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THE OLD COLLIER GOLF CLUB

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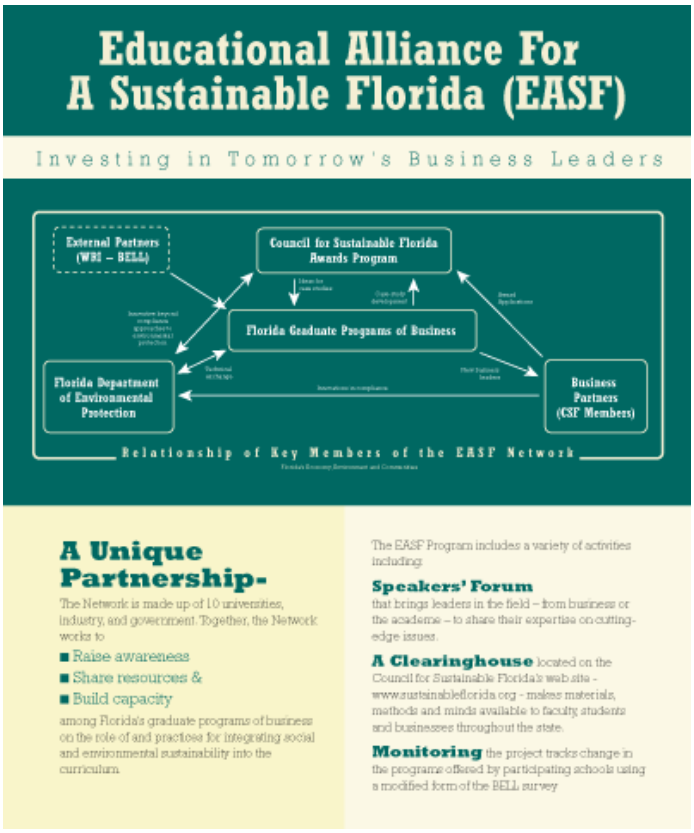
http://www.sustainableflorida.org/SignatureProgram.cfm



Council for Sustainable Florida

THE OLD COLLIER GOLF CLUB
CASE STUDY

In 1998 Collier Enterprises (CE) gave Tim Hiers, golf course manager at Collier's Reserve, the mission to develop a premium-membership, stand-alone, private golf course featuring an "Old Florida" landscape on property already owned by the company. The land was within an environmentally sensitive watershed, had experienced intermittent water restrictions and despite this was under intense development pressure. In addition, there was no readily available source of fresh water for irrigation of the golf course.

COLLIER ENTERPRISES (CE)

Collier Enterprises, Ltd. was a private company based in Naples, Florida. Collier's investments were diversified among commercial and residential real estate developments, agribusiness, oil & gas, and private equity. Affiliated companies included Collier Investments, Hamilton Harbor Marina, The Old Collier Golf Club (TOCGC), Collier Development Corporation, OrangeCo and Immokalee Ranch. Collier family members were active and took a personal interest in many of the CE projects including The Old Collier Golf Club project. The Collier family was instrumental in supporting the commitment and providing the financial resources to create a sustainable course that offered the combination of play and aesthetics that would celebrate the Old Florida landscape that their pioneering scion knew when he began the development of what is now called Collier County. Fix last sentence!

The Old Collier Golf Club was sited on 267 acres of mixed uplands and wetland habitats, bordered by the Cocohatchee River to the north and by major roads to the east, west and south. The Cocohatchee River was designated an Outstanding Florida Water (OFW). Prior to construction of the golf course, the property was undeveloped except for a storm water management system that provided water management for part of the Naples Park community, a substantial and older residential community located to the south of TOCGC.

The plan called for a cost-effective design and operation of the course that incorporated specific native landscape and course play aesthetics. Premium membership fees were to be instituted at this private, invitation-only course because of the combination of the uniqueness of the landscape experience and the quality of play. The plan also had to meet regulatory constraints for environmental and water use permits. Construction for the course, budgeted at $10 million, began in January 2000 and was completed in November 2000. The course opened for play in September 2001.

PERMITTING ISSUES

The South Florida Water Management District (SFWMD), under the authority of the Florida Department of Environmental Protection, was responsible for permitting the water-related issues of TOCGC. The primary issue that had to be resolved in order to proceed with the project was finding a source of water for irrigation. Once that issue was

resolved there was an additional need for permits in two closely related areas – water quality and hydrology.

Water Use

The SFWMD regulated water consumption. The project site was located in the coastal zone approximately ¾ mile from the Gulf of Mexico. The site was not suited for development as a golf course because there was no practical source of treated sewage effluent (gray water), the water used in Southwest Florida for public right-of-way and golf course irrigation.

Water Quality

Water quality standards fell under Section 62-302 of the Florida Administrative Code. Because water discharging off the future site of TOCGC flowed into the Cocohatchee River, part of the Wiggins Pass Estuarine System, Outstanding Florida Water (OFW), there was additional concern for possible pollutant discharge from the golf course. Section 62-302.700 stated, "It shall be the Department policy to afford the highest protection to Outstanding Florida Waters and Outstanding National Resource Waters." In general, DEP did not issue permits for direct pollutant discharges to OFWs that lowered ambient (existing) water quality or indirect discharges that significantly degraded the Outstanding Florida Water.

Hydrology

SFWMD regulations stated that the amount of runoff coming off the property after construction was not to exceed the pre-construction runoff rate. For TOCGC this included the existing drainage from the Naples Park community south of the course because it historically had drained onto the TOCGC property. The SFWMD also required Collier Enterprises to neither accelerate nor impede water flow off the land in the Naples Park community and into the OFW after construction was completed. To meet the permit demands, the SFWMD required CE to design a system that retained all water falling on and draining into the golf course site based on a 25-year storm event.

SEE EXHIBIT 1: Aerial View of Drainage, River and Wetland Areas Prior to Construction

THE PROJECT

Partnering with Audubon International

Audubon International (AI) was a nonprofit organization in New York focused on education, research and enhancing biodiversity to improve the quality of life through conservation and sustainable practices in land development. AI was supported by corporate sponsorships, individual contributors and members, bequests and the sales of books and prints. Recognizing that golf courses often represented the only open space in many communities, AI in 1991 established its Signature Cooperative Sanctuary programs where it provided educational, resource, and site assistance to private land owners and

golf course managers with ongoing or planned projects. The United States Golf Association became a partner and major contributor to the Sanctuary programs that were supported by memberships and fee-for-service agreements with individual courses.

AI offered three levels of certification for golf courses: bronze, silver and gold. The bronze level was the most basic level of service where AI audited and reviewed the Natural Resource Management Plan (NRMP) created by the golf course until it had achieved alignment with AI conservation principles. AI provided educational resources to bronze level courses. At the silver level, AI prepared the NRMP and provided site-based technical assistance and education. Courses joined the program at the bronze and silver levels prior to construction. At the gold level, AI took the lead in a far-reaching Environmental Plan for design, construction, best practices management and ongoing monitoring of the project. In 2004, AI listed 7 courses designated as Gold Signature Cooperative Sanctuaries.

The Relationship

While Hiers had the choice merely to comply with the permitting requirements, he could not have exercised that choice and continued working with AI. Ron Dodson, president of AI, made it clear with each partner that permitting requirements were starting points not because they were inadequate but instead because they were designed as one-size-fits-all. AI's unique approach was to design around each site individually, enhancing the health of the environment rather than just maintaining the current environmental status of the site or merely mitigating possible environmental damage.[1] Further, a condition of the alliance was that the innovations that occurred during the planning and development stages were to be showcased for learning purposes of others in the industry and anyone else with an interest in sustainable design.

Hiers had worked under design, cost, environmental, regulatory and permitting constraints with AI before when he had served as golf course manager at Collier's Reserve, a CE property. The design, construction and operation of that project resulted in its designation as the world's first Certified Audubon Signature Cooperative Sanctuary. While this project had been the development of a 448-acre gated golf community as opposed to construction of a stand-alone course, Hiers had recognized the valuable role Audubon International played in helping meet the multiple expectations for that project. Hiers believed TOCGC needed AI's involvement if the course was to meet the expectations of prospective members, the regulatory agencies, and CE. His first decision was to propose establishing another working relationship with AI. Hiers secured that decision from CE and the partnership began in December 1998.

Ron Dodson employed a team approach where multiple missions, plans and goals were combined under an umbrella mission that provided for the mutual advantage of human and natural uses, embracing the unique requirements of the site and its designed purpose. The team approach created a sense of "family" that allowed conflicting concerns to be voiced and addressed while keeping all team members motivated and open to innovations that created an enhanced environment and experience. [2]

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[1] R. Dodson (personal communication May 7, 2004)
[2] R. Dodson (personal communication May 7, 2004)

According to Dodson, Hiers explained that he had always had an interest in the environment but AI provided him the "steering wheel" that in turn permitted him to integrate all the stakeholder concerns into a completed project.[3] AI's approach focused on mutual uses and benefits. The approach fostered design and operations that improved the long-term health of the site environment as well as the surrounding watershed through an integrated resource management plan that required each decision to have economic benefit. The plan was site-specific and according to the AI website included:

> …strategies for natural resource management, architecture, sustainable building and infrastructure, landscaping, and community education. Sustainable Development Projects involve on-going monitoring and research and require a long-term commitment to showcase principles and practices of environmental sustainability. (www.audubonintl.org, ¶ "Gold" Signature Membership)

Hiers and CE relied on state-of-the-art expertise from a team composed of an experienced course architect, the staff of AI, a landscape architect with extensive native plant experience, and a design/irrigation firm that had experience with courses in areas of severe water restrictions and shortages. Additionally, outside suppliers and vendors suggested by AI and members of the team provided specific expertise for engineering portions of the project. At all times the team kept focused on doing the right thing the right way while creating a fun course to play.[4] The integrated environmental plan created through the alliance with AI guided the decisions that were made for meeting permit and regulatory issues as well as fostering the right design perspectives. The team dynamic developed and managed by AI and Hiers provided the forum for addressing problems and conflicts that arose during development.

First Decisions

While all decisions were approached in an integrated process, there were two that occurred early in the development that were andinterrelated and boldly innovative. First, a turf grass was identified after consultation with AI team members that could be irrigated with brackish water, the only water that was available on site. Second, there were innovations available in irrigation systems that were cost effective, irrigating only those areas that required water and activating in the middle of the night to take advantage of discounted off-peak electricity and possibly reducing the need to irrigate by taking advantage of the late night rains that often occurred in the summer months.

Turf Grass

Brackish water used for irrigation at TOCGC was readily available from the Cocohatchee River and a 587-foot deep artesian well drilled on-site. While Seashore Paspalum grass can be watered with brackish water, this species had not been tested on a working course in a subtropical climate. The choice was bold enough that when word spread about the decision to use two new strains of Seashore Paspalum, one for the fairways and rough

[3] R. Dodson (personal communication May 7, 2004)
[4] T. Hiers (personal communication April 14, 2004)

and the other for the greens, Hiers received calls from many people in the industry wondering how he made such a high-stakes decision. [5]

The turf grass decision, however, eliminated a major issue for CE – the need to obtain a water use permit from SFWMD. Since the District did not regulate withdrawal of brackish water from underground sources this permit issue was rendered moot. Hiers and his team still had to contend with the water quality and hydrological issues including how the use of brackish water might affect these permit issues.

In part this was accomplished by decisions such as reducing the amount of turf grass on the course. TOCGC had 77 acres of turf while a comparable course had 90-130 acres. The reduced acreage of grass required less fertilizer, thus creating less potential for nutrient runoff into the OFW and possibly avoiding a permit violation. Native habitat was used in place of these potential turf grass areas. Once established, native plants required no irrigation, fertilizer or pesticides; further reducing the chance of pollutants reaching the OFW. In places where turf grass was used on other courses, TOCGC used additional native plants during construction and created new natural areas including linear corridors connecting pre-existing native habitats thus enhancing the "Old Florida" landscape theme the Collier family desired.

Exhibit Two: Greens and Native Plants

Irrigation

At TOCGC, an irrigation system was needed that withstood the salt in the brackish water and could be directionally applied to the turf grass areas only. It was essential to keep the brackish water off the native plant areas that made up nearly all of the out-of-play areas on the course as those species were not saltwater tolerant. In addition, Hiers wanted to use a low pressure irrigation system because of its energy saving features. In order to achieve these goals, Collier Enterprises invested a premium of approximately $500,000 more than a freshwater irrigation system would have cost. The TOCGC system cost $1.7 million while a typical system at a comparable course would cost $1.2 million in Florida but $1.6 million in water-restricted areas like Arizona. By using about 2700 sprinkler heads as opposed to the average of 800-1200 for a comparable quality course, the system could deliver brackish water only in the envelope of the turf area and out of the fresh-water-requiring native plants.

Hiers believed that by using sustainable practices he saved enough money in operating costs to offset the higher initial irrigation system costs. The most immediate and long-lasting benefit was not having to pay for irrigation water. Hiers conservatively estimated that TOCGC saved $35,000 a year compared to a typical golf course of equal quality which used water from on-site wells or effluent (gray) water provided by a local water utility.

Additional savings were realized by the reduced need for electricity to operate the water pumps and by installing a system with an expected five- to eight-year longer lifespan than the 20-year lifespan of typical golf course irrigation systems. On a similar upscale golf

[5] T. Hiers (personal communication April 14, 2004)

course in south Florida the electric bill for operating the water pumps ranged from $1,000 to $1,700/month. The TOCGC bill was approximately $600/month or less. Using $1,100/month as average cost for other courses, TOCGC saved $6,000/year in electricity by using variable frequency drive (VFD) pumps and watering in the six-hour off-peak electrical demand time from midnight until 6 AM. This was historically the time of lowest wind speed in Naples, meaning that the turf areas received better coverage from watering in the short window of off-peak hours. Using larger-than-normal pipes and VFD pumps reduced water pressure in the system, eliminating air hammer, a condition that degraded most irrigation systems, but did not lower the pressure enough to affect water delivery by the sprinkler heads.

When Hiers and AI developed the brackish water irrigation concept, outside vendors like Toro had to test out stainless steel prototypes of pumps and fittings that would not corrode in the salty and mineral-laden water. Once again, Hiers and AI had found the right people with the willingness to work on innovative solutions to the site's constraints.

While the focus of the irrigation system was to deliver brackish water where it was needed and keep it out of the areas where the water could have caused damage, the system also minimized the amount of watering and hence the opportunity for polluted runoff to reach the Cocohatchee River. This provided added assurance to the SFWMD that the golf course had met the permit requirements for hydrology and water quality.

Engineering solutions were available to solve the water quality and hydrological concerns of the permitting agencies. Protective berms were designed and placed to divert potential surface runoff away from the mangrove buffer and the Cocohatchee River. Eleven water management lakes incorporated into the golf course design were built for the purpose of retaining rainfall on the golf course and the drainage from Naples Park. Lake design also allowed for the use of natural filtration to maintain pollutant discharge at or below permitted levels. Monitoring of water quality and quantity was required as part of the permit requirements and by AI.

Native Habitats

Another permitting issue for TOCGC imposed by the Florida Game and Fresh Water Fish Commission was to preserve existing native habitat for the gopher tortoise, a state-listed threatened species that was present on the site. Permit conditions required preserving 45.6 acres of native habitat. The course design created 70 acres of native habitat. This offered the further intangible benefit of creating new habitat and an enhanced food source for wildlife including the gopher tortoise. The outcome of adding more native habitat than the permit required, Hiers said, was an increase in the gopher tortoise population. Similar results occurred for other species such as the pileated woodpecker.[6]

Hiers and AI had exceeded permit requirements by choice to enhance the environment of the site in order to support wildlife and biodiversity while simultaneously reducing the cost of maintaining the larger turf grass areas typical of traditional courses. The decision was incorporated into the design of the course as the team and Tom Fazio worked on each hole's aesthetics and play. On holes where the architect wanted more turf area, a

[6] T. Hiers (personal communication April 14, 2004)

compromise was reached to reduce native plants on the right-hand side of the hole where golfers typically sliced balls and to increase the use of native plants on the left hand side of the hole. This achieved Fazio's goal of making it easier to retrieve balls hit out of play.

EXHIBIT 3: Native habitats joined by a planted corridor.

Other Operational Considerations

TOCGC realized other real-dollar savings in operating costs and an intangible benefit that, while not readily quantifiable, probably would save CE money in the future. From the combination of having less turf grass area to fertilize and using a water delivery system that minimized loss of nutrients in run-off, Hiers estimated an annual savings of $20,000/year on nitrogen, the most expensive component of fertilizer. Similarly, Hiers realized savings on pesticide costs. The majority of pesticide applications focused on the greens surfaces which comprised approximately 2% of the total turf grass acreage on the golf course and were only treated as needed. TOCGC spent less than $40,000 annually on pesticides, while a golf course of comparable quality typically spent $60,000 to $80,000 per year on pesticides.

A significant intangible benefit came from using brackish water. Because brackish water use was not regulated by the SFWMD, TOCGC could continue watering during mandatory water restrictions imposed by the SFWMD. The District had increasingly issued water restrictions in southwest Florida. Rapid growth of the area had strained the region's shallow aquifers, the source of much of southwest Florida's water. Until new sources of water could be developed, the region faced periodic water shortages.

Water shortages resulted in dramatic increases in the cost of operation for golf courses. Additional operating costs included increased costs for fertilizer and pesticides to help drought-weakened turf grass recover after water restrictions were eased, increased watering costs including the electricity necessary to pump and deliver the water and, in worst-case drought conditions, replacement of dead turf grass.

Design Elements

The design of TOCGC was intentionally sustainable. However, as Tim Hiers pointed out, the learning curve at TOCGC was more in the integration of existing knowledge than in the creation of new knowledge.[7] For example, the VFD pumps had been on the market about two decades. The irrigation system knowledge had been developed and tested in areas like California and Arizona which had experienced severe water shortages and restrictions. Seashore Paspalum, the salt-tolerant turf grass used by TOCGC, was used in a competition course known for speedy greens in Argentina. However, none of the components had been brought together in an integrated fashion prior to the development of the Naples course.

Partnering with AI in the Audubon Signature Program provided the starting point and the knowledge base that guided the comprehensive planning necessary to design and execute

[7] T. Hiers (personal communication April 12, 2004)

a sustainable course. Hiers explained that the team approach AI employed was one he had experienced at Collier's Reserve. The TOCGC project had built upon the trust and working relationships established in the Collier's Reserve project. In that project and the TOCGC project the Collier family, Hiers himself, and AI intentionally exceeded regulatory requirements to create not only a premium membership course but also to establish new benchmarks and a statement of excellence.[8]

Many national and international visitors from the golfing industry came to see the course and learn about the integrated plant management system at TOCGC. Hiers and his staff explained how design, landscape and engineering solutions were integrated to maximize the play of the course while meeting permit requirements and minimizing the environmental impact on water, hydrology and native habitat. [9]

The golf course opened on September 28, 2001, and was the first golf course to receive AI's Gold Signature Membership. In addition to the savings associated with water and water delivery, pesticides and nitrogen, Hiers' decision to use native plants in most out-of-play areas ultimately resulted in 70 acres of the golf course rarely needing water, fertilizer or pesticides.

CONCLUSION

Hiers had to solve two interconnected problems in working to build the Old Collier Golf Club. His orders were to create a golf course with the "Old Florida" feel by making the site look as natural as possible. This problem was compounded by the fact that there was no readily available source of gray water for irrigating the turf grass. The solution, a boldly innovative move, was to use two strains of Seashore Paspalum, a grass that could be watered with brackish water. It also required developing a landscape program that utilized native plants that could survive without irrigation and chemicals while it provided for the superior play aesthetics expected of a premium-membership course.

Hiers' other challenge was to build the course within the parameters set by the environmental and water use permitting programs. He had to adhere to all permit conditions imposed by law. With the assistance of Audubon International, Hiers was able to blend the two tasks and create a golf course and environmental management plan that exceeded the permit conditions, created the "Old Florida" look and was highly sustainable.

[8] T. Hiers (personal communication May 18,2004)
[9] T. Hiers (personal communication April 14, 2004)

EXHIBIT 1
THE OLD COLLIER GOLF CLUB
AERIAL VIEW OF DRAINAGE, RIVER AND WETLANDS PRIOR TO CONSTRUCTION

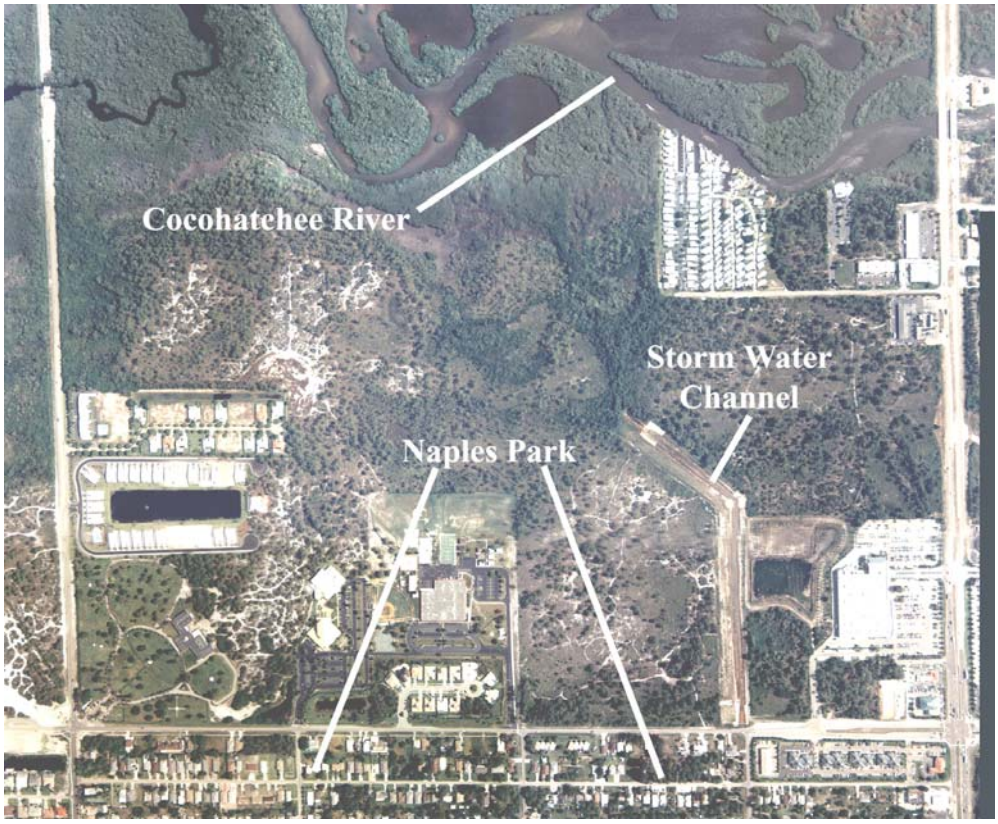

EXHIBIT 2
THE OLD COLLIER GOLF CLUB
GREENS AND NATIVE PLANTS

EXHIBIT 3
THE OLD COLLIER GOLF CLUB
NATIVE HABITATS JOINED BY A PLANTED CORRIDOR

EXHIBIT 4
THE OLD COLLIER GOLF CLUB
FINISHED COURSE

THE OLD COLLIER GOLF CLUB
TEACHING NOTE

OPENING PARAGRAPH

In 1998 Collier Enterprises (CE) gave Tim Hiers, golf course manager at Collier's Reserve, the mission to develop a premium-membership, stand-alone, private golf course featuring an "Old Florida" landscape on property already owned by the company. The land was within an environmentally sensitive watershed, had experienced intermittent water restrictions and despite this was under intense development pressure. In addition, there was no readily available source of fresh water for irrigation of the golf course.

TEACHING OBJECTIVES

This case is designed for use in an upper-level management class where the typical adult learner has some team leadership and supervisory experience. Most learners at this stage in their careers are unlikely to have extensive experience with either gauging the environmental impact of decisions or understanding integrated approaches to project management that involve managing multiple experts inside and outside the corporation. However, they do understand that success in a high-stakes, high-visibility project can impact a career.

The learning this case encourages can be focused not only on the student's ability to articulate environmental management and sustainable practices in a corporate decision-making framework but also on what approaches can be carried back to the student's organization- The theoretical concepts in upper-level management courses often focus on decision making and strategies in team or project situations under resource constraints. This case allows students to evaluate a high-stakes, high-visibility strategic decision in a team-run project under severe constraints. The case may also be appropriate for an introductory course in environmental management where students are making career changes and have limited exposure to environmental concepts.

The case is easily analyzed since the problem and key decision maker's solution are provided with no extraneous materials to sift. The conceptual aspects of integrated plant management will provide a challenge to those just beginning to manage teams and processes or those with little exposure to environmental and sustainability concepts. The risk surrounding the decision should interest students whose career paths are preparing them to assume positions of real power. Students should evaluate the decision that has already been made as well as the appropriateness of the decision criteria. Students should generate and consider other approaches that could have been taken and other valid decision criteria that could have been applied. Students may then offer alternative solutions and develop action and implementation plans.

The case is lean and clearly organized so that students will have time to consider the conceptual issues they encounter as well as spend time getting acquainted with the basic environmental and sustainability concepts that lead to a triple bottom line.

IMMEDIATE ISSUE

How best to proceed with the project to build a golf course without a fresh water supply. Hiers had to decide how best to proceed with the project despite the high degree of uncertainty and ambiguity associated with it.

BASIC ISSUES

1. Decide on the best approach to develop the necessary knowledge base and increase the likelihood of successfully innovating solutions to the project's constraints.
2. Decide on the approach that would integrate the different missions and constraints of stakeholders (CE, Collier family, regulators, AI, prospective members.)
3. Develop the framework and relationships necessary for integrating specializations.
4. Find and act on knowledge within budget and regulatory constraints.

SUGGESTED STUDENT ASSIGNMENT

1. If you were Tim Hiers would you have accepted the challenge to design and build The Old Collier Golf Club? Why or why not?
2. Do you agree with Tim's handling of the decision making? What would you do differently if you were Tim?

CASE ANALYSIS

Quantitative

Comment [i1]: These questions are designed to help the learner articulate what can be used in terms of sustainability and environmental details as well as what can be transported into a broader business arena in regard to thought process.

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Learners will usually try to organize the environmental management information in the case to measure cost effectiveness. Their quantitative assessment should produce results similar to the material presented below in Table 1. The table can be used on the board as a way of helping students organize the quantitative material.

COSTS	**TOCGC Savings Per Year Over Comparable Course**
Irrigation system—One time expense	**None on purchase ($500,000 over purchase price of traditional system)**
Life of system	**5-8 years extended life over traditional system**
Electrical	**$6,000/yr**
Nitrogen	**$20,000/yr**
Pesticides	**$20,000**
Water	**$35,000**
TOTAL YEARLY OPS EXPENSE SAVINGS	**$81,000**

Table 1. Cost efficiencies comparing TOCGC and comparable quality course.

Learners can then calculate the payback period and present value as follows:

Payback Period = $\frac{\text{Initial Investment}}{\text{Annual Benefits}} = \frac{\$500{,}00}{\$81{,}000} = 6.17$ years

Net Present Value= (Cash flow X Present value factor) – Investment Amount
= (81,000 X 7.843) – 500,000
= (135,283)

The calculations assume the water, electrical, nitrogen and pesticide savings are attributable to the irrigation system and that the system will meet these savings annually over 25 years at a discount rate of 12%. The weighted cost of capital cannot be determined from the case. Note that these calculations will disappoint students and the instructor will need to point out that the NPV of the irrigation system was considered a cost of doing business. However, the brackish water this irrigation system tolerated meant that the course could be watered even under severe water restrictions, thus increasing savings attributable to the system from turf that did not need replacement. In the end, CE was primarily interested in the quality of the course attracting members who could pay premium membership fees and in the environmental statement the course would make.

Qualitative

Learners will determine that while there are savings in monthly operating costs, the savings are not the primary benefit to Hiers' approach. The other benefits include: (1) stream of annual premium membership fees based on the uniqueness of the course, (2) improved native habitat for endangered and at risk species that enhances the members' experience and sense of exclusivity, (3) a worldwide learning laboratory where others can come and take back new approaches that will, in turn, improve livability and biodiversity at other sites that also appeal to the market segment for this course.

The decision sequence in the case will intrigue learners who are new to environmental and sustainability issues. Their understandings in discussion should mirror the sequence in Table 2 below. The sequence presents how increased knowledge aided Hiers in addressing what at first appeared to be insurmountable obstacles but did not reduce the ambiguity and risk associated with the decisions and project. However, each decision that Hiers made increased the ability to innovate solutions. These are high-stakes and high-visibility decisions that without an integrated approach and commitment from CE would not minimize the risk of the project. The decision analysis heightens the focus on the strategic importance of integrated plant management applied in a team approach because it looks at Hiers' decision criteria as well as how the implications of decisions accumulate over time.

	Hier's Decision	Student Alternatives
Decision	***Partner with AI at Gold Level***	
Criteria	Must be source of knowledge and experts capable of innovation and working with Hiers, CE and regulators	
Benefit	Provides mission integration; Proactive regulatory approach that meets dual missions: conservation of the watershed and a unique, premium course; Builds on similar concerns between AI and regulators on conservation of watershed, thereby decreasing time in permitting and saving money; Improves approach to premium market and image; Builds on previous team experience at Collier's Reserve thereby decreasing Hier's learning curve working with AI; Provides experience with Integrated Plant Management and planning that tie to Collier family desires for the course.	
Risk	Sets up tension between watershed conservation and course design; Increased ambiguity and cost because Hiers needed to manage team innovations and solutions that exceed permit requirements as a condition of Gold Level Membership	
Decision	***Select Seashore Paspalum***	
Criteria	Must withstand brackish water and look as well as play comparably to traditional turf choices	
Benefit	Survived on brackish water that is available on site; Eliminated gray water permit obstacle	
Risk	Increased design and team challenge because the grass was untested in subtropical climate for viability, playability and look	
Decision	***Reduce Turf Area***	
Criteria	Reduce pollutant discharge from pesticides and treatments and reduce monthly operating costs including applications and electricity.	
Benefit	Increased aesthetics of native habitat; Reduced pollutant discharge issues	
Risk	Involved cost of team time spent in reaching consensus hole by hole regarding aesthetics & play; unproven look to the course that, in turn, could affect marketing to a premium segment..	
Decision	***Resolve Permit Issues***	
Criteria	Get through permitting as quickly as possible to reduce cost that is traditionally associated with construction delay.	
Benefit	AI's approach to grass and reduced turf improved sensitive watershed area in terms of water, hydrology, and native habitat, reducing time in regulatory compliance process	
Risk	Increased design challenge and marketing risk	
Decision	***Select Irrigation System***	
Criteria	System must withstand salt and programmable controls to keep brackish water off native plants while being cost effective to run and preferably taking advantage of the pattern of rain in Southwest Florida.	
Benefit	Longer life of system; lower electric costs to run system.	
Risk	Increased risk as integrated system is untested; Larger initial investment	

Table 2. Decision Sequence and Benefit/Risk Assessment at TOCGC

Instructors may want to use the format and content of this table for the basis of an interactive board display, focusing first on Hiers' decisions and, then, student alternatives.

Assessment

Alternatives to Hiers' decision usually include the following: (1) refuse the project because of the regulatory/water constraints and lack of knowledge about how to develop the course and let the land stay open which also serves an environmental goal, (2) suggest and lobby for another residential golf and residential community like Collier's Reserve because the core competencies are in place and the management as well as profitability issues are understood and (3) accept the project only after making sure the employer is committed financially and strategically to creating a one-of-a-kind golf course.

Discussions on alternative action and implementation plans could be defined that run the gamut from selling the land, improving the open space as a passive-use sanctuary for the Florida Gopher tortoise or some kind of botanical site. Decision criteria for the alternative actions and implementation plans usually center on how to deal with the water constraints, core competencies, best use of the land, lost opportunity, image and cost issues.

Learners may want to review the decision to apply for the Gold Membership rather than two other categories of membership in the AI Sanctuary Program. Discussion can focus on the perceived marketing benefits to TOCGC with the Gold Membership. Average costs and lists of courses participating at the various membership levels are available at the AI website.

Additionally, Hiers' project management and team skills will be discussed in terms of the learner's own career concerns and experiences. Often learners wish to discuss how to identify the best outside help, how to sell the idea of using outside experts to their organizations, and how to stay strategically focused on the mission without losing sight of critical details, costs and time constraints.

Discussion

TOCGC did not have access to gray water (treated effluent water from a water treatment plant) use to the extent required for the irrigation of a golf course, thus eliminating traditional watering and maintenance practices from inclusion in the course plan. Further, the course was bounded on one side by the Cocohatchee River, an Outstanding Florida Water (OFW). This state designation affords such a water body special protection including a provision which states that there can be no degradation of existing water quality beyond the existing levels. This had an impact on the amount, types and methods of application of traditional pesticides and fertilizers (the concern being the release of traditional products which have a high nitrogen or phosphorus content). Finally, the golf course could not increase or impede storm water run-off from the neighborhood to the south of the site, Naples Park.

The lack of gray water and the inability to manage the course according to traditional practices required Hiers to innovate. In order to complete the mission set by Collier Enterprises (CE) Hiers partnered with Audubon International (AI). AI required Hiers and CE to exceed permitting requirements in order to enhance the environment of the course. The partnership impacted the selection of grass and the size of the area dedicated to turf.

Those decisions in turn impacted the choice of products as well as systems used to maintain turf for growth and protection from pests.

At the beginning of the course project, neither AI nor Hiers knew how and where regulatory requirements would be exceeded. However, as the plan developed, opportunities were identified as the team developed responses to the severe constraints facing the project. Restrictions on water resources, habitat and aesthetic requirements spurred innovation much like restrictions and constraints spur innovation with entrepreneurs. The opportunities presented risks that needed to be assessed and met. For example, the area devoted to natural habitat was increased, thereby improving the environment while benefiting CE's operating budget through cost savings. However, increasing native habitat affected the design of the course, requiring further team work and innovation to work out placement of native plants that would improve play but still build natural corridors.

CONCLUSION

To wrap up the case discussion, the authors suggest asking this final question to foster reflection and action: *What learning can you take from this case that would be transportable to your industry?*

Portable learning would include the following concepts:

1. *Alignment of values in project planning and execution.* The Collier family vision of preserving a native Florida landscape around a golf course led to a new standard in sustainability through the alignment of values from the conceptual to the maintenance stage of the finished project. The family's leadership and financial commitment were clear throughout the design and building of the golf course. AI's approach to building a team in which a variety of discrete missions are integrated into one of mutual advantage to the parties and the human and natural communities aligns decision-making criteria throughout a project.
2. *Team leadership*. Hiers and AI created a knowledge-driven team of specialists who worked toward the CE mission, bringing together architects, designers, engineering and product specialists. Ultimately the CE mission served the AI mission: e.g. preservation of the sensitive watershed—while AI served the CE mission of building an Old Florida landscape around a world class golf course.
3. *Integrated project planning and integrated plant management*. Environmental values may drive the vision of a project; but unless the values are incorporated in each detail of the planning process, gathering and incorporating the newest information, the project will be neither sustainable nor cost effective because the project elements will not be integrated into a cohesive environmentally and operationally cost efficient system.
4. *Collaboration with third parties for knowledge management*. While Hiers indicated that pieces of the knowledge needed to create TOCGC had been available for as long as two decades, he needed to connect to the right clearing house of knowledge (AI) to begin accessing the information. Further, while pieces of solutions were available, none had been integrated as they would have to be at TOCGC. Thus, assessing opportunities and risks fell to AI, the team and Hiers.

Knowledge and the commitment of team members to solve problems and Collier family support were the only tools available to meet the mission.

5. *Resource assessment and allocation under conditions of constraint*. The site for this golf course presented an extreme case of resource constraints; however, the ability to see the resources in new ways: e.g. use brackish water instead of grey water—created an atmosphere conducive to innovation and learning that positively impacted the design and execution of what was in essence an adaptive strategy.
6. *Use of infrastructure to reduce resource usage*. Managers need to understand the important relationship of infrastructure and resource usage whether on a golf course or in a manufacturing plant or an office building. In this case, managers may take away an ability to drill into details and seek alternatives that can be assessed for tangible and intangible benefits.
7. *Conceptual design approaches and considerations*. This case involved multiple specialists in design, each with priorities and specialties. For example, the course had to be fun to play; the greens had to have speed. At the same time, the plants that conveyed an old Florida feel could not interfere with the game. Students may take away concepts of how to blend specialties in design and how to manage the process from conception to execution through a collaborative model using teams.

Instructors should note that the focus of the learning will likely change depending on the background of the learners and the focus of the specific class. This list above is not inclusive of all portable learning but instead provides a starting point to help guide class discussion.

THE OLD COLLIER GOLF CLUB
TECHNICAL NOTE
ENVIRONMENTAL CONCEPTS

Comment [k2]: OK

If you have a limited background in environmental science, you may not realize that this field of study views sustainability as more than saving a business money by implementing measures that improve the bottom line and happen to be good for the environment. Environmental science considers sustainability a state where all species on the planet, especially humans, are living and interacting with the environment rather than trying to dominate and control it. The fundamentals of environmental science described in this section describe two principles that are taught in introductory environmental science classes. Together they provide an introduction to sustainability from an environmental perspective and show that a link does exist between the way businesses and environmental science view sustainability. As you read this, think about the benefits of employing sustainable business practices, and then go outside your comfort zone and consider how sustainable business decisions can have broader, global impacts for the environment.

For much of recorded human history, society has believed the earth had unlimited natural resources and that supplies of everything were inexhaustible. Additionally, the exponentially growing population was viewed in terms of its economic potential and not the potential impact it would have on our natural resources. This mindset has led to the current state of affairs in which the majority of people and businesses are not aware of the need to conserve resources and do not make the connection between conservation of natural resources and the economic benefits to be gained by implementing sustainable businesses practices.

There are two fundamental elements of environmental science that, once understood, can be appreciated for their profound impacts on the business world. The first is the concept of carrying capacity. In every ecosystem, there is a limit on how many individuals of a given species can live indefinitely within a given space at a given time. That number is referred to as the carrying capacity, symbolized by the letter K. Carrying capacity, while a fixed number, is only fixed so long as nothing in the system changes. In an ecosystem however, change is constant and thus the potential to change K is always present. When the conditions within an ecosystem change, the carrying capacity for each species may change depending on the type and duration of the change and the ability of the species to adapt to or resist the change.

Comment [k3]: Please do not change

The second fundamental has to do with matter. The Law of the Conservation of Matter says that while we can change elements and compounds (composed of atoms, the building blocks of matter) from one form to another, we can neither create nor destroy matter. For example, all the carbon atoms that exist on this planet today were here a million years ago and will still be here in another million years. But, the matter in which one finds these atoms today will be different from how the atoms were 300 years ago and how they will be 300 years from now.

Comment [k4]: OK to delete comma

In fact, this is the basis for the global warming issue. Prior to the advent of extracting and burning fossil fuels (they contain many carbon atoms), most of the carbon atoms were underground in oil and coal deposits. Once we removed them from these long term

storage sites and burned them to obtain the energy stored in these compounds, the carbon atoms did not go away. They moved from the oil and coal into the atmosphere where their gradual accumulation changed the proportions of carbon dioxide gas in the atmosphere and initiated the problem we now identify as global warming.

The fact that every element has a finite supply is, in itself, not inherently problematic. The issue is how we determine how to use this finite supply. If there were ways to close the loop (closing the loop in the manufacturing process) on the use of elements and use the atoms over and over, the supply should be indefinite. One of the great success stories of this is the recycling of aluminum cans. Aluminum is an element and there is a finite amount of it on the planet. But, there is an extensive system for recycling aluminum in place that significantly closes the manufacturing loop and slows the extraction of new aluminum ore from the ground.

Comment [k5]: that significantly closes the manufacturing loop and slows the …..

The use of phosphorus, a critical nutrient for plants is an example of how the one-way flow of a resource has resulted in problems for many species. It is an example of the ecological concept, "everything is connected." Most of the phosphorus on earth is in long term storage as phosphate rock. Through the process of erosion small amounts of this essential plant nutrient are released and made available for plants.

Comment [k6]: it is important to emphasize this a one ay flow, do not delelte

Humans have accelerated the natural cycling of this element by extracting massive quantities of phosphate-containing rock and converting it into phosphates for the fertilizer industry. Over the decades that this fertilizer has been applied to the land, often too much is used and some of the excess phosphate not taken up by crops has been flushed by rains into rivers and ultimately transported to the coastal waters.

Comment [k7]: do not change, technically correct as written

Because phosphorus is an essential nutrient for the growth of plants, the presence of phosphorus in near shore waters, at levels higher than normal, creates the opportunity for rapid growth of algae. Under the right conditions the algae will multiply repeatedly, much faster than they would if the excess phosphorus (considered pollution when present in excess) was not present. The results are algae blooms which have been known to cause fish kills and the death of other marine life. Presently there is no way to capture excess phosphorus in the water so the emphasis is on preventing it from entering the water at the places where it is first applied.

Comment [k8]: OK

Taking the concepts of a carrying capacity and the idea that we are not sustainably managing many resources known to have a finite supply, the concern that we are not creating environmental sustainability is easy to understand.

It is also easy to see that there is a real potential for more problems to develop if the human population continues to increase. With each new life, the amount of our finite resources must either be split among a growing pool of people or some must do without so that others don't have to give up any of what they have.

It is in this vein of thinking that you can begin to appreciate Hiers' efforts to bring sustainability to TOCGC. As the case demonstrates, Collier Enterprises is saving money through implementation of the sustainable practices. These savings are more than just direct monetary benefits to the company. By reducing the use of fertilizer, Hiers saves money because he does not have to spend as much on fertilizer costs. From an

ecologically sustainable view, the less nitrogen and phosphorous he uses, the less of these finite resources are taken from long term storage sites and possibly released into the environment where they can contribute to pollution problems and algae blooms. Also, by using energy efficient pumps that use less electricity, the power company can burn less fuel. Indirectly, and in an admittedly miniscule way, there is less carbon dioxide being released into the atmosphere than if he was using less energy efficient pumps. But, every bit helps.

These are real cost savings to the company but the small differences to the environment are difficult to quantify and appreciate. Businesses can quantify cost savings but they are often totally unaware of the added environmental benefits to society they are creating since these benefits are not realized or documented in the company's bottom line.

However, the cumulative impact of all businesses adopting the kinds of sustainable practices used at TOCGC would be substantial from an environmental and economic perspective. Furthermore, in a sustainable society, the theory is that businesses would have to pay less for environmental permits and some taxes since these funds are typically assessed to pay for the cost of pollution to society. If there is less pollution, the theory says, there should be less cost associated with pollution prevention and clean up.

To learn more, read one of the basic texts on environmental science and expand on the ideas of carrying capacity, the law of conservation of matter and other basic principles of environmental science. You may also want to take a course in environmental management or a basic environmental science class to learn more about how the living world interacts with and depends on the environment.