
Golf Course Benefits

tal Research Committee was to develop a scientifically based paper on the benefits of turfgrasses targeted for publication in a peer reviewed scientific journal. The paper was completed and reviewed by fourteen key world-respected scientists representing the broad range of technical subjects addressed. It also was reviewed by Texas Agricultural Experiment Station personnel, approved for publication and submitted to the Journal of Environmental Quality.

The topic areas include: (a) turfgrass evolution; (b) history of turf use; (c) turfgrass functional benefits including soil erosion control and dust stabilization, ground water recharge and surface water quality, organic chemical decomposition, carbon sink, heat dissipation, noise abatement, glare reduction, decreased noxious pests, allergy related problems, safety in vehicle operation, security for vital installations, and wildlife habitat; (d) turfgrass recreational benefits; (e) turfgrass aesthetic benefits including improved mental health via a positive therapeutic impact and contributions to social harmony and improved occupational productivity; (f) contemporary issues such as water conservation and ground surface water quality preservation as related to pesticide and fertilizer use.

This has been a rewarding and enlightening project and a new perspective has evolved concerning the environmental issues challenging the golf courses. This position paper, and other USGA projects, are needed first steps to address environmental issues. However, the lasting solution will be achieved from the golf course industry and environmental groups working together to achieve common goals and objectives.

The Earth Fund

On Course with Nature - Dr. Donald F. Harker

This project has adapted information on ecoregions across the United States for use in naturalizing landscapes around golf courses. The result of this effort will be the *Landscape Restoration Handbook* which will be published in June 1993. By increasing the natural areas around the golf course, it is hoped to increase or preserve wildlife habitat.

Earth Fund researchers look at golf courses as valuable green space within the urban environment. Golf courses, however, are not regularly cited in scientific literature concerning wildlife habitat, and more often receive negative attention in popular

press. This project surveyed the literature on natural areas and established woodland size, vegetation structure, and other information to encourage wildlife usage of golf courses. The United States is already divided into natural ecoregions and the book developed from the project describes how to recreate or manage the natural vegetation on the site.

Lists of native plant species and nurseries in the United States that produce these materials was incorporated into the book. The landscape side of the problem, or the "how to do it" principles, are a major portion of the book. Careful attention to recommendations on adapted plant materials for a region was emphasized. A detailed map of the United States indicating the natural ecoregions and plant communities was developed and will be included in the book. Landscape architects and horticulturalists can use this map and then go to a nursery to select suggested plant species. Currently, native plant species do not have something similar to this approach, and the project will help a great deal to meet this need.

From an urban planning perspective, the book could help develop scenarios for natural corridors through urban areas by linking golf courses, parks, and larger tracts of land. The concept of 'sustainable development' and 'quality of life' also were covered. The *Landscape Restoration Handbook* will be available in June 1993.

The Institute of Wildlife and Environmental Toxicology

The Effects of Golf Course Activities on Wildlife - Dr. Ronald J. Kendall

The Institute of Wildlife and Environmental Toxicology (TIWET) at Clemson University has conducted numerous studies on the environmental effects of pesticides used on golf courses. TIWET, with USGA funding, initiated research in golf course management practices to institute environmentally sound approaches based on knowledge of chemical use, fate and effect. Resulting information will aid in the development golf course management practices that provide satisfactory playing surfaces, without damage to the environment.

The basic objective of the project was to understand the "golf course ecosystem." This includes an understanding of how birds, fish, and plants respond to golf course chemical inputs, as well as pesticide and nutrient behavior in water, soil, and

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sediments. This information will be integrated into an ecological risk assessment which can be applied, initially, to the Ocean Course at Kiawah Island and potentially, to a wider distribution of courses.

The golf course research group consists of seven graduate students and five faculty members from the Department of Environmental Toxicology and TIWET at Clemson University. The pilot study on the Ocean Course, Kiawah Island, began in July, 1991. This investigation focused on two areas: 1) developing a thorough water sampling program to measure the quantity of fertilizers and pesticides reaching adjacent marshes; and 2) assessing the potential for exposure of wildlife on the Ocean Course and adjacent habitats.

The development of Kiawah was conducted with environmental foresight, resulting in a residential and resort community endowed with diverse habitat and abundant wildlife. The Ocean Course, constructed with an innovative drainage system that captures runoff from rainfall and irrigation, is situated in a sensitive ecosystem of sand dunes and tidal marsh. Chemicals used on the course are deterred from entering adjacent wetlands and the water can be recycled.

TIWET efforts have concentrated on gathering background information on the Ocean Course and on substantiating irrigation and chemical application procedures. Maps and diagrams were developed and used to describe the flow of irrigation and drainage water on the course. Turf management practices and pesticides used on the Ocean Course were documented. Chemical application records were collated and the irrigation schedule was recorded. Water samples have been collected for preliminary analysis of fertilizer and pesticide residues.

Texas A&M University

Human Benefits of Golf Course Views: Emotional Well-Being, Stress and Performance - Dr. Louis G. Tassinary and Dr. Roger S. Ulrich

While golf courses are an important type of land use in most cities and suburban areas, there is little scientific evidence regarding the human benefits that golf courses make possible. More specifically, there is virtually no sound, convincing research regarding the "influence of golf courses on the psychological and physical well-being of people." The absence of research on these issues is not a problem for the avid golfer, for whom the benefits

of golf courses and the game are intuitively self-evident. The great majority of Americans, however, are not golfers, and accordingly lack the direct experience that is probably necessary for an intuitive appreciation of the benefits of golf courses and the game.

The lack of research on golf course benefits can be a major problem both from the standpoint of communicating or marketing the benefits of the game to the non-golfing public, and/or conveying the benefits of a proposed golf course to either a planning commission, a zoning board, a city council, or a group of environmentalists. The reality is that intuitively-based arguments about the human benefits of golf courses, however commonsensical to golfers, carry little or no weight in the face of the more publicized or tangibly documented issues such as pesticide and nutrient runoff, consumption of scarce water resources in semi-arid areas, or membership policies based on racial or ethnic criteria.

A major feature of the two proposed studies is the emphasis placed on state-of-the-art *physiological* and *behavioral* measurement techniques, in combination with self-report techniques, such as questionnaires, for examining the effects of golf courses on human well-being and cognitive performance.

The initial plan was to conduct two studies. The main objective of the first study was to identify and measure the physiological and emotional effects of off-site views of golf courses and compare these effects with those resulting from viewing other common types of landscapes. The main objective of the second study was to identify and measure the effects of viewing golf courses on the performance of cognitive tasks relevant to productivity in the workplace.

Performance on these tasks will be diagnostic of our capacity to either monitor or reject incoming information and to either analyze or synthesize diverse information. For example, a significant part of the project will focus on whether viewing a golf course elicits a positive mood, that in turn enhances performance on tasks related to creative thinking. Video footage has been taken in the Houston, San Antonio, Austin, Dallas/Fort Worth, and Sam Houston Forest areas. On the basis of this footage, a small group of candidate sites was selected from a large number of potential sites within each environmental category and videotaping was completed in the fall of 1992. The raw video footage for the first study has been pre-