Minimum, Law of The Encyclopedia Article

Minimum, Law of The

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The Law of the Minimum was first proposed in 1840 by Justus von Liebig, a German chemist. He worked on agricultural crops and concluded that the level of individual chemicals in the manure fertilizer he added proportionately influenced growth of the crops. Each plant and animal requires certain kinds and amounts of nutrients (both macro- and micro-nutrients) for optimal growth and survival. If all chemicals are provided except for one key ingredient, the plant or animal will either stop growing or die. If that one chemical is added in excess, then the next essential element in limiting concentration will limit the growth, and so on. An analogous illustration would be a wooden barrel with staves where each stave is cut at a certain height. The level of water poured into this barrel would reach only that of the shortest stave, which would be equivalent to the limiting nutrient.

Phosphorus is the number one limiting nutrient in most lakes. Limnologists (aquatic ecologists) know that if they can limit the phosphorus input into a water body, then they can control algal growth in this system. People who fertilize their lawns often unknowingly add excess nutrients when only one element such as nitrogen may be limiting the growth. This accounts for much of the excess nutrient input into aquatic ecosystems.

Not only is too little of essential chemicals important, but too much can also be detrimental. For example, copper is an essential trace element for algae, but it can be added in excess (known as "blue-stoning") to control algal blooms. Thus, the Law of Tolerance, which describes the optimum environmental conditions for organisms, is a more realistic ecological concept than the Law of the Minimum.