

protection need be defined in light of the larger landscape unit. Energy diagrams like those given in Figure 1 help to better understand a systems relationships with the larger environment. By showing the driving energies entering from the left and top, exports leaving the system to the right, and its internal processes as links between inputs and outputs, the systems diagram makes explicit relationships of the system under study to the larger system.

The symbols used in the diagrams of Figure 1 have precise mathematical meaning (see Odum, 1984), so that a diagram is also a mathematical model that can be simulated on computer to gain insight into the behavior of the system. Driving energies or rates of internal processes may be varied and simulation results then help to explore the response of the system to change and may lead to better management decisions.

As an example, simulation results of the model of cypress wetlands in Figure 1, are given in the lower half of the figure. Surface water inflow is programmed to be lower than normal and then higher than normal. The resulting graphs show the effects of altered surface water inflow on hydroperiod and taken as an example, could be used to suggest management alternatives for development of surrounding uplands. In the first case, surface waters are diverted and the wetland is much drier than normal, while in the second case, where runoff from surrounding lands has been increased, the wetland is much wetter for longer periods of time. Using models such as this, the effects of development in surrounding areas on wetland hydroperiod could be determined prior to development and suggestions might be made that would mitigate any unwanted changes.

#### Creating "Artificial" Wetlands

In landscapes where development is high, the energy signature is dominated by energies released by humanity. Surface and ground waters are altered in both quantity and quality as development interests change drainage patterns, impervious surfaces increase, and sewage is released to the environment. The tendency as the percentage of developed land increases is a gradual drying of the landscape. Waters runoff faster due in part to increased impervious surfaces and in part to "flood control" .