

DECISION ANALYSIS

Saving the Endangered Species of Erewhon, Part 1 (Plants At Last)

The Nature Conservancy is about to make land purchases in two areas of Erewhon. Area A is in the **valley** and Area B is in the **highlands**. Both areas contain rare and endangered species of plants. In fact a thorough inventory identifies 350 species of rare plants in the valley and 240 species of rare plants in the highland.

The Conservancy's problem, which you have been hired to help them resolve, is how much land to acquire in each of the two areas. The following are considerations:

1. Because of edge effects, experts estimate that a protected area in the valley should have an area of at least 15 hectares, while a protected area in the highland should have an area of at least 25 hectares.
2. PhD research by a University of Minnesota botanist shows a regression between an area and the number of rare species to be found in it. In the valley, the regression suggests that the number of rare species an area will contain is five times the number of hectares. For the highland, the regression is three times the number of hectares.
3. There are political considerations. The highland tribes have a long standing feud with the valley tribes. The Conservancy has made a policy decision: land purchased in one area shall be not more than twice the amount of land purchased in the other area.
4. There are also social considerations. A team of sociologists has developed a social upheaval index (SUI). For each hectare purchased in the valley, the SUI is increased by 5 points while for each hectare purchased in the highlands the SUI is increased by 2 points. Sociologists will veto any purchase plan that leads to an SUI of more than 400 points.
5. The cost of land in the valley is 300 Pickles (the unit of currency in Erewhon) per hectare. In the highland land costs 200 Pickles per hectare.

Given these considerations, you have been asked to advise the Nature Conservancy on how many hectares it should purchase in each area. You have been asked to consider two scenarios:

- (a) you have a budget of 24,000 Pickles
- (b) you have a budget of 34,000 Pickles.