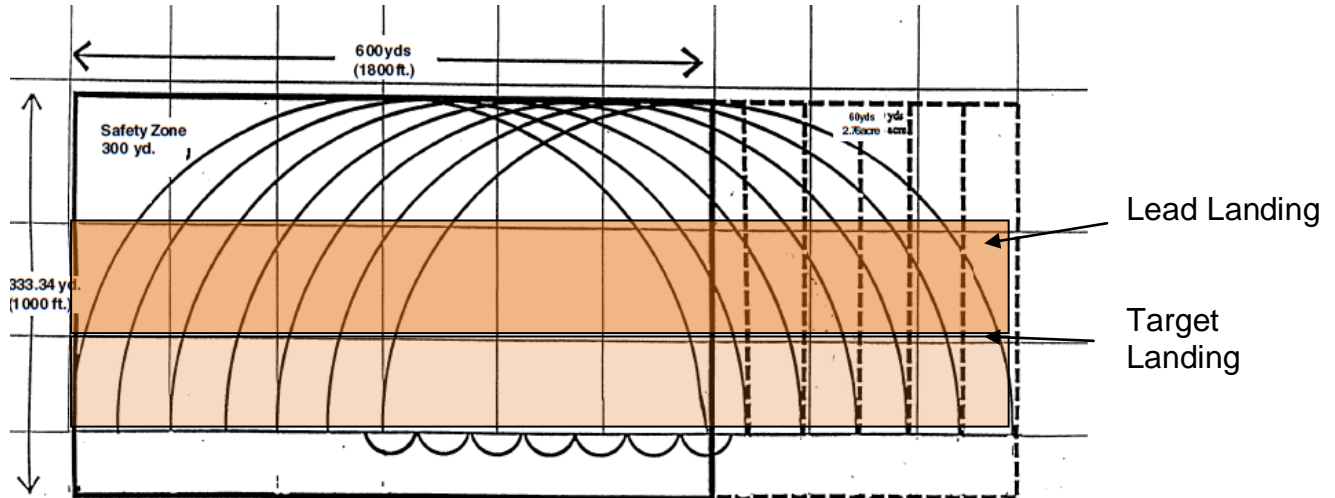


Lead Fallout Areas.

This document first explains the problem with lead-shot fall-out and the various methods shooting ranges use to limit the problems associated with clean-up.

The shot-fall from a shotgun will generally fall up to 125 yards from the firing point. Although safety distances are recognized as 300 yards, shot rarely gets to this extreme.

With regards to lead reclamation, this is a very complicated task of removing lead-shot from the ground.. For skeet and trap shooting, the “settling” area is very easy to predict as shots always go in the same direction or arc. Also, with Skeet and Trap, the shooting stations are arranged in a straight line, trying to “squeeze” in as many fields as possible.



This diagram shows multiple fields with their safety (and lead shot-fall) areas overlapping. Most of the shot will fall in darker middle area. With Skeet and trap the rules request clear, flat land to a minimum depth of 100 yards, so as not to interfere with the shooter’s path of vision. Generally, Skeet and Trap fields tend to be on smooth, clear land, usually plain “dirt or sand” with no vegetation out to 200 yards.



This range is in the desert and the target debris area is shown here (the first 60 – 75 yards). Shot fall area is beyond the target debris area to the LEFT.

There are 20 Skeet / Trap overlay fields at Ben Avery Club. You can see the target "pollution" area here



Lead shot tends to fall in this area.



For this type of club, it is very easy to prepare a lead mitigation program. As all the shot falls in a closely defined area, completely flat, free from trees, ground cover, and shrubs, recovery is an easy process.

All the Lead Mitigation / Reclamation program basically has to state, is that the land will be “mined” every two to three years. Target debris is another story, the clay birds are either destroyed into small pieces or dust when hit in the air, or they shatter when hitting the ground. As can be seen below, there appears to be no piles of broken clay targets. This is because, periodically, the club uses a tractor dragging numerous chains behind it, which pulverize the target debris. Although this is still a “pollution” area, the non-toxicity of modern clay targets makes this a lesser concern.



For the lead reclamation a company will come in periodically, every two to three years and reclaim the lead. They use an excavation machine which removes the first 6” to 8” of “dirt” and centrifugally spins the mixture and separates the lead from the dirt which is then laid back down. Generally, the removal company gives half the lead back to the club, and keeps half for itself as payment.

This process satisfies the EPA and the club can continue shooting.

If you look closely at the photograph below, you can see the track marks of a recent recovery session.



With a large club that holds State, Region and National competitions as well as a loyal following of locals, they could shoot 5,000,000 targets per year. With shotgun shells each releasing 1oz of lead per shot that equates to 156 tons of lead per year. The club can resell the shot to shooters who re-load their own shotgun shells. With reclaimed lead selling for around \$30 / 25lb bag, income from the reclaimed lead amounts to \$375,000 !!

That's fine for a Skeet or Trap club. The problems exist for Sporting Clay Clubs.

The nature of Sporting Clays is that the game should replicate the habitats of wild game and as such the target presentations should mimic the flights and behaviors of natural birds.

Teal rising from a cover, ducks coming into land, pheasants flying high from towers, or being driven across the fields, rabbits bouncing across the rough terrain, or quail zipping close to the ground. For all these situations, the Sporting Clay Course designer must use his imagination to provide an interesting and challenging course. A Sporting Clay course will have numerous stations to shoot from, each one providing a unique combination of two targets. If the land is cleared, the ambiance of the shooting is lost.

The photos below show various "densely wooded" shooting stations where widespread clearing of the ground cover and trees would totally spoil the target presentations.



Some sporting clay courses have stations organized in fields, like a corn field, or in a desert environment.



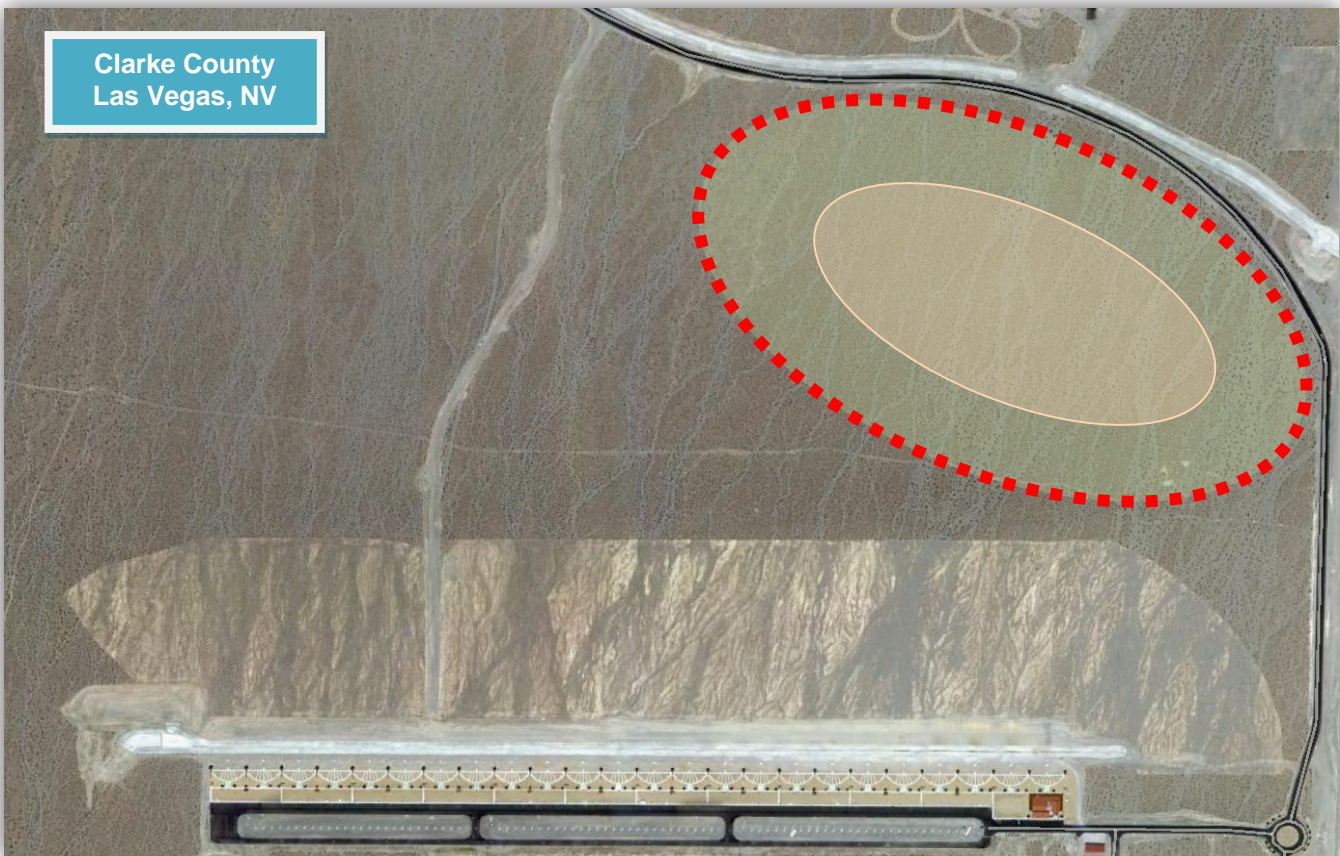
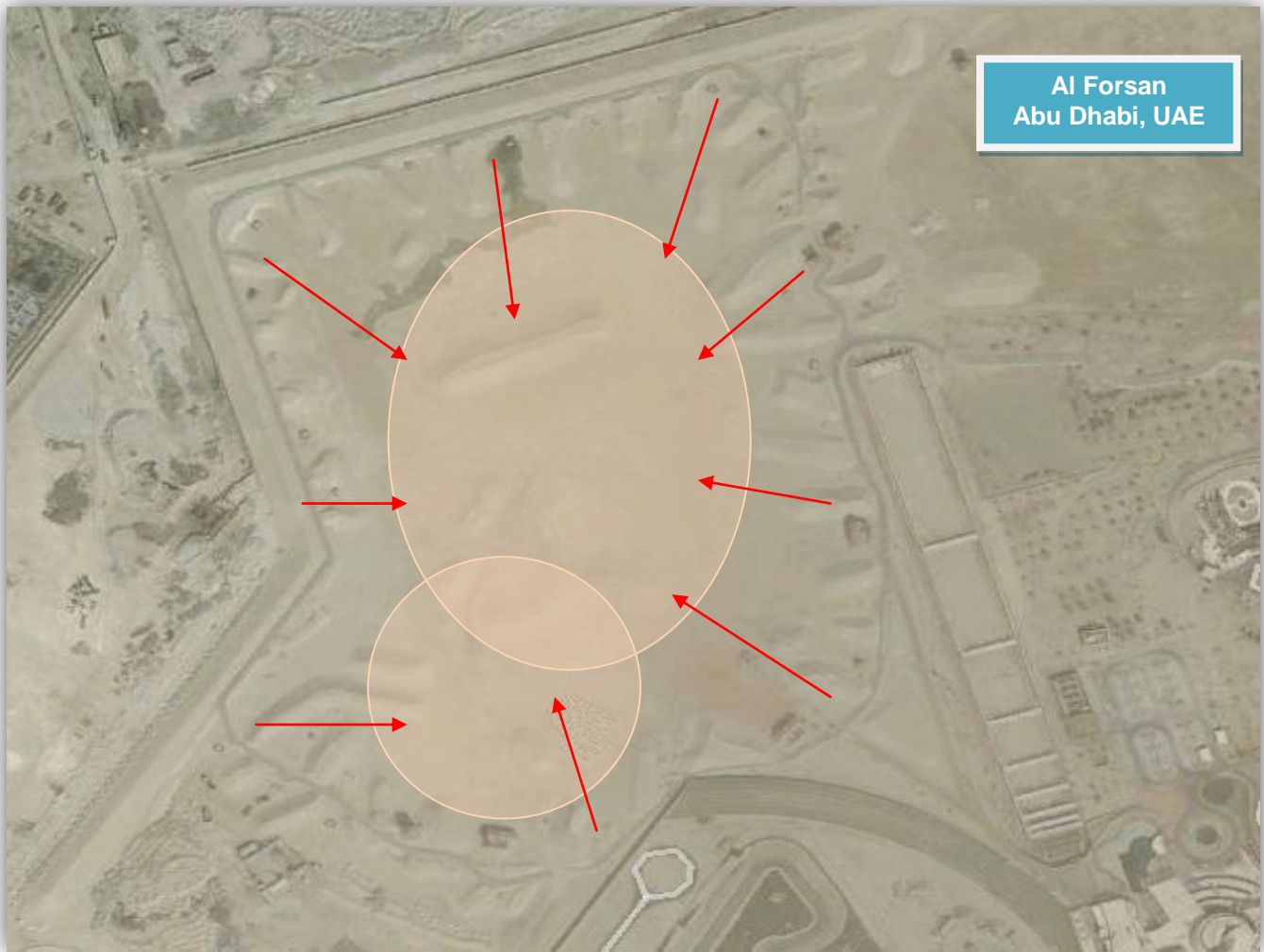
With the desert course as shown below, many stations fire in towards each other, so the shot-fall zone overlaps and the lead is “easier” to remove.



At this club in Arizona, sporting stations all fire towards the middle where the majority of lead accumulates.



The same is true for the range in Abu Dhabi and the “proposed” range in Clarke County, Las Vegas.



Lead shot collecting on the ground. This is the area beyond the target debris area. Between the grass area and the towers at the rear, is where the targets fall.



This area is where the lead shot falls and has to be re-claimed periodically.

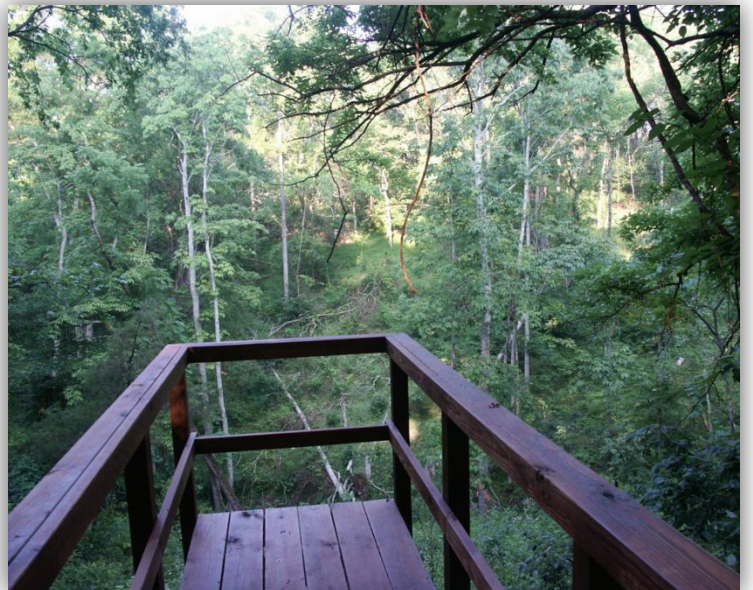


Note the phenomenon above – ants collect the shot and insulate their underground nest by forming a circle of closely arranged shot.

This is the “border” area where target debris and lead shot fall in the same area.



**So what does a “pristine” Sporting Clay Course look like after several years of shooting. Lead and targets landing in carefully designed “drop” areas.
But not EPA approved.**



**Now what does a “cleared”, easy clean-up, Sporting Clay Course look like.
EPA “approved”**



**A lot of the white “specs” are the plastic wads from inside the shotgun cartridge.
These pose their own pollution problem – see data at end of document (Appendix 2)**





Because there are no bushes, berms or trees, the target debris is very visible.



**NOTE: This document is for SHOTGUN shooting only. (Lead shot)
There is a separate study for rifle and pistol as these disciplines
use berms and bullet traps to “capture” the projectiles**

What’s the solution?

There are various regulatory bodies concerned with the control of pollution on shooting ranges.

Top of the list is the Clean Water Act (CWA) which prohibits the pollution of any United States Waterways, whether government owned OR privately owned. Even if you own your own lake or pond, the Clean Water Act prohibits you from polluting it.

Following the CWA are the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Then finally, the Environmental Protection Act, which covers all the above, plus pollution from noise.

Breaking these down into some form of classification we can see what really affects us....

CWA – If you have a river, waterway, lake or pond on your property you definitely cannot fire over it or into it, but further, you have to watch where the “run-off” from your range finishes up. i.e. when it rains, does the run-off water run down the side of a hill, into a culvert, into a stream, then into a river which in turn runs into a lake?

Where’s the water-table on your land? How far down is it and what’s the soil composition? Does water easily seep through the soil and into the water table, even though the nearest river or lake is miles away?

What’s the chemical composition of the soil? What’s the ph value?

Let’s assume we’re over that one... What’s next?

The CERCLA concerns itself mainly with the abandonment and resale of shooting range property, especially closed, abandoned or re-classified military property.

RCRA’s main concern is the storage or cleanup of abandoned shooting ranges.

Which leaves EPA..... and the storage of toxic materials.....

Whoever is chosen to prepare the Lead Mitigation Program should research the rules and regulations pertinent to the local area, county and state, where the shooting range is situated.

**NOTE: One way around the lead pollution problem is to use Steel Shot.
If steel shot s been ruled out. Appendix “1” shows a sample “run-off filtration method.**

Appendix "1"

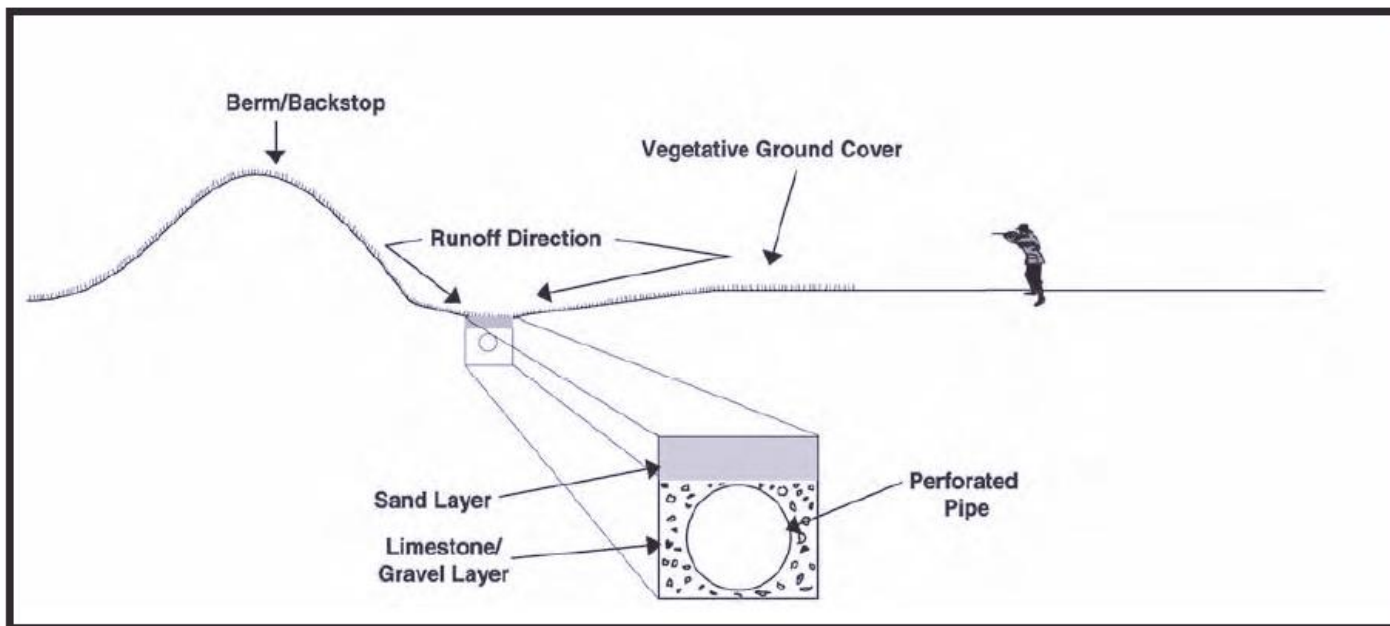
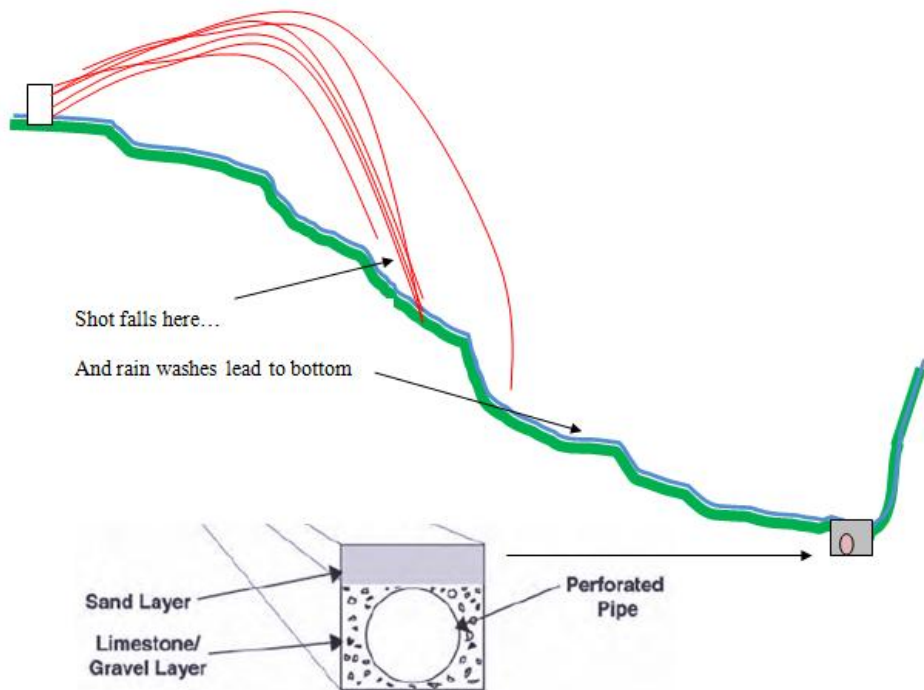


Figure 3-2 – Sample Filter Bed System (Adapted from Proceedings for National Shooting, Range Symposium, October 17-19, 1993, North American Hunting Club and Wildlife Forever)

We can capture and remove lead from the bullet traps, (Rifle and Pistol) all in one area of sand, but Shotgun is the hard one as it's over a large area. So, we have to capture or treat the initial run-off. Once lead has "settled" and oxidized it doesn't give off any toxins, we just have to treat any water.




Appendix “2”



These photos are the extreme in miss-management of “pollution”. Although some of the white “specs” are from white target fragments (launched at night-time to make them visible), the majority are the plastic wads from the shotgun cartridges. There is no EPA or regulation controlling these, but good house-keeping will keep the land looking pristine and well cared for. Plus, the “absence” of wad inserts, shows any EPA random visit, that there is a pollution plan in force.




Suggested reading.


 United States Environmental Protection Agency
EPA-903-B-01-001
Revised June 2005
Region 2

Best Management Practices for Lead at Outdoor Shooting Ranges

CORRECTIVE ACTION AT OUTDOOR SHOOTING RANGES GUIDANCE DOCUMENT



Colorado Department of Public Health and Environment


Hazardous Materials and Waste Management Division
Colorado Department of Public Health and Environment

 **NSSF - National Shooting Sports Foundation-**

ENVIRONMENTAL ASPECTS OF CONSTRUCTION AND MANAGEMENT OF OUTDOOR SHOOTING RANGES

Environmental Fate of Lead in Florida Shooting Ranges

a) 

b) 

OSR

PHYTOREMEDIATION CONTROLLING POLLUTION WITH PLANTS

Daniel J. Arnold, 9-12
Nancy J. Hazuka, 9-12
David L. Herring, 9-12
David L. Murray, 6-8
Sherri Williamson, 9-12

In Collaboration With:
Brian Frankhouser, Environmental Engineer
Federal Energy Technology Center

Ecological Engineering – Rutgers University

The term, "ecological engineering," was first coined by Howard T. Odum in 1962. Howard Odum is now professor emeritus at the University of Florida, where his work in systems ecology has flourished.

Ecological engineering, he wrote, is "those cases where the energy supplied by man is small relative to the natural sources but sufficient to produce large effects in the resulting patterns and processes." (H.T. Odum, 1964, "Man and Ecosystem," Proceedings, Lockwood Conference on the Suburban Forest and Ecology, Bulletin Connecticut Agric. Station)

Another definition that follows from that relates to ecosystem management by human society (Center for Wetlands, University of Florida):

"Ecological engineering is the design of sustainable ecosystems that integrate human society with its natural environment for the benefit of both. It involves the design, construction and management of ecosystems that have value to both humans and the environment. Ecological engineering combines basic and applied science from engineering, ecology, economics, and natural sciences for the restoration and construction of aquatic and terrestrial ecosystems. The field is increasing in breadth and depth as more opportunities to design and use ecosystems as interfaces between technology and environment are explored."

All the above documents mentioned here can be downloaded free of charge at:

www.shooting-academy.com/Range%20Plans