Castiglion del Bosco – Montalcino, Italy
Methodology for Landscape Performance Benefits
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Environmental

Preserved 100% or 3,200 acres of the site's existing mature forest, which provides habitat for 6 species of beetle classified as Endangered or Near Threatened in Europe, as well as numerous bird and mammal species.

Approximately 3,200 acres, over 70% of the Estate, is covered in mature woodlands containing tree species such as pine, chestnut, oak, olive and cypress. In order to minimize disturbance to the wooded areas, the core of the Estate was reused and the golf course was sited in existing meadows, with none of the forest cleared aside from minor improvements to woodland trails.

The forested areas provide habitat for numerous mammals including cinghiale (wild boar), deer, fox, porcupines, skunks, badgers, martens, weasels and foxes. Bird species found in the forest include barn and tawny owls, buzzards, harriers, kestrels, woodpeckers, ravens, flycatchers, hawks and pheasants. In addition to the more common species, the forest also provides habitat for several species of insect on the IUCN Red List of Threatened Species. All of these species rely on large, old trees for their survival and are threatened due to habitat loss, making preservation of the existing forest crucial. One beetle species found in the area in listed as Endangered in Europe while five species are listed as Near Threatened:

Insect species listed as Endangered in Europe:
Ropalopus ungaricus

Insect species listed as Near Threatened in Europe:
Ampedus cardinalis (Cardinal Click Beetle)
Ampedus coenobita
Osmoderma eremita (Hermit Beetle)
Pseudotriphyllus suturalis
Ropalopus insubricus

Endangered species face a very high risk of extinction in the wild and Near Threatened species are close to qualifying for a threatened category, or are likely to qualify as threatened in the near future.

Sources
Information on threatened and endangered species obtained from:
IUCN (International Union for Conservation of Nature) Red List of Threatened Species
http://www.iucnredlist.org/
Information on common plant and animal species obtained from:
Parco Artistico Naturale Culturale Della Val d'orcia
http://www.parcodellavaldorcia.com

Preserved and restored approximately 400 cypress trees lining the entry drive into the estate. The 800-year old trees are an important element of the distinctive visual identity of the Val d'Orcia region, which is designated as a UNESCO World Heritage Site. Moreover, UNESCO has identified the loss of these types of trees as a potential threat to the conservation of this significant cultural landscape.

They cypress allée lining the arrival route to the site is known as being the longest in Tuscany and it is assumed that the trees were planted at approximately the same time the Estate castle was built, about 800 years ago. Special measures were taken to preserve and restore existing healthy trees, remove unhealthy trees and invasive plants, and plant new trees to maintain and enhance the aesthetic character of this historical landscape. An arborist was hired to evaluate the existing trees and issue a report and recommendations. The landscape contractor proceeded with the recommended work and established an ongoing maintenance and treatment program for the trees.

The Estate lies within the Val d'Orcia region, an area designated as a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage site and part of the Val d'Orcia Artistic, Natural and Cultural Park. Founded in 1996, the park is focused on increasing awareness of cultural and environmental heritage as well as the promotion and support of traditional agriculture and its products. The 2004 UNESCO designation indicates the cultural significance and aesthetic value of the agrarian and pastoral landscape. Cypress trees are an important element of the distinctive visual character of the historic landscape, with the UNESCO documents stating that "Cypresses form a striking addition to the landscape planted along routes and around settlements, their regular from punctuating the rounded shapes of the hills and their dark color contrasting strikingly with the pale landscape" (p.132). Because maintaining the cypress trees and this aesthetic character is an important piece of preserving the cultural landscape of the area, "Loss of scattered trees" has been identified as a potential threat to the conservation of this significant landscape (UNESCO, p.135).

To estimate the number of trees along the drive the following calculations were completed:
Length of tree-lined drive between entry & forest = 1 mile (5,280 feet)
Approximate average distance between trees = 25 feet
# of trees along both sides of drive = (Length of drive/Distance between trees) $\times$ 2
422 trees = (5,280/25) $\times$ 2

Sources
Information on Cypress tree preservation & restoration provided by Derek Gagne, EDSA
Information on cultural significance of landscape obtained from:
UNESCO World Heritage List. 2004. *Evaluations of Cultural Properties* (p.132 &135)
http://unesdoc.unesco.org/images/0014/001488/148834e.pdf
Parco Artistico Naturale Culturale Della Val d'orcia
http://www.parcodellavaldorcia.com

Social

Produces over 2,700 lbs of organic vegetables, fruits, and herbs per year in the 3,500 sf kitchen garden for use in the estate's two restaurants and culinary academy.

The 3,500 ft2 organic kitchen garden is located in the center of the Estate among the main guest amenities and was designed by the Vatican's garden landscaper with collaboration from the resort chefs. Over 180 varieties of vegetables, fruits and aromatic herbs and grown and utilized in the seasonal and regional cuisine of the estate's two restaurants and culinary academy.

In order to estimate the amount of produce grown in the garden, the yield per square foot was used for 38 varieties of common vegetables, fruits and herbs. Assuming that approximately half

of the garden is planted (with the other half taken up by paths), that leaves 1750 ft2 for food production. Vegetables and fruits were estimated to use 1600 ft2, with herbs using the remaining 150 ft2. Thirty-two typical varieties of vegetables and fruits and six types of herb were assumed to represent approximate production of the garden. For each variety, yield of pounds per ft2 was multiplied by the area planted, and then all pounds were summed to calculate the estimated total annual production.

3,500ft^2/2 = 1750 ft^2
50 ft^2 × 32 varieties of common vegetables = 1600 ft^2
25 ft^2 × 6 varieties of common herbs = 150 ft^2
Area planted × pounds/ft^2 yield = Total pounds food produced
2,766.38 pounds = organic produce grown/year

Source
Estimate of amount of produce grown obtained from:
Grow Your Own Vegetables Value Calculator
http://www.plangarden.com/app/vegetable_value/
Note that garden production may vary significantly from year to year based on environmental conditions.

Produces approximately 300,000 bottles of wine annually from the 170 acres of vineyards.

The Estate is the fifth largest out of 200 producers of Tuscany's iconic red wine, Brunello di Montalcino. The 170 acres of Sangiovese grapes are from vines that local farmers have cultivated since the 18th century and wine is produced on site at the 39,000 ft^2 gravity-fed facility and sold worldwide.

Source
Information on volume of wine produced obtained from:
Kahle, Laurie. 2006. Castiglion del Bosco. *Atelier Magazine Robb Report* 204-206.
http://ateliermagazine.com/wp-content/uploads/2012/01/V2a_PPcastiglion1.pdf
Note that vineyard production may vary significantly from year to year based on environmental conditions.

Cost Comparison Methods

While the planting design for a typical resort has a significant portion of ornamental and exotic species, approximately 70% of the plants used at Castiglion del Bosco are native to Tuscany. The native trees cost approximately the same as non-native species; however, the native shrubs cost about half as much as typical ornamental or exotic species, saving about 35% in shrub purchase costs.

All plants for the Estate's landscape design were supplied by Piante Mati, a family nursery near Pistoia, which is located approximately 85 miles from the site. Native species made up approximately 70% of the plants used in the design and were chosen for their drought tolerance as well as aesthetic reasons. The native plants were arranged in large, simple masses, creating planted areas that would blend well with the surrounding traditional agrarian landscape. This style is in contrast to a more typical resort planting plan, which would rely heavily on ornamental and exotic species planted in a more traditional garden design. While almost all tree species have similar costs, there was a significant difference in the cost of native shrubs compared to non-native species. Native shrubs planted in this massing style cost about half the price of ornamental or exotic species, which is partially because of discounts due to buying fewer types of

plants in much larger quantities. With 70% of native species used, this amounts to a savings of about 35% in shrub purchase costs.

To determine the cost savings, the following calculations were completed:

# of native species used/# of total species used = % native plant species
51/72 = 70.8%
Price range of native shrub species used in design = 10 – 14 Euros/plant
Price of typical resort shrub species (ornamental/exotic) = 20 – 30 Euros/plant
Price of native species/Price of typical species = shrub cost savings
10/20 = 0.5
shrub cost savings $\times$ % native plant species = % cost savings due to native shrubs
0.5 $\times$ 70.8% = 35.4%

Source
Calculated using information provided by Derek Gagne, EDSA