
Golf Course Benefits and Influence

The purpose of this project is to document and quantify the influence of golf courses on people, other biological organisms, and environmental factors. The studies include research pertaining to the influence of golf courses on:

1. Local soil and climate regarding gaseous and particulate pollutants that affect air quality; temperature, humidity, and wind modification; soil stabilization and watershed management; and noise modification;
2. Biological diversity of flora and fauna in urban, urbanizing, and urban-agriculture fringe areas;
3. Psychological and physical well-being of people, and the importance of landscape aesthetics to humans due to the interaction between people and plants.

Spectrum Research, Inc.

Golf Course Management and Construction: Environmental Issues

The final manuscript for the book *Golf Course Management and Construction: Environmental Issues* was submitted to Lewis Publishers, Inc. on October 4, 1991. The book is a summary and assessment of the technical and scientific research on the environmental effects of turfgrass management and, to a smaller extent, golf course construction. The book is intended as an introduction to the concepts of the non-point source environmental impacts of turfgrass management for turfgrass scientists and specialists, landscape and golf course architects, developers of turfgrass systems and golf courses, golf course superintendents, environmental scientists, and land use regulators.

The manuscript is organized into eight chapters. The introduction provides an overview and historical perspective regarding turfgrass management and environmental quality. The second chapter discusses the relationship of turfgrass management to the critical issues of water resources. This chapter focuses on the issues of water use, water quality, soil and water conservation, and movement within the water cycle. Chapters three and four provide a state-of-the-art scientific review

and assessment of the literature regarding the environmental effects of nutrient and pest management practices. The fifth chapter provides an introduction to concepts necessary for development of integrated management systems for turfgrass. Chapter six covers the direct and indirect effects of golf course management and construction on wildlife and aquatic organisms. The seventh chapter is an introduction to the critical issues of conservation and protection of wetlands which is emerging as a critical environmental concern of the 1990's. Chapter eight contains tables of toxicity tests related to the effect of chemicals used for turfgrass management. Each of the chapters includes a section on research and information needed to resolve the issues surrounding the positive and potentially adverse effects of turfgrass management.

Dr. James Balogh

Texas A&M University

Quantification and Validation of the Beneficial Contributions of Golf Course Turfgrasses

This progress report represents a summary of the ongoing research activities for the first nine months of a project entitled "Quantification and Validation of the Beneficial Contributions of Golf Course Turfgrasses." The objectives of this project were to: 1) conduct a detailed assessment of the literature to obtain and validate scientifically based sources of information supporting the benefits of turfgrass to our environment via golf courses, and 2) conclude with a manuscript that will be submitted to a major, peer-reviewed, scientific journal as a seminal article on the environmental benefits of golf courses. Also, there would be the opportunity to publish a Texas Agriculture Experiment Station bulletin or report which could be in press sooner than the scientific paper.

Considerable time and effort has been spent toward achieving our objectives since fall 1990. Over 282 papers have been collected, organized, and assessed (many are not useful for our needs). Over 84 personal inquiries have been made for specific information concerning the benefits of golf course and turfgrass. These numbers will be increased substantially before our objectives are

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achieved. A tentative outline for a position paper, to be submitted to *Science*, was completed in June 1991. Currently we are writing a preliminary draft which should be completed in early 1992. A final draft of the manuscript will be submitted to the USGA Green Section on or before May 1, 1992.

This has been a rewarding and enlightening project because there is a need for it, and because our perspective has evolved concerning the environmental issues challenging the golf course industry. This position paper, and other USGA projects, are needed first steps. We agree, however, that the lasting solution will be achieved from the golf course industry and environmental groups working together to achieve common goals and objectives.

Dr. James Beard

The Earth Fund

On Course with Nature

This project will adapt information on ecoregions across the United States for use in naturalizing landscapes around golf courses. 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 has 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 eco-regions and the book developed from the project will describe how to recreate or manage the natural vegetation previously on the site.

An outline of the book contents was developed and an extensive literature review was completed during the last three to four months. Lists of native plant species and nurseries in the United States that produce these materials will be incorporated into the book. The landscape side of the problem, or the "how to do it" principles, will be a major portion of the book. Careful attention to recommendations on adapted plant materials for a

region will be emphasized. A detailed map of the United States indicating the natural ecoregions and plant communities was developed in 1991. 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.

The Green Section will help select photographs of golf courses that are already utilizing some of the principles the book will develop. From an urban planning perspective, the book could help develop scenarios for natural corridors through urban areas by linking golf courses, parks, and larger tracks of land. The concept of 'sustainable development' and 'quality of life' will be covered.

Dr. Donald Harker

Institute of Wildlife and Environmental Toxicology

The Effects of Golf Course Activities on Wildlife

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. Attempts will be made to determine those products and management procedures which reduce non-target wildlife exposure to pesticides. Resulting information will aid in the development of golf course management practices that provide satisfactory playing surfaces, without damage to the environment.

The pilot study on the Ocean Course, Kiawah Island, began in July, 1991. This investigation has focused on two areas: 1) developing a thorough water sampling program to measure the quantity of 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