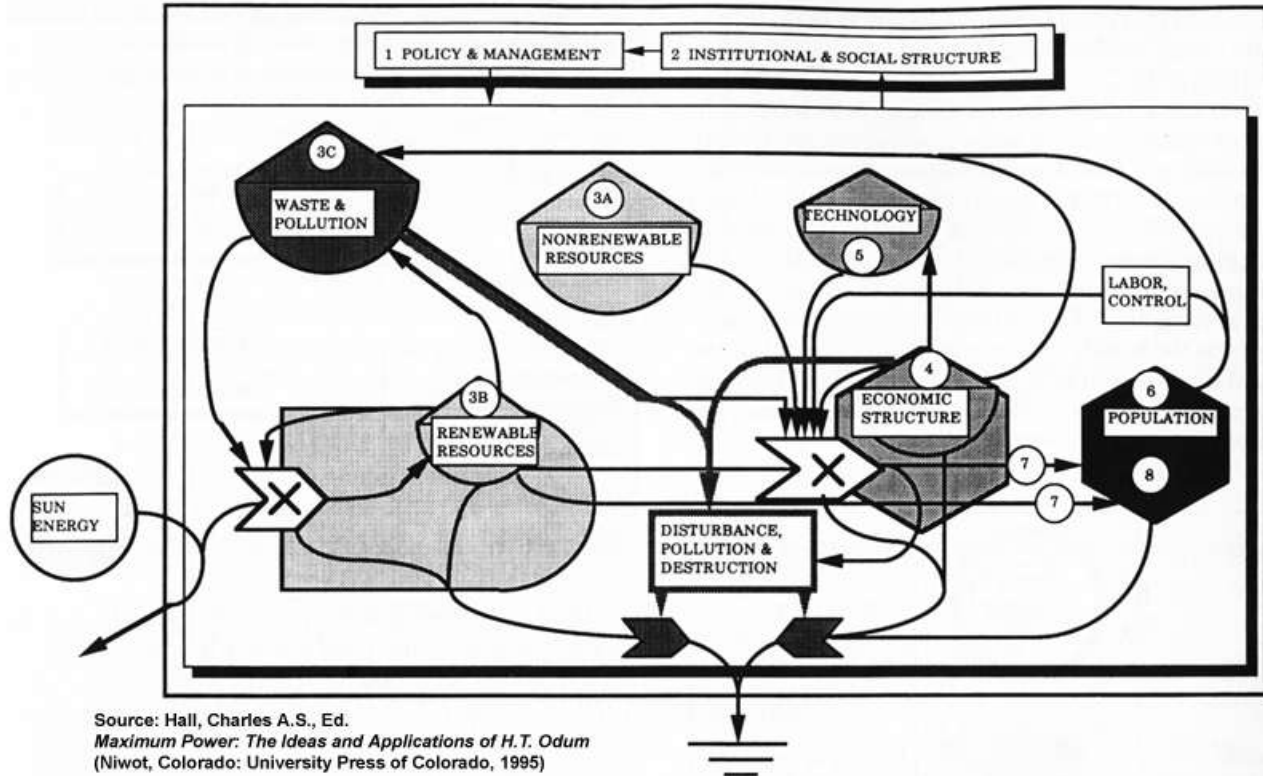


A Systems Ecological Model of Global Development



A systems ecological model for sustainable development analysis. (See text for numbers.)

Explanation of the System Map

A basic familiarity with this aggregated system model can help one picture the connections between nature and human interaction according to physical laws. The diagram also illustrates the meaning of closed loop thinking and the concept of stocks and flows.

From left to right, reflecting the basic direction of energy transformations, the diagram shows solar energy entering the system and being captured by the renewable resource systems (3b) (including the natural component of agricultural systems), which are exploited by economic production systems (4) and directly by humans (8) to generate consumable inputs (7). The flow through this major energy transformation chain is amplified by the non-renewable resources (3a), drawn in and interacting with renewable resources, labor, and technology (5) in the production-function (multiplier) symbol. The production and depreciation processes generate heat (which ultimately leaves the system) and waste and pollution (3c), which feedback

negatively on stock regeneration and energy transfer processes.

Social dynamics in the population and interactions between ecological, economic, and human sub-systems generate social and institutional structure, which produces policies and management, which to varying degrees modify and control the energy transformation process. Human needs (6) are implicit in the population stock, but are also reflected in the labour flow (willingness to pay by means of work for satisfaction of needs), which is influencing the production-function (multiplier) symbol. Consumable inputs (7) are acquired by the population from the production function or directly from renewable resource stocks.

Quoted from: Hall, Charles A.S., Ed. *Maximum Power: The Ideas and Applications of H.T. Odum* (Niwot, Colorado: University Press of Colorado, 1995) pp 168-169.