

Table 3. Odum's (1992) Concepts for Undergraduates Environmental Literacy

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- 1 An ecosystem is a thermodynamically open, far from equilibrium system.
- 2 The source-sink concept: one area or population (the source) exports to another area or population (the sink).
- 3 In hierarchical organization of ecosystems, species interactions that tend to be unstable, nonequilibrium, or even chaotic are constrained by the slower interactions that characterizes large systems.
- 4 The first signs of environmental stress usually occur at the population level, affecting especially sensitive species.
- 5 Feedback in an ecosystem is internal and has no fixed goal.
- 6 Natural selection may occur at more than one level.
- 7 There are two kinds of natural selection, or two aspects of the struggle for existence: organism versus organism, which leads to competition, and organism versus environment, which leads to mutualism.
- 8 Competition may lead to diversity rather than to extinction.
- 9 Evolution of mutualism increases when resources become scarce.
- 10 Indirect effects may be as important as direct interactions in a food web and may contribute to network mutualism.
- 11 Since the beginning of life on Earth, organisms have not only adapted to physical conditions but have modified the environment in ways that have proven to be beneficial to life in general.
- 12 Heterotrophs may control energy flow in food webs.
- 13 An expanded approach to biodiversity should include genetic and landscape diversity, not just species diversity.
- 14 Ecosystem development or autogenic ecological succession is a two-phase process.
- 15 Carrying capacity is a two-dimensional concept involving number of users and intensity of per capita use.
- 16 Input management is the only way to deal with nonpoint pollution.
- 17 An expenditure of energy is always required to produce or maintain an energy flow or a material cycle.

- 18 There is an urgent need to bridge the gaps between human-made and natural life-support good and services and between non-sustainable short-term and sustainable long-term management.
- 19 Transition costs are always associated with major changes in nature and in human affairs.
- 20 A parasite-host model for man and the biosphere is a basis for turning from exploiting the earth to taking care of it (going from dominionship to stewardship).

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Adapted from Odum, 1992, pp. 542–545.