

A Preliminary Theory for an Approach to Planning Environmentally Balanced Desert Landscaping

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Desert landscaping at a given site, whether native, introduced, or a combination of both, will be environmentally balanced only to the extent that any requirements, deficiencies or interactions which depart from those of the site's potential natural biotic community are jointly and severally compensated for. In addition to this internal balance, an external balance relates to the compatibility with mental rhythms and human expectations of associated social habitat.

Our present century has witnessed a renewal of interest in the "balance of nature" under the modern designation *ecology*. Whereas ecology is replete with theory, its proliferation into pragmatic nooks and crannies has been a *fait accompli* from which we may occasionally look back to construct overlooked theory as a basis for further progress.

An environmentally balanced landscape, with healthy well-formed photosynthesizers in proper stratification, green with a blue sky, birds chirping and butterflies flitting, certainly has a favorable psychological impact on human beings, whereas an unbalanced landscape with discordant elements, unhealthy or dead plants, absence of birds and other natural features, has a depressing effect. It is the ubiquity of planned landscapes in our lives that magnifies what might at first seem a trivial concern. Psychiatrists have found experimentally that wall and ceiling color in a room can be varied to calm or enrage the emotionally brittle. Certainly contrived landscapes can have similar, if not more powerful, results and cumulative doses might affect even the most stable of individuals.

Pragmatically derived landscaping is as creatively produced by a good architect as good music is by a composer. Geneticist Dr. Susumu Ohno, famous for computerized translations of DNA sequences into music, finds that strands from healthy tissue produce pleasing melodies, one being a dead ringer for Chopin's Nocturne, Opus 55, No. 1. But oncogene music from cancerous tissue produced the sombre rhythm of a deathmarch. Could composer-generated music borrow from physiological rhythms which were fixed by complex series of DNA bases in the composer? Fed back to the ear, music modifies human activity; it soothes, stimulates, enrages, comforts or shocks, perhaps because its wave-lengths are harmonics of certain sequences of human physiological rhythms.

Dr. David Carpenter, dean of the school of public health at the State University of New York in Albany, is concerned that electric transmission lines and electronic appliances in homes and offices create electro-magnetic fields which, although once thought harmless, may also interfere with our physiological rhythms. Psychology, music, electro-industrial discordancies, environmental balance, human ecology and landscaping are all related.

This is all in introduction to our belief that landscaping should be environmentally balanced. As we live our lives increasingly in one humanly contrived landscape or another, our bodies are repeatedly bombarded by good and bad "vibes"—the good ones generated through environmental balance, the bad ones through deficiencies, malformations, and discordancies. Some of the bad elements may be

so strong as to provoke a conscious awareness of bad feeling with attendant stimulation of negative thought associations, psychosomatic headache, and even emotionally triggered nausea. The depression that many persons feel in cemeteries is re-experienced by some whenever they encounter Italian Cypress or Arborvitae, species which frequently display discordancies both in cemeteries and in contrived desert landscaping. But mental disturbance caused by poorly balanced landscaping is probably more insidious, cumulative, and wide-spread.

We believe that desert landscaping in particular is often environmentally unbalanced because few architects have considered the full range of compatible species and possibilities. The diversity of desert life forms, on the other hand, makes it more likely that discordancies will be brought together. Desert ecology is still poorly understood by many. Harshness of the desert habitat makes it likely that sunburn, freeze-damage, desiccation, or disease (all discordancies) will be apparent when critical species tolerances to environmental factors are exceeded. Also, some assemblages of desert species can be quite discordant with the social patterns of the human habitat at the site.

Although this paper will not include directions in more detail at this time for achieving environmental balance in desert landscaping other than the theory preliminarily proposed and italicized at the beginning, we note a number of observations below which we are using to create an explicit guidebook.

The environment at a particular site calls for certain parameters in a constructed landscape just as certainly as it would have fixed parameters of the site's potential natural vegetation. The human habitat associated with the site presents further environmental pressures. Landscaping will deteriorate and become increasingly unbalanced in direct proportion to the degree of misfit with the environmental realities of the site. Rapidity of deterioration will be inversely proportional to the adequacy of contrived compensations such as soil modifications, irrigation, artificial shading, pruning, application of fungicides, herbicides, insecticides, etc.

A contrived compensation, although ostensibly changing a single factor, acts on the ecological balance and thus is apt to produce corollary changes and down-the-road ancillary effects with possible disastrous consequences. Deterioration can be slowed only insofar as intensive maintenance is provided and new subsidiary compensations prove adequate. The landscape will be more maintenance-free and easier to balance when fewer compensations are needed. Compensations will be required only in proportion to the number of misfits. Fewer

misfits will arise from having a larger array of pre-adapted species to choose from and intimate knowledge of species behavior.

The recentness in geologic time of Southwestern desert biotic communities shows that species which never lived together before have reached a stable equilibrium with each other and the environment. Although relatively recent natural selection has certainly honed the genetics of Southwestern desert species to allow them to settle down with excellent goodness of fit into their present specific desert communities, for the most part they were already pre-adapted to their ultimate roles by ancient adaptive pressures operating over considerable time.

Since the environmental balance in our desert biotic communities has come largely from ecological interaction among genetically preadapted species (as opposed to in-situ evolution), there is great potential for achieving as good a balance in contrived landscaping using introduced species as components together with native ones. This allows the flexibility necessary to meet human habitat needs and to provide foodplants for birds and beneficial insects. Relative stability of such contrived hybrid landscapes depends not only on pre-adaptations in the species introduced but also on the sifting and winnowing of the species as they act and interact on each other as if they were in a huge outdoor experiment. Intelligent specifications for environmentally balanced desert landscaping can be made from observations of contrived hybrid landscapes which have existed long enough for considerable ecological succession to have occurred and/or species experimentally added or removed over a long period of years. The Boyce Thompson Southwestern Arboretum has been an excellent laboratory for such studies.

We began our work at the Arboretum 17 years ago, specializing in desert ecology and studying the full spectrum of environmental relations of living organisms from lichens to trees and from invertebrates to humans. One of us (F.S.C.) supervised planting and garden development for a number of years and the other (C.D.C.) has managed the Arboretum nursery through a dozen or more years during which desert plants have been successfully popularized by means of plant sales and specialized events. We owe a special debt of gratitude to Warren Jones as a longtime friend and mentor. He has been our bright star on the desert landscaping horizon. His concepts, discoveries, and introductions will serve his profession well over the coming decades. His inspirations are to desert landscaping what those of Frank Lloyd Wright are to building architecture.