and runoff increases.

however, they do not replace eroded sand. Strategic retreat, the relocation of waterfront structures inland, is practiced on a limited basis today to protect structures and help preserve the beach. The best option for treating *erosion* of a beach or land area often depends on the primary goal — preservation of the beach or property protection.

DREDGING

As development continues around the Inland Bays, requests for new dredging projects increase along with the population. Dredging is the process of removing bottom sediments to create or maintain safe, navigable channels for recreational or commercial boating purposes. In Delaware, dredging also is used to obtain sand for beach restoration activities, to remove unwanted sediments and vegetation from state-owned ponds and lakes, and to control sediment deposits in inland waters.

Dredging physically alters the bottom and temporarily causes water *turbidity*, or cloudiness, and damage to plants and animals. Dredging of dead-end canal systems to allow access of pleasure boats to new developments results in stagnant water in the canals because there is little or no freshwater inflow

for flushing. Dredging the upper portions of tidal tributaries fosters the extended upstream progression of salt water from the Inland Bays into the upper tributaries. On the other hand, removing bottom sediments from navigational channels and existing marinas can be beneficial if the dredging helps to improve circulation patterns.

Two Department initiatives focus on ensuring that our dredging projects reflect the best technologies and methods to minimize adverse impacts: the "Statewide Dredging Activity Analysis and Management Project" and a review of the "Inland Bays Dredging Study."



"Mother Earth is a living, breathing creature composed and formed like us. The land is her skin, draped over her rock and stone bones; the trees and grasses are her hair. Wind and breeze are our Mother's breath; the ocean and waters are her blood. As with us, her life-force is in constant motion and every drop is precious."

— Charles Clark IV
Assistant Chief, Nanticoke Indian Tribe