Around urban areas, chemical pollutants are absorbed and detoxified by green plants. Turf and trees also serve as effective "dust traps." No. 4 hole at Montammy Golf Club, New Jersey.

Golf Courses and The Environment

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MEMBERS OF THE general public, watching golf, whether on television or at tournament sites, must think that golf courses receive substantial support from the environmentalists. Golf course architects, however, know this simply is not true and that we are becoming more and more ensnared in environmental problems.

In the late 1960s and early 1970s, environmentalism became the new watchword. Many conditions affecting the environment and our health needed correction; hence, the laws to clean up our air, streams, etc. were enacted to protect health. Along with this movement, many naturalists and wildlife advocates became active to protect their special interests.

In his new book, *Environment, Technology, and Health*, Dr. Meril Eisenbud states that many divergent views of opposing environmental objections have been due, in part, to misinformation and misrepresentation of facts. He also states that, because of inaccurate, emotional and misleading coverage of environmental issues by the news media, and as a result of the political clout of single-issue advocacy groups, opinions concerning environmental issues are very far apart. According to Dr. Eisenbud, polarization has developed hand-in-hand with politicization, and together they have often prevented programs of environmental protection from evolving rationally.

As a result of regulations advocated by various environmental agencies, conflicts exist between different legitimate and quasi-environmental groups over what constitutes desirable environmental objectives.

As dedicated and professional environmentalists, we consider golf course development an improvement of man's

habitat; because of the many regulations however, the creation of a golf course meets potential pitfalls. For example, the regulations designed to improve or to reduce air pollution can result in actions which are self-defeating. Consider, for example, the clearing and grubbing operation in the early stages of golf course construction. In Massachusetts a few years ago, the State Office of Environmental Affairs issued regulations that prevented any outdoor burning of trees, brush and leaves; however, the regulations permitted the use of huge diesel-powered chippers which spewed out their noxious pollutants, contaminating the air to a much greater degree. At the same time, this chipping operation greatly increased construction costs. Because of problems encountered in the new wave of environmentalism, we should present our views, along with supporting evidence to back up our contention that golf courses, on balance, benefit man's habitat.

LET US EXAMINE golf course construction to determine how it affects the environment. In clearing and grubbing, often fifty percent or more of the area has to be cleared of trees to provide for the golf course area. Certain beneficial effects may result from this clearing. Of the wooded areas remaining between the fairways and other areas, there will be a certain amount of selective thinning and pruning. The remaining trees — the healthy ones — would grow faster. The removal of dead and fallen trees, along with slash and dense undergrowth, would reduce the tree disease. Much of the wooded area in the country has been previously cut over, and has never been properly managed. These areas would now come under the supervision of the golf course superintendent. The fairways, themselves, could act as firebreaks, helping to prevent fire damage to the entire area. The cleared areas rarely used by the general public, would then be available for golfers, cross-country skiers, joggers and others, and would result in greater appreciation and enthusiasm for the natural environment. The open spaces would encourage an increase in the population of the type of wildlife that prefers this type of habitat. In opposition to this, those species of plant and animal life that prefer the dense undergrowth characteristic of unmanaged wooded areas would be adversely affected. The overall environmental effect, however, would be no less desirable than in the original site.

Another essential operation in the development of a golf course is the cutting and filling operation. It is necessary to change existing contours to develop landforms inherent in the nature of the game such as greens, tees, fairway bunkers, etc. In altering the upland contours, it is necessary to reduce steep grades and abrupt slopes to meet conditions suitable for the game. Upland contours are altered so that water-holding pockets are eliminated and also to produce adequate surface drainage. Producing more gradual sloping will reduce the effects of erosion, increase the visibility of the target areas, thereby increasing the safety of the golfers, allowing for greater ease of maintenance. In any construction there are always some short-term detrimental effects. There may be a temporary change in the water table, and ground water aquifers may be

Grass provides oxygen, acts as an enormous air conditioner and beautifies the environment. No. 13 hole at Knickerbocker Country Club, New Jersey.

changed or relocated. During the period of construction of six months to a year, a certain amount of soil erosion may temporarily pollute streams that pass through the property. Any change in the landforms must alter the eco-system; however, it is not long before another desirable eco-system is established.

Now, we come to the use of wetlands. Wetlands have almost become sacrosanct and statutes have been passed in many states to protect them from indiscriminate use. Briefly, wetlands are defined in many statutes by the amount of standing or slowly-running water that occurs near the surface during normal growing seasons and by the species of vegetation they support. Interpretation of these statutes has been so strict sometimes, particularly on local levels, that small, isolated low areas which may hold surface drainage water and may exhibit vegetative growth characteristic of wetlands, are called wetlands. Calling some of these isolated, depressed areas wetlands is no more justified than calling a sandbox a desert. Without question, wetlands, along with uplands, perform a number of valuable functions. They help in flood control; they help to stabilize the water table; they provide a unique habitat for many plants and animals. However, in order to perform these functions, a wetland must be of considerable size.

IN CONSTRUCTING golf courses, it has been necessary and desirable sometimes to use portions of swamps, meadows or bogs. This is true for two reasons:

1. It has been relatively cheap land because it has few other commercial uses.

2. Its water can be used for irrigation, water hazards, and aesthetic values.

Constructing a golf course in a wetland of viable size does not involve using a large portion of the area; it does, however, infringe upon a part of it. Obviously, the habitat of that immediate area is altered, but it is true that it has been replaced by another desirable, though different, habitat.

There are possible detrimental effects. A change in the wetlands may destroy the breeding ground of some forms of swamplife and may temporarily disrupt the drainage of adjacent landforms. Many of the adverse effects, however, can be minimized through proper design and construction techniques. For example, much of the area that is not required for the golf course itself can be left untouched and incorporated into the overall design concept. Innisbrook, in Tarpon Springs, Florida, is a good example of this approach. Larry Packard, the golf course architect, created biological harmony between the golf course habitat and the surrounding cypress swamp.

Another area of environmental concern in golf course construction involves straightening, realigning, or relocating a stream bed. This is often necessary on a small scale because it makes more land usable and makes the relationship between the land and stream bed more suitable for a golf course. It also provides for easier and more efficient maintenance of stream bed areas.

Several beneficial effects of stream channeling:

1. An increase in the flow velocity, resulting in higher oxygen content.

2. A reduction in eutrophication.

3. A more desirable habitat for certain types of aquatic life.

Some adverse environmental effects:

1. The disruption of stream bed or banks, resulting in a temporary increase in the amount of erosion. This would be due to an increased velocity flow and the removal of erosion-controlling vegetation.

2. The removal of streamside trees, brush and other vegetation would produce higher water temperatures as a result of more sunlight, thus changing the existing ecosystem.

3. Here again, we would have the disruption of certain breeding grounds.

To the naturalist, stream channeling means miles of barren concrete-lined sluiceways. In golf course construction, we obviously have something different in mind. The purpose would be to recreate a stream in another location which would blend with the natural landforms.

We have touched on a few of the facets of golf course construction which might, to a greater or lesser degree, affect the environment. Let's now look at golf course maintenance.

TWO OF THE PRACTICES necessary for the maintenance of a golf course that provoke the ire of the avocational and quasi-environmentalists are the use of fertilizers and pesticides.

Since golf courses require large acreages of turf, it is not surprising that they use fertilizer. The problems resulting from the use of fertilizer for the production of crops is greatly minimized on golf courses for the following reasons:

1. Since golf courses are covered with a permanent crop, there is much less need for plant food on a per-acre basis than would be required for most farming operations.

2. Since turf roots absorb a high percentage of available plant food, there is significantly less migration of fertilizer contaminants, if any, into the surrounding streams and lakes.

3. Phosphorous is an ingredient in many fertilizer applications; however, it has been demonstrated that phosphorous attaches itself to the soil particles and is not redissolved in sizable amounts. It is through soil erosion that more of the phosphorous gets into water sources. Control of soil erosion with a dense, healthy turf minimizes the danger of phosphorous pollution to an insignificant level.

4. Most golf course grasses require low concentrations of phosphorous. In many instances on established golf courses, the superintendent, in his maintenance program, often uses fertilizers containing no phosphorous in order to control the proliferation of *Poa annua* —annual bluegrass.

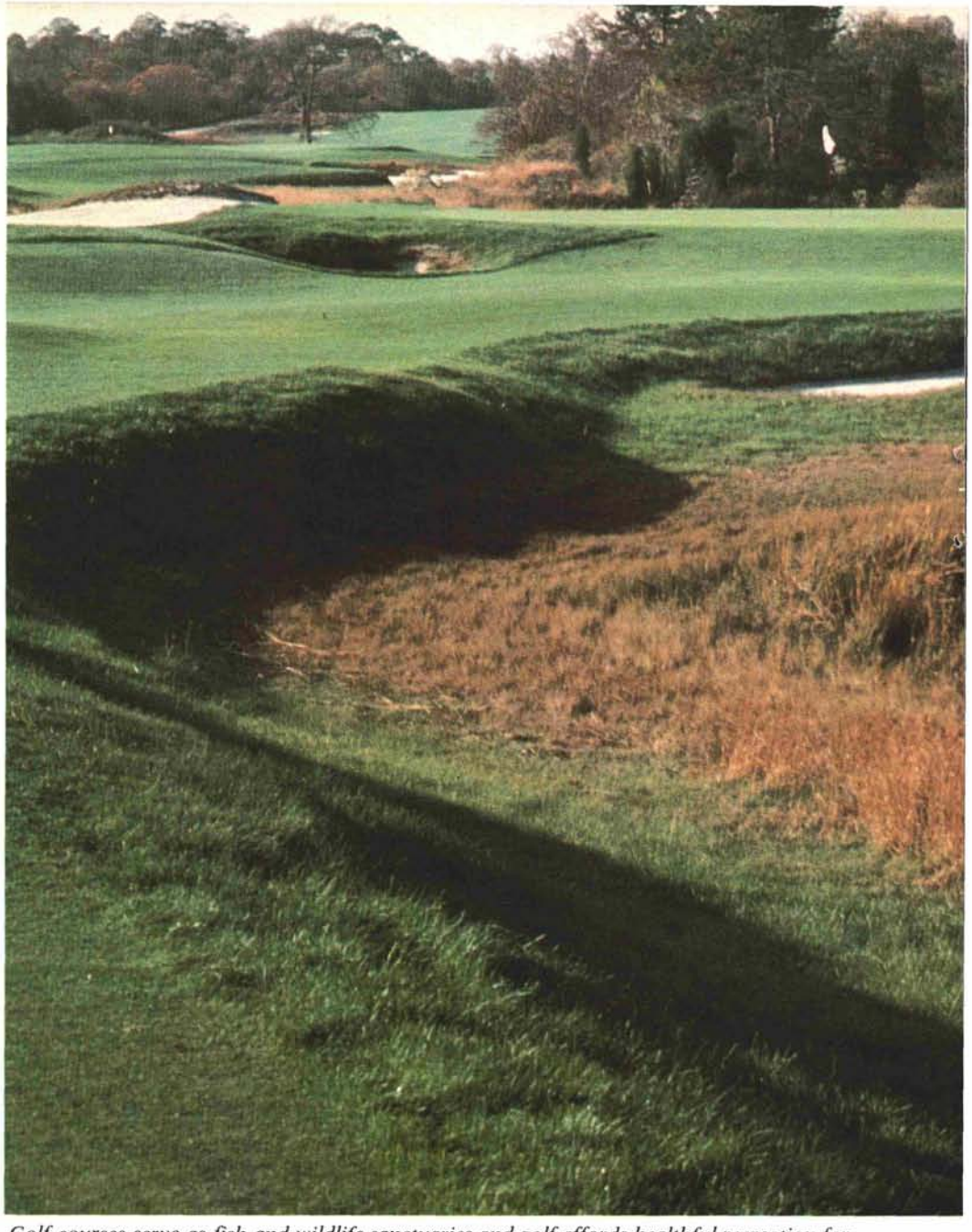
5. Nitrogen, as an ingredient in fertilizer, is used to such an extent by the active growing grass plant that very little is leached through the soil. This is due partly to a low concentration of available nitrogen and to the slow-releasing nature of fertilizer often used by golf courses.

In a recent study conducted at Texas A&M by the USGA Green Section, it was shown that where soluble forms of fertilizer, including ammonium nitrate and ammonium sulfate, were applied, high concentrations of nitrate were found in the leachate from experimental greens. These concentrations exceeded standards established by the EPA. The study also showed, however, that with proper irrigation, the use of slow-release fertilizers and proper spacing of fertilizer application, nitrate contamination of water sources could be well within EPA limits. Where greens are located close to water sources, drainage systems can be designed which will conduct the leachate away from ponds and streams so that contamination becomes almost non-existent.

Now what about the use of pesticides? A lot has been written, mostly negative, regarding pesticides. The use of pesticides is an important aid in helping to improve the quality of life. They help control many diseases of plants, animals, and humans, and they are partly responsible for making our agricultural

system the most productive in the world. The problem is with the injudicious use of these substances. Pesticides used by golf courses have both positive and negative effects. On the positive side, fungicides and insecticides are used in the turf industry to keep turf healthy and vigorous. Most fungicides used on golf courses are quickly biodegradable and don't move great distances in the soil. Since turf has great powers of absorption, pesticides applied directly to the plant area will be retained in the general area and will not be carried off by surface water drainage before it becomes non-toxic once again. Since the turf on a golf course is not consumed by range animals, there is no chance of pesticides entering the food chain, nor is there a chance for accumulative buildup of pesticides in animal tissue. Shortly after application, most herbicides begin to break down as outside forces act upon them. Through adsorption, the herbicides are attached to particles of soil until the various decomposition processes begin their work. In turf, where there is very little erosion, there is little, if any, relocation of the herbicides.

Some negative effects do result from the improper use of pesticides. Improper use of fungicides may damage turf, diminishing the beneficial effects. Misuse of herbicides may temporarily sterilize the soil, thereby preventing the germination of plants. In cases where drifting may occur, the use of certain pesticides may contaminate areas outside the target zone, resulting in possible harm to man and wildlife. In other cases, pesticides may contaminate adjacent ponds and streams and may possibly be toxic to aquatic life as well as to those animals using the water for drinking. The superintendent and his assistants can encounter health hazards through the improper handling of pesticides.



Golf courses serve as fish and wildlife sanctuaries and golf affords healthful recreation for millions of people. No. 14 hole at National Golf Links of America, Southampton, New York.

NOW, LET'S CONSIDER the positive contributions that golf course development makes to the environment. For many years golf courses have provided a pleasurable, outdoor sport and recreational activity for millions of people of all ages, and it has been a means of improving the quality of their lives.

The golf course enables millions to enjoy the wonders of their natural surroundings. Since golf courses are built on a variety of landforms, such as the links courses at the seashore, the inland courses often abutting wetlands, and the mountain and desert courses, it has enabled millions of golfers to communicate with many different ecological situations and to gain a knowledge and appreciation of these varied environments. Golf courses built in the past century have been responsible for keeping hundreds of thousands of acres in open land. Where these open lands exist near densely populated urban areas, they have produced untold benefits toward improving the quality of life.

In many communities, both private and municipal courses serve a vital social need by holding civic functions and charitable events. In smaller communities, the golf club often serves as the only social and recreational outlet for many residents and provides a social gathering point for the community. High school and college teams are invited to use the course for their interscholastic and intercollegiate matches.

During the growing season, the average 18-hole golf course of one hundred fifty acres provides enough oxygen for 10,350 people. This same acreage is responsible, too, for reducing large quantities of carbon-dioxide, produced mostly by burning fossil fuels. Around the urban areas, sulfur dioxide, ammonia, nitrogen oxide and other products can be absorbed and detoxified by green plants. Many plants are, of course, affected by pollution, as is animal life, but research indicates that turf is more tolerant of polluted air than other plants and is able to turn these

noxious pollutants into useful plant ingredients.

Turf acts as an enormous air conditioner. It purifies the air of chemical pollutants, and with grass, along with trees, is an effective dust trap. Grass and trees act to control the velocity of the airstream so that dust particles can settle out. At the same time they help to moderate the air temperature. Studies have shown that because of evapotranspiration, turf is usually 20 percent or more cooler than any pavement or artificial turf, and even five feet above the surface, the temperature is 10 degrees cooler above the turf areas. Water purification and conservation is another contribution that golf courses make to the environment. The creation of ponds and lakes for the dual purpose of enhancing the beauty and playability of the course itself, as well as supplying a source of water for irrigation, is a valuable conservation measure. Water resource is a growing concern in many parts of the country, and, therefore, any conservation from capturing excess runoff into reservoirs aids in water conservation. The use of this water, through sprinkler systems, helps in the purification, through aeration, thereby helping to restore some of the oxygen content of water.

Another water conservation method is the use of sewerage effluent by an increasing number of golf courses. Architect Bill Amick's new course, Mangrove Bay, in St. Petersburg, Florida, has the blessing and the financing of the Environmental Protection Agency for the wastewater distribution system. This subject was discussed in detail last year in Chicago at the Wastewater Conference.

IN MANY AREAS, particularly in the North, golf courses, during the winter periods, can be used for other recreational activities. A golf course is an ideal site for the increasingly popular sport of cross-country skiing. Also, other winter sports, such as ice skating, tobogganing, snow shoeing and, in a number of cases, downhill skiing, can be undertaken. During the season when the golf course is in active use, many clubs allow fishing in their ponds and

streams. In many instances jogging and hiking are popular pastimes.

GOLF COURSE DEVELOPMENT can often improve our surroundings by creating a greater use of substandard land. Many unsightly areas such as sanitary landfills, gravel pits, and strip-mined areas, can be greatly improved by the creation of a golf course. A good example of a golf course that is built on sanitary landfill is, again, Mangrove Bay. The turning of worked-out gravel pits into golf courses and recreational areas has helped to eliminate the visual pollution in a number of areas. With funds earned from gravel sales, these scars on the landscape can be eliminated. Two examples are the Wampatuck Country Club, in Canton, Massachusetts, designed by Geoff Cornish, and the Colonial Golf Club in Lynnfield, Massachusetts, designed by the late Bill Mitchell. X. G. Hassenplug has designed the Laurel Green Country Club, an executive course, on a strip-mined area in Westmoreland County, in Pennsylvania.

IN MANY PARTS OF the country, small farm holdings may not be economically feasible to continue as a farming operation, yet the landowner may wish to keep his property as open land. Converting wooded or farm land into a golf course is one desirable property use which can provide a continued income and a reasonable tax resource. However, overkill with a high tax assessment, particularly near urban centers, can discourage this type of conversion. The landowner, in order to stay solvent, sells his property to a developer of industrial, commercial or residential sites. The principle of assessing land as to its highest and best (economic) use, rather than its actual use, has been a regressive policy for farm and recreational land.

The arbitrary or frivolous opposition by zealous members of narrow-based special interest groups who want their esoteric interests protected can prevent many projects of economic benefit to mankind from going forward. Any group wishing to maintain the status quo of the open land of others because they are concerned about increased traffic flow, the possibility of a club liquor license, or the loss of their personal hunting ground has used environmental laws as their stalking horse. The resulting possibility of extended delays, numerous hearings and unnecessary planning and engineering can cause a proposed project to be abandoned to avoid this needless harrassment and unproductive costs.

In the past 10 years laws have been passed that were designed to protect and improve the environment. In urban areas, the automobiles were contaminating our air beyond reason, paper and chemical mills were polluting our lakes and rivers, and strip miners were despoiling the landscape. Our environment needed protection, thus the laws and regulations. After the legislators enacted the laws, the regulatory agencies — federal, state and local — interpreted these laws and formulated all inclusive rules and regulations. Oftentimes the regulation set standards that were based on studies and facts of doubtful validity. We know that the EPA has in the last few months revised some of these standards so that they more closely relate to reality. Golf course development has been caught in the web of these environmental requirements. The intent of the legislators was not to hamper desirable environmental projects, but the effect of bureaucratic interpretation has done just that. Usually the higher echelons of government agencies are quite sympathetic toward the use of open land for a golf course; however, the tyranny of the bureaucratic system, particularly in the lesser offices, has made golf course development difficult and, in some cases, marginal.

IT IS FUTILE FOR us to bemoan the fact that golf has been restricted in its development and operations by the current wave of environmentalism. We cannot lose this battle by default. A number of positive actions can be taken in protecting and advancing the game.

First, on the national and state levels, the various associations in the golf field should marshal their forces in a cooperative effort to influence existing and proposed legislation. This may be through a public relations effort along with some lobbying designed to benefit our field of endeavor. The purpose of these efforts should be directed toward the following:

1. To have an input in new and proposed legislation where the game's interests are involved.
2. To seek relief, exceptions, and permissible uses under existing legislation, as in the case of the farming industry, with respect to wetlands.

Second, on the local level, many superintendents, architects, and club members have appeared before conservation commissions, zoning boards, planning boards, and other local agencies on behalf of new golf course projects or existing courses. At these hearings, we should not only be able to support our projects as desirable, environmental developments, but also we should be able to document, in detail, the various implications that are involved. We should have facts and concepts that would support our contention that the project or alteration would be a desirable ecological change.

Third, we must continue to promote research into various methods and materials that will diminish any harmful effects of our construction and maintenance practices.

In short, we should pursue in an aggressive and positive manner our contention that golf benefits man's habitat and improves the quality of life.

For 1980, It's National Golf Week

Golf's annual charity program, National Golf Day, is nearing us once again, but take a second look. National Golf Day has become National Golf Week.

The 1980 campaign will have a local look and the national Round of Champions is gone. Now each club professional will conduct his own National Golf Week competition and will follow the format of his choice.

The PGA of America, which spearheads the annual drive for a host of golf charities and agencies, suggests a target contribution of $3. It will be the week of June 23rd to 30th.

One of the recipients of National Golf Day . . . err . . . National Golf Week, . . . is the USGA Green Section. Since 1952, the PGA has contributed more than $282,000 to the Green Section. This money has been used to support a number of golf turfgrass research projects and in this way the funds go back into improving conditions for the players.