

What on Earth are We Doing?

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(Ed. note: This is an edited summary of the *Guiding Principles of Sustainable Design*, a collaborative effort of individuals representing professional design and conservation groups, various offices of the USNPS, other national as well as local governmental agencies, and ecotourism resort operators.)

Introduction

Human beings are not interacting well with the Earth. As World Bank economist Herman Daly has stated, “we are treating the Earth as if it were a business in liquidation.” The connotation of development has eroded from improving the quality of life for humans to an economic activity that assumes endless growth is both possible and desirable. What can be done to counterbalance the damaging effects of human activities on this planet? Sustainability has come to the forefront in the last 20 years, and may provide the general guidance humankind needs. Sustainability is a concept that recognizes that human civilization is an integral part of the natural world, and that nature must be preserved and perpetuated if the human community is to sustain itself indefinitely. Sustainable design is the philosophy that human development should exemplify the principles of conservation, and encourage the application of those principles in our daily lives.

Sustainable design, sustainable development, design with nature, environmentally sensitive design, holistic resource management—regardless of what it’s called, “sustainability,” the capability of natural and cultural systems to maintain themselves over time, is key.

The USNPS’s Sustainable Design Initiative

Two events in particular were instrumental in creating the USNPS’s Sustainable Design Initiative: the Vail Symposium and the Maho Bay workshop. In October 1991, five working

groups studied “the state of the parks” as part of organizational renewal activities associated with the Vail Symposium marking the 75th anniversary of the USNPS. They found

that the USNPS is being stressed by a variety of factors, including population increases, park visitation increases, demographic changes, increased numbers and types of sites to manage, environmental degradation, lack of capable leadership, and the need to protect whole ecosystems. The working groups acknowledged that certain environmental stresses are beyond the scope of standard park management, and that sustainability is a way of addressing these stresses on a broader scale.

In November 1991, the Sustainable Design Initiative was officially launched with a workshop in Maho Bay Camp, Virgin Islands National Park. Participants from professional design and conservation groups, national and local governmental agencies, various offices of the USNPS, and ecotourism resort operators brought diverse perspectives and ideas, and a strong commitment to develop practical advice on sustainable design. The outcome was a set of guiding principles for the application of sustainability to the management of sensitive natural and cultural resource areas. The raw data generated at the Maho Bay workshop subsequently was augmented with information from additional sources and edited by the Denver Service Center of the USNPS into a formal publication.

The *Guiding Principles of Sustainable Design*, published in October 1993, is a collaborative effort intended to provide a basis for achieving sustainability in facility planning and design, emphasize the importance of biodiversity, and encourage responsible development decisions in parks and other conservation areas, particularly

where related to ecotourism. This merger of sustainable development and ecotourism provides tremendous opportunities for affecting visitor perceptions of the natural and cultural world, and developing conservation-oriented values.

The suggested principles to be used in the design and management of park and other visitor facilities emphasize environmental sensitivity in planning, design, construction, operation and maintenance; the use of non-toxic materials, resource conservation and recycling; and the integration of visitors with natural and cultural setting. The goal is to affect not only immediate behaviors but also the long-term beliefs and attitudes of visitors.

Interpretation

Interpretation must be redefined to provide better knowledge of resources, appreciation of their relevance to us, and positively influence human values, thus leading to the protection of the overall environment.

Natural resources

A basic premise of sustainable development is that facilities must, to the fullest extent possible, function within the ecosystem and its constraints rather than separately. Although it is not always readily apparent, ecosystems provide direct ecological services to the human developments within them. If an ecosystem becomes overloaded or severely stressed, these services are jeopardized.

Natural behavior within an ecosystem. We must develop a basic understanding of natural behavior within an ecosystem before we can design facilities to function sustainably within it.

Links between ecosystems. We must ascertain the links between ecosystems to avoid changes in one that may have consequences in another. Natural resource protection will involve planning and government controls over a wide geographical area to account for these connections.

Fragmentation of habitats. Habitat fragmentation must be minimized because this causes loss of biological diversity.

Energy subsidies for ecosystems. Sustainable development must limit imported energy to sustain human needs, and instead take advantage of renewable energy sources within the local ecosystem. A basic question should be how the development could function, or even if it should, if the energy subsidy were unavailable or created significant disruptions in distant ecosystems.

Human demands on ecosystems. Because the demands of human use on an ecosystem are cumulative, new proposals must account for the previous use of resources so that effects of past activity, proposed development, and anticipated future use do not exceed the ecosystem's capability and resiliency.

Acceptable limits of change. Even with sustainable development, change is inevitable in an ecosystem. Limits of acceptable change must be developed that are well below the ecosystem's capability and resiliency to ensure that natural stresses or disasters do not cause the whole system to collapse. The limits must be respected scrupulously.

Ecosystem monitoring. The effects on surrounding resources of developing

and operating facilities must be routinely monitored and evaluated as an early warning of potential stress to the ecosystem; action should be taken immediately to correct any problems.

Cultural resources

Much of what is valued in historic developments is their response to the climate, natural setting, and use of locally available building materials. A symbiotic relationship of human activities within their host environment is evident in the occupants' structures, such as the Anasazi cliff dwellings at Canyon de Chelly National Monument in Arizona. The vernacular response to climate, setting, and materials provides opportunities for presenting positive lessons in ecologically sound design. Conversely, many of our historic military, industrial, and engineering sites afford opportunities to discuss ecological excesses of the past. The architectural style, landscape design, and construction materials of sustainable development should reflect the indigenous cultural heritage of the locality or region.

Sustainable site design

Site design is a process of intervention involving the sensitive integration of circulation, structures, and utilities within natural and cultural environments. Sustainable design is not a reworking of conventional approaches and technologies, but a fundamental change in thinking and in ways of operating. Beyond a change in basic approach, sustainable site design requires holistic, ecologically based strategies to create projects that do not alter or impair, but instead help *repair and restore* existing site systems.

The "Valdez Principles for Site De

sign,” developed by the firm Andropogon Associates, can serve as policy guidelines in site design for developed areas of national parklands.

- Recognition of context. What are the impacts of the project on the larger community?
- Treatment of landscapes as interdependent and interconnected. Fragmented landscapes must be reconnected to establish contiguous networks able to support a variety of natural plant communities and habitats.
- Integration of native landscape with development. Developed landscapes should be redesigned to support a variety of components of the native landscape to provide critical connections to adjacent habitats.
- Promotion of biodiversity. Site design must be directed to protect local plant and animal communities, and new landscape plantings must deliberately reestablish diverse natural habitats in organic patterns that reflect the processes of the site.
- Reuse of disturbed sites. Instead of siting new development in remaining rural and natural areas, previously disturbed areas must be reinhabited and restored.
- Making a habit of restoration. Every development project should have a restoration component for all site systems, including soils, water, vegetation, and wildlife.

Construction methods and materials

The goal to leave the landscape visually unimpaired after development drives the need to evaluate every construction method and material used.

There should be no residual signs of construction or environmental damage. Preservation of the natural landscape is of great importance during construction because it is much less expensive and more ecologically sound than subsequent restoration. Careful organization and sequencing of construction should be emphasized. Material staging should be carefully planned to use only areas subsequently to be developed. Procurement should be scheduled to limit the amount of material to be accommodated on site at any given time during construction. Careful planning of the construction process can help identify alternative methods and techniques that minimize resource degradation. Projects must be adaptable to reflect unforeseen environmental conditions. And, throughout construction, resource indicators should be monitored to ensure that resources are not being adversely affected.

Building design

To ascertain the most environmentally sensitive building materials, the complete life-cycle energy, environmental, recycling and waste opportunities and implications of each material must be examined. This cradle-to-grave analysis involves tracing the effects of a material or product and its by-products from its initial source availability and extraction through refinement, fabrication, treatment, transportation, and use, and then predicting its eventual reuse, decomposition, or disposal. Tracing includes the tabulation of energy consumed and the environmental impacts of each action and material. The selection of materials for a sustainable

design is then a matter of evaluating the positive and negative environmental consequences for the lowest possible total environmental loss.

The goal of sustainable development and sustainable building design is to create optimum relationships between people and their environments. More specifically, sustainable development should have the absolute minimal impact on local, regional, and global environments. Planners, designers, developers, and operators have an opportunity and a responsibility to protect the sanctity of a place, its people, and its spirit.

Sustainable design balances human needs (rather than wants) with the carrying capacity of the natural and cultural environments. It minimizes environmental impacts, importation of goods and energy, as well as generation of waste. In an ideal situation—after determining that the proposed development is indeed necessary in the first place—it would be constructed from natural, sustainably harvested materials collected on site; generate its own energy from renewable sources such as sunlight or wind; and manage its own wastes. Sustainable design is an ecosystematic approach that demands an understanding of the consequences of proposed actions. The long-term objective of sustainable design is to minimize resource degradation and consumption on a global scale.

Energy management

Responsible energy use is fundamental to sustainable development and a sustainable future. Each site has primary renewable energy resources,

such as sunlight, wind, geothermal and tidal energy, or biogas conversion. With existing technologies, the intelligent use of primary renewable energy resources can benefit any development. Energy management must balance the justifiable demand with appropriate supplies.

Water supply

The challenge of sustainable design in terms of water resources applies more to those areas where fresh water is not limited than to arid areas where the economics of high-cost water tends to promote wise stewardship. The cornerstone of any domestic water supply program is conservation. Water conservation includes using reclaimed wastewater effluent, gray water, or runoff from ground surfaces for toilet flushing or irrigation of planted landscapes and food crops. It also involves the widespread use of water-conserving flush toilets, and where practical, composting toilets. All other plumbing fixtures should be evaluated to limit water consumption.

Waste prevention

Because experience has shown that there is no completely safe method of waste disposal, the only way to avoid environmental harm from waste is to prevent its generation. Pollution prevention means changing the way activities are conducted and eliminating the source of the problem. It does not mean doing without, but doing differently. Preventing pollution in a sensitive resource-related setting means thinking through all the activities and services associated with the facility and planning them in a way

that generates less waste. Reduction, reuse, and on-site biodegradation and recycling are the key components of a sustainable waste prevention approach. A material doesn't become waste until it is thrown in the garbage can. If a material can be reused, it is a resource, not waste. Reuse is the best form of recycling. Recycling can be maximized through the purchase of products for which there is a ready market as recycled materials. Ideally, if no other reuse or recycling option exists, materials used at a facility should be recycled, even at a net loss, rather than sent for disposal. We should limit to the greatest possible degree materials that become waste problems; nothing should be purchased that ultimately will become toxic.

Facility maintenance and operations

An essential goal of a high-quality, well-maintained sustainable development should be the hiring and training of individuals who excel in local artisan skills. These artisans should be absorbed into the design, construction, maintenance and management of sustainable facilities as part of a sustainable personnel program to complement sustainable development. Employees who are involved in a project from the outset would be more

likely to show the pride required to maintain the facilities at the highest levels of quality.

The role of these operations is to facilitate good visitor experiences without the depletion of resources and to promote environmental and cultural resource awareness and education. Sustainable development operations should help impart to both visitors and staff an enhanced set of values supporting sustainable human behavior toward the Earth. Sustainability must be visible in all aspects of facility operations, including visitor services and concession operations, maintenance, utilities, and waste handling. By interpretation and example, visitors can learn how to adapt some of the sustainable methods to their personal lifestyles.

Through adopting the concept of sustainability, the USNPS is hoping over the next 75 years to more effectively accomplish its conservation ethic and 1916 Organic Act mission, "which purpose is to conserve the scenery and natural and historic objects and the wildlife therein, and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

