SUSTAINABLE DESIGN

A COLLABORATIVE NATIONAL PARK SERVICE INITIATIVE

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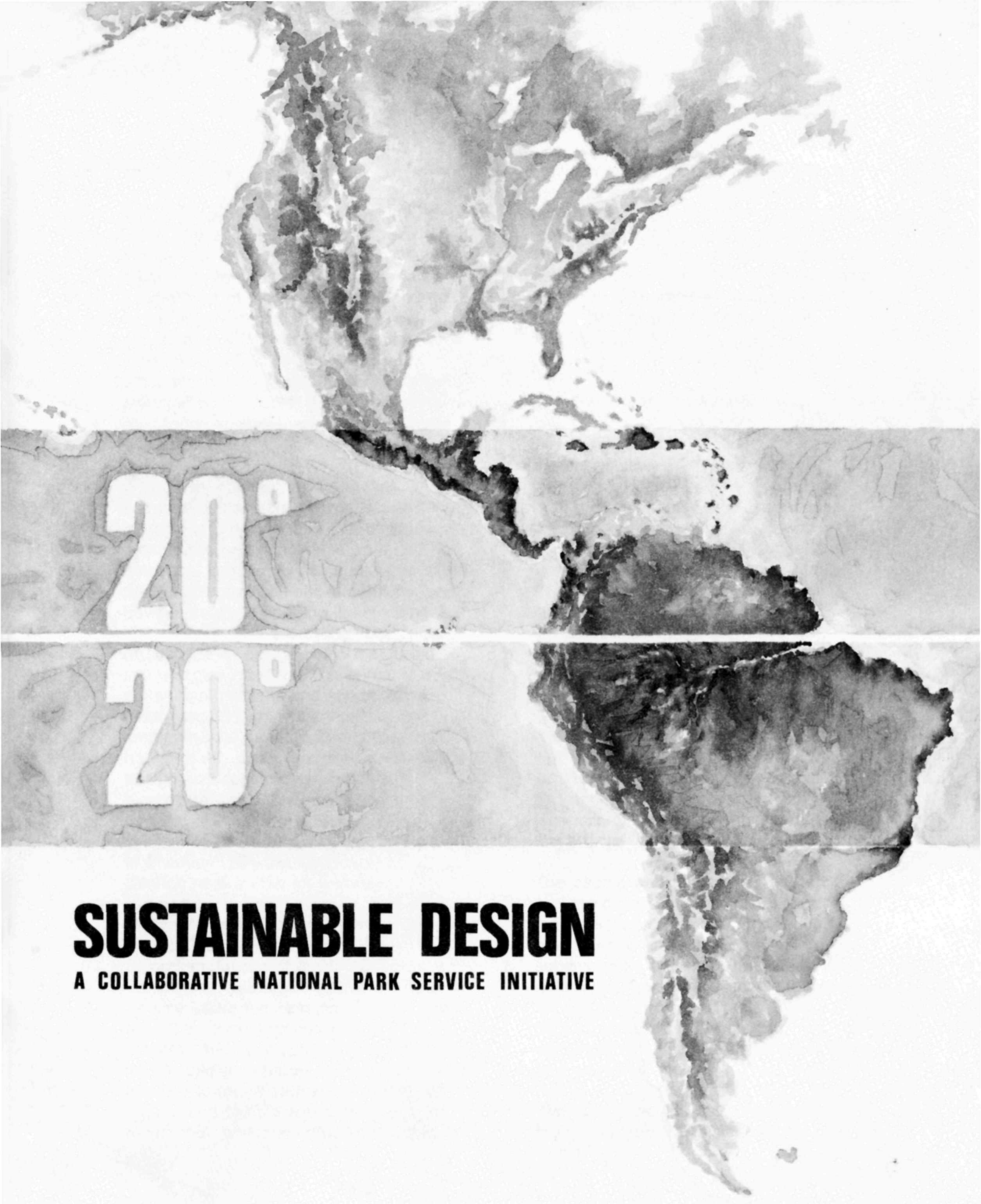

SUSTAINABLE DESIGN

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Sustainable Design: A Collaborative National Park Service Initiative

The Initiative

The concept of sustainable design has come to the forefront of design thinking in the last 20 years. It 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 itself is to survive. Sustainable design articulates this idea through building that exemplifies the principles of conservation and encourages the application of those principles in our daily lives.

A corollary concept, and one that supports sustainable design, is that of bioregionalism—the idea that all life is established and maintained on a functional community basis and that all of these distinctive communities (bioregions) have mutually supporting life systems that are generally self-sustaining. The concept of sustainable design holds that future technologies must function primarily within bioregional patterns and scales. They must maintain biological diversity and environmental integrity, contribute to the health of air, water, and soils, incorporate design and construction that reflect bioregional conditions, and reduce the impacts of human use.

In October 1991 the National Park Service held a 75th anniversary symposium in Vail, Colorado, entitled *Our National Parks: Challenges and Strategies for the 21st Century*. One of the recommendations of the symposium participants was that the National Park Service adopt the concept of sustainable design as a guiding principle of facility planning and development. The objectives for the design initiative are to design park facilities to minimize adverse effects on natural and cultural resource values, to reflect their environmental setting, and to maintain and encourage biodiversity; to construct and retrofit facilities using energy-efficient materials and building techniques; to operate and maintain facilities to promote their sustainability; and to illustrate and promote conservation principles and practices through sustainable design and ecologically sensitive use.

The Maho Bay Workshop

The National Park Service sustainable design initiative was launched in November 1991 with a pilot project to draft guidelines for visitor use facilities in a tropical climate. A workshop was convened the week of November 10 at Maho Bay in the Virgin Islands. Maho Bay was chosen both for its tropical setting and the demonstration of sustainable design at the Maho Bay resort. Participants came from the public and private spheres and represented the American Institute of Architects, American Society of Landscape Architects, National Parks and Conservation Association, National Oceanic and Atmospheric Administration, Greenpeace, architectural and engineering firms, ecotourism interests, Caribbean governments, and the National Park Service.

The people who gathered at Maho Bay brought diverse perspectives and ideas to the workshop. Together, they produced guidelines for sustainable design in nine subject areas and then translated those guidelines into specific recommendations for design in tropical climates. The subject areas were selected to encompass all aspects of design in parks and recreation areas.

The guidelines and recommendations from the Maho Bay workshop are

projected for release in the summer of 1992. Following are some of the highlights of the workshop findings.

Natural Resources

Facilities should, to the extent possible, function within the surrounding ecosystem and should not place additional stresses on its resources or processes. A basic understanding of the ecosystem is essential to designing facilities that will function within it.

The carrying capacities of facilities should be based on resource considerations (capability, resiliency), not on the physical capacity of a site to contain development.

Indicator species should be identified and monitored to determine the potential impacts of development.

Limits of acceptable environmental change should be established before development begins. All parties involved in the development should recognize and respect these limiting factors and not attempt to circumvent them through short-term technological solutions.

The effect of the development on the condition of resources should be routinely monitored and evaluated, and actions immediately instituted to correct identified problems.

Further fragmentation of habitats on a local and regional scale and loss of biological diversity should be avoided.

Transition zones should be considered between parks or recreation areas and unrestricted development areas; special guidelines or controls on development should be established as needed.

Long-term resource protection should involve planning and government controls on a regional scale.

Cultural Resources

When an aspect of the built environment achieves sufficient importance that it is deemed significant in human history, it becomes a nonrenewable resource worthy of sustainable conservation. Management, preservation, and maintenance of cultural resources should be directed to that end.

Sites should be surveyed for cultural resources, and the significance, integrity, and intrinsic qualities of those resources determined.

All site and facility designs should incorporate methods for protecting and preserving significant cultural resources over the long term.

The architectural style, design elements, and construction materials of new developments should reflect the cultural heritage of the locality or region.

Cultural resource treatment and maintenance methods should be both environmentally sensitive and sustainable over the long term.

Site Planning and Design

Site planning and design is a process of intervention involving the location of roads, trails, structures, and utilities to make natural and cultural resources and values available to people. To reflect the principles of sustainable design, planners and designers should assume an accountability to the environment. Both

ecosystem dynamics and resource carrying capacities should be understood so that resource values are preserved and disruption of natural systems is minimized.

Site resources and their landscapes should be analyzed and understood before intervening.

Alternative sustainable design strategies should be evaluated for functional and performance deficiencies and for potential impacts on natural and cultural resource values.

Development should occur in phases, with monitoring of site resources between the phases to ensure that facilities and their use are not damaging resource values or exceeding the capacity of resources to sustain themselves.

Technological intervention should be minimized. Development should reflect simplicity in form and function.

Mitigation and site restoration *after* development, although useful tools in certain cases, should be considered a last resort rather than a standard practice. Avoiding the need for such actions should be the rule in sustainable design.

The effects of previous development should be carefully considered before proceeding with additional development.

Adaptation, recycling, reuse, and energy conservation should be promoted in site design.

Architectural Design

The long-term goal of sustainable design is to minimize resource degradation and consumption on a global scale. To achieve this goal, sustainable design should create in visitors, designers, and developers a new awareness of the built environment. Because design and development have contributed to environmental degradation in the past, design for sustainable developments should become a model and teaching tool for a new ethic.

All elements of a building should be considered equally important, especially as they relate to harmonious integration within the ecosystem. In other words, the building system should be nonhierarchial.

The human activities that create and maintain a building should be as important as the building itself.

The concept of growth within sustainable limits should be considered. A facility may begin on a small scale; then, based on knowledge of the environment gained by the designer, manager, and staff during the initial phase, it may experience a period of growth. The ultimate size of the facility should depend on the ability of the environment to sustain it.

A building should be interactive with the environment. This is an important concept, because it acknowledges the fact that the building has an effect on the environment, just as the environment has an effect on the building.

Building Ecology

To qualify as a sustainable development, a park or recreation facility should provide specific functions related to education, recreation, relaxation, recuperation, and restoration. Additionally, it should incorporate research and development for, or demonstration of, ways to live environmentally aware lives in the 21st century.

Sustainable development should meet three of the following criteria: provide education on the wildlife, native cultural resources, historical features, or natural features; provide recreation and relaxation; provide health recuperation; provide spiritual and emotional recuperation; accomplish environmental restoration. It should also provide research and development for and/or demonstration projects of ways to minimize human impacts on the environment.

An environmental report card—an ongoing record of positive and negative environmental actions—should be established for each development. To be considered sustainable, a development's environmental report card should show close to zero global impact or no net environmental loss. In the selection of materials for the development, its environmental report card should be weighed against those of others to achieve the lowest total environmental loss.

Building materials should be prioritized by origin when considering their selection—for example, primary materials, found in nature, including wood from sustainable sources, stone, and plant fibers; and secondary materials from recycled products, including some wood, aluminum, cellulose, and plastics. Hydrocarbon-based products should be avoided, even those that are recycled. Tertiary materials include man-made and synthetic materials and those made from nonrenewable sources.

After materials are in place in the development, a declaration of their global impact is recommended. Each material should be labeled, stating, from cradle to grave, the energy it took to get there, the environmental degradation caused by its extraction, fabrication, and use, and what are its toxic and harmful components.

Interpretation

Sustainable park and recreation development will succeed to the degree that it anticipates and manages human experiences. Interpretation provides the best single tool for shaping experiences and infusing a set of values. To succeed, it must affect not only immediate beliefs and behaviors but also longer term beliefs and behaviors that control our lives.

Visitor experiences in parks and recreation areas should be based on resources, should be environmentally sustainable, and should encourage the value of protecting the environment.

The local culture should be a significant part of visitor experiences.

Site and facility design should allow visitors to experience natural and cultural resources in an intimate, sensory fashion. Opportunities for private moments in natural settings should be created. Visitor interaction with resources should be encouraged.

Educational opportunities should include interpretation of the systems

that sustain the development as well as programs about natural and cultural resources values.

The values of sustainability should be apparent to visitors in all daily aspects of operation, including services, retail operations, maintenance, utilities, and waste handling. The best model is a good example.

Energy and Utilities

Responsible energy use is fundamental to sustainable development. Renewable energy should be on site and significant. With the ultimate goal of energy sustainability there are clear steps to reducing the amount of energy consumed. Existing technologies offer cost-effective alternatives to conventional power and water utilities.

Primary renewable energy resources should be analyzed to best apply alternative sources (sun, wind, biogas).

The principles of siting and architectural design should be applied to reduce the need for energy-consuming utilities (air-conditioning, water heaters, high-level artificial lighting).

Water and energy conservation measures should be incorporated in all aspects of design (toilets, showers, commercial kitchen and laundry appliances). Ground and surface water sources should be protected from contamination. Alternative water treatment methods suitable to the ecosystem should be explored and implemented.

Energy production and use should be a visible component of the sustainable development. Visitor experiences should be broadened by awareness of energy use issues and the use of efficient appliances, conservation methods, and renewable energy sources. Energy "meters" should be installed to monitor and illustrate energy consumption.

Waste Disposal

Experience has shown that there is no completely safe method of waste disposal. All forms of disposal have some negative environmental impacts. The only way to avoid environmental harm from wastes is to prevent their generation in the first place. Waste prevention does not mean doing without, but doing differently. It pays economically as well as environmentally. Alternative methods of waste disposal can help reduce the environmental effects of wastes that are generated.

Planning for any sustainable development should provide a comprehensive strategy for minimizing the generation of solid waste. This strategy should include

- Limiting the use of disposable products and packaging
- ensuring that products that eventually become waste are nontoxic
- composting or anaerobically digesting biodegradable wastes
- reusing materials on-site or sending materials for off-site recycling

Facility managers, operators, educators, and maintenance and service personnel should be trained in waste prevention and the priorities of avoid, reuse, and recycle.

Waste prevention methods and systems should be apparent to visitors, and ways to change personal habits and adopt more responsible attitudes toward waste should be described.

Recycling and biodegradation should be the preferred methods of waste disposal.

Facility Maintenance and Operation

To succeed, sustainable development must be maintainable. Designers need to work closely with managers in defining acceptable maintenance and operational practices and employee training requirements that will allow the facility to operate and be maintained at the same level as when it was designed and constructed.

Sustainable facilities should exhibit the following characteristics: an operational mandate and direction (commitment to sustainable design), minimal resource damage, high-quality materials, visitor satisfaction, low operational costs, low maintenance costs and reduced maintenance staff, low utility costs, low levels of rehabilitation, and values that remain intact over the long term.

Facilities should be designed using the minimum technology necessary to meet facility needs. Simplicity of design and construction will reduce maintenance costs and make operations easier.

Facilities should meet or exceed safety and accessibility standards. Materials chosen should meet public health standards concerning toxicity. Materials containing toxic substances should be carefully selected and monitored to eliminate or drastically reduce the possibility of those substances entering the ecosystem.

Facility designers and managers should work closely with local communities to share knowledge and experience and to minimize any effects of the project on local lifestyles, customs, and traditions. Local workers should be employed in the development as well as the operation of the facility.

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