

Uses for Knowledge of Our Ecological Life Zones

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The Holdridge system for classifying world life zones

The Holdridge System attempts to define relatively equal and comparable ecological units called life zones. These life zones are identified using a triangular matrix whose axes represent the variables of biotemperature, precipitation, and potential evapotranspiration ratio. Biotemperature is defined as the mean of unit-period temperatures with the substitution of zero for all unit period values below 0°C and above 30°C. Therefore, life zones are primarily climatic divisions that define conditions for ecosystem functioning. Each life zone can be further subdivided into associations to account for local environmental influences such as soil, atmospheric, or moisture conditions. Thus, associations are secondary level classifications of the Holdridge System.

Use of the Holdridge system for classifying world life zones has primarily concentrated in the Tropics where it has proven to be appropriate to the complexities of tropical vegetation and very useful in ecological research, physical planning, land use, water resource management, and climate change mitigation programs.

Distribution and Description of Life Zones Observed in Saint Lucia

A recent study found that three complete and three transitional life zones occur on Saint Lucia based on the Holdridge system for classifying world life zones. Twelve percent of the island was classified as Tropical Premontane Moist/Wet, 20% as Tropical Premontane Wet, 6% as

Subtropical Dry/Moist, 29% as Subtropical Moist, 26% as Subtropical Moist/Wet, and 7% as Subtropical Wet. Tropical rainforests were not identified because rainfall stations did not report annual rainfall greater than 4000 mm (needed to identify rainforest) and also because current rainfall distribution models did not spatially identify significant areas receiving such amounts. However, given the lack of rainfall stations within the interior, it is quite possible that tropical rainforest exist on the island.

Application of Life Zone Information

Descriptions of vegetation within the life zones of St. Lucia indicate the affinity of some plant species to definable environments. Investigation of plant associations and biodiversity in general, existing within the confines of these environments, can lead to a better understanding of the location and range of ecosystems in need of protection. For example, a study to assess the coverage of biodiversity within protected areas in Costa Rica found that only nine of the 23 life zones were adequately represented. It concluded that a significant portion of the country's biodiversity were at risks. The current system of protected Forest Reserves in St. Lucia does not include all life zones and their associations. This definitely represents a significant risk to local biodiversity. Therefore, proper definition of life zones can form the basis for a more justifiable, comprehensive, and scientific distribution of Reserves.

Subtropical Moist Forest has often been referred to as amongst the most intensively used life zone throughout the world. This is certainly the case in Saint Lucia. Although it is the largest life zone found on the island, assessment of degradation resilience relative to other life zones may lead to more environmentally friendly decisions on projects such as those involving infrastructure expansion.

Life zone considerations can potentially play a meaningful role in facilitating plans to resolve water supply and use issues. This is because the potential evapotranspiration ratio axis of the Holdridge life zone classification matrix is an expression of general water conditions per annum. It identifies potential areas of water surplus and water deficit. This information can be utilized in locating areas of supply and demand for water resources. The further away water demands are made from the Wet life zones, potentially, the more complex and expensive the project for delivery of this water. By extension, the identity of life zones may also assist with locating dams for water supply by using the system's humidity provinces as indices of evaporation rates.

Scientific evidence shows that our climate is changing. Average global temperatures have risen about 0.5 degrees over the last century, and the seven hottest years during the last 140 years occurred after 1980. Due to a close correlation between climate and vegetation distribution, Holdridge's life zone system is a useful tool for predicting the impact of climate change on forest. This is based on the fact that climate controls the location and distribution of tree species in the forests through its influence on temperature, rainfall, moisture levels, evapotranspiration, and plant reproduction. This is particularly important to our hurricane-prone island, as these are also the factors that determine the manner and rate of forest recovery (succession) after severe storms. Can our forest adapt to changes in our climate? How fast is the distribution of natural vegetation changing in response to climate change? Which species will survive another 0.5 degrees increase in temperature? Application of our knowledge of life zones can provide us with the conceptual framework for answering such fundamental questions.