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Tim G. Benton and Alastair Grant.Â When Sustainability observed trade-offs are taken into account in red deer In Brazilian extractive reserves, the palm Iriartea (Cervus elephas), the survival elasticities are negative deltoidea is harvested for its wood13.Â When the population is not at equilibrium (either through environmental perturbations or non-equilibrium dynamics), the elasticities need to be evaluated numerically. When the underlying attractor is non-equilibrium, or the environment is variable, the elasticities of can be markedly different from the elasticities of (Ref.Â Elasticities of an equilibrium population size (Neq) can be calculated as logNeq/logaij, similarly elasticities of mean population size can be calculated for populations that fluctuate33. In these systems, ecological resilience is maintained by keystone structuring processes across a number of scales, sources of renewal and reformation, and functional biodiversity. In practice, maintaining a capacity for renewal in a dyna-mic environment provides an ecological buffer that protects the system from the fail-ure of management actions that are taken based upon incomplete understanding, and it allows managers to affordably learn and change. INTRODUCTION.Â The ball represents the system state and the cup represents the stability domain (Figure 1). An equilibrium exists when the ball sits at the bottom of the cup and disturbances shake the marble to a transient position within the cup. Evolutionary behaviour in ecological systems with trade-offs and non-equilibrium population dynamics. A. White,1* J.V. Greenman,2 T.G. Benton3 and M. Boots4.Â When the magnitude of the population oscillation exceeds a threshold, the characterization fails. Trade-offs with decelerating costs can produce a CSS, multiple CSSs or evolutionary branching points. The evolution of reproduction and survival parameters may be contingent on initial conditions and sensitive to small changes in other life-history parameters. Evolutionary branching allows types with distinct reproduction and survival parameters to evolve and co-exist. Keywords: adaptive dynamics, evolutionary branching in fecundity, population oscillations, trade-offs. 6.6 Stability of non-trivial equilibrium and one class of Lyapunov functions. 6.7 Lyapunov function and exergy. 6.8 One more Lyapunov function.Â 8.6 Phenomenological thermodynamics of interacting populations. 8.7 Community in the random environment and variations of Malthusian parameters. 8.8 Summary of the ecological important issues.Â 13. Application of exergy as ecological indicator and goal function in ecological modelling. 13.1 Introduction. 13.2 Exergy and specific exergy as ecological indicators. His most important brainchild was the ecological systems theory, where he defines the four concentric systems that are the micro-, the meso-, the exo- and the macrosystems. He later added a time-related fifth system, the chronosystem (Wikipedia â€“ The Free Encyclopedia.) 2 As of lately, this theory has been renamed as the bioecological systems theory. It underlines the child´s own biology as the primary microenvironment that is the fuel for development. The Bronfenbrenner ecological systems theory lays stress on the quality and context of the child´s surroundings. Bronfenbrenner maintains that because the child develops, the interaction with the environments acquires a complex nature.