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 during the first year 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 pesticide residues.

Dr. Ron Kendall

Texas A&M University

Human Benefits of Golf Course Views: Emotional Well-Being, Stress and Performance

While golf courses are an important type of land use in most American 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 runoff, consumption of scarce water resources in semi-arid areas, or membership polices 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. For reasons related to scientific validity, we strongly favor using a combination of physiological, behavioral, and self-report measurement instruments in the assessment of human responses. Such a research strategy avoids relying solely on widely-used verbal measures such as "aesthetic preference" and "satisfaction" and thus circumvents a potential criticism of such measures based on recent empirical demonstrations that preference ratings for natural environments may neither be correlated with improved emotional well-being, nor be consistently linked with such human benefits as recovery or restoration from stress or mental fatigue.

The specific objectives of these studies are to: 1) 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 urban land uses (i.e., commercial strips, residential areas and parks, etc.); and 2) identify and measure the effects of viewing golf courses (relevant, for instance, to views from workplace windows) on the performance of cognitive tasks relevant to the productivity of administrators and other employees. 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.

The anticipated benefits of the research will include: 1) the potential positive consequences of golf course location for off-site users will be identified, assessed, and made accessible for practitioners involved in land use decisions; 2) a precedent will be established for the training of graduate students in landscape architecture on the indirect health

consequences of golf course design and location; 3) peer reviewed publications in established scientific journals; and 4) continued theory development in an ongoing basic research effort by the investigators to more fully characterize the dynamic relationship between humankind and the natural landscape.

Dr. Louis Tassinary
Dr. Roger Ulrich