transport, are manifestations of such a landscape. The landscape, when viewed as a system driven and organized by water, exhibits mechanisms for cycling, conserving, and transporting nutrients chiefly from areas of low concentration to points of high concentration. Thus, the ecosystem, at one scale, concentrates carbon, nitrogen, and phosphorus into organic matter, and at the larger scale, nutrients one concentration in wetlands and estuaries as a result of transport pathways that are generally downhill. Since most wetlands are low points in the landscape are wetlands, nutrients and other chemicals are concentrated within them.

Until recently, land functions and processes were little influenced by human actions. Nutrient dynamics, for example, were largely a function of relatively closed cycles within native ecosystems, with some input from the atmosphere and weathering of parent materials. As humanity's influence on the landscape has increased, nutrient cycles have been greatly modified.

The impact of humanity on regional nutrient budgets and cycling is widespread and pervasive. Conversion of forests and meadows to agricultural and urban uses has altered regional nutrient dynamics by changing soil chemistry and increasing soil erosion and the harvesting of forest products. Yet, the role of humanity as consumer of raw materials in concentrated forms and spatial concentration has had a far greater influence on the larger environment. Materials are collected from far and wide, spatially concentrated, and consumed. In the process, by-products are released to the environment. This concentrated consumption and eventual release of by-products has influenced the chemical character of the larger environment.

The great urban areas release, each day, tons of nutrients in very concentrated forms which must be assimilated into the landscape. Until very recently, wastes like sewage, were diluted to some acceptable level and then discharged to the environment. Since the dilution agent was most often water, the discharge points were associated with rivers, streams, lakes, and estuaries. As long as the water body was large and the discharge relatively small, further dilution was achieved and the nutrients and other chemicals were finally reduced to concentrations typical of the landscape and assimilated by it.

As a result of the increase in the size and number of urban concentrations, the amount of nutrients released to the environment far exceeds anything the landscape has ever seen before. Thus, new environmental systems are emerging at points of release and adjusting and self-designing to the new conditions.

The landscape, having evolved over millions of years, is an efficient chemical machine cycling, converting, and changing species of chemicals and associations of