

A tropical landscape featuring a wide, shallow river with a sandy bed and some water. The river is surrounded by lush greenery, including tall reeds on the left and a dense forest of palm trees in the background. In the distance, a large, forested mountain rises under a cloudy sky. The overall scene is a natural, scenic view of a tropical environment.

Combining Ecological, Social and Political Factors in a Ranking Approach

Combining Factors

Ranking approach can include a lot of factors

Methods to combine



Combining Factors

Simplest Case-weighting:

1 set of factors for all objectives and all activities

Weight factors by importance for overall objective

$$\text{Score} = \frac{\text{Factor}_1 * \text{Weight}_1 + \text{Factor}_2 * \text{Weight}_2 + \dots}{\text{max}}$$



Combining Factors

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Slope	Slope values	Rank
Flat slope	0--9	0.33
mid slope	9--25	0.66
steep slope	>25	1

Water Bal	P-ET	Rank
Surplus	>0	1
Balanced	0	0.66
Deficit	<0	0.33

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S = 35 WB = 10
S = 40 WB = 0

$$\frac{1*1+1*1}{2} = 1$$

$$\frac{1*1+0.66*1}{2} = 0.8$$

Combining Factors

Simplest Case:

1 set of factors for all objectives and all activities

Weight factors by importance for overall objective

$$\text{Score} = \frac{\text{Factor}_1 * \text{Weight}_1 + \text{Factor}_2 * \text{Weight}_2 + \dots}{\text{max}}$$

Slope (w=2)	Slope values	Rank
Flat slope	0--9	0.33
mid slope	9--25	0.66
steep slope	>25	1

Water Bal (w-1)	P-ET	Rank
Surplus	>0	1
Balanced	0	0.66
Deficit	<0	0.33

S = 35 WB = 10
S = 40 WB = 0

$$\frac{1*2+1*1}{3} = 1$$

$$\frac{1*2+0.66*1}{3} = 0.9$$

Combining Factors

Complex Case:

Activities

Objectives

Weights

$$\text{Score} = \frac{O1*w1+O2*w2\dots}{\text{max}}$$

Objective

Factors

Weights

$$\text{Score} = \frac{F1*w1+F2*w2\dots}{\text{max}}$$

Combining Factors

Complex Case:

Activities

Objectives

Weights

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Objective

Factors

Weights

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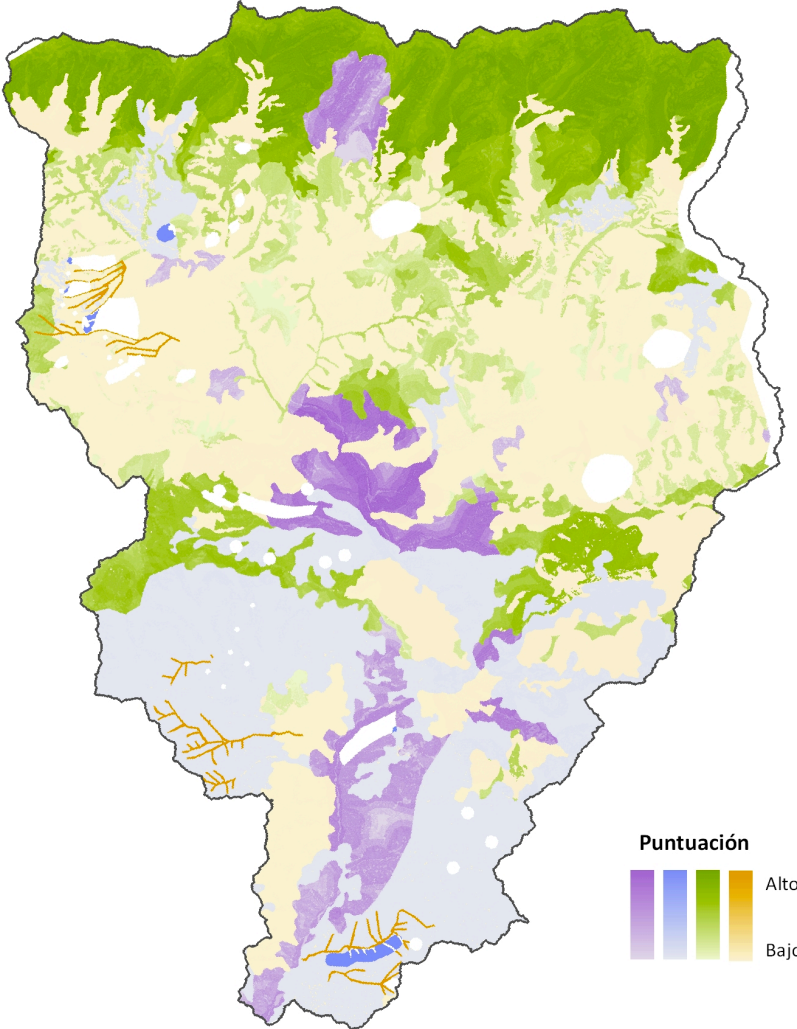
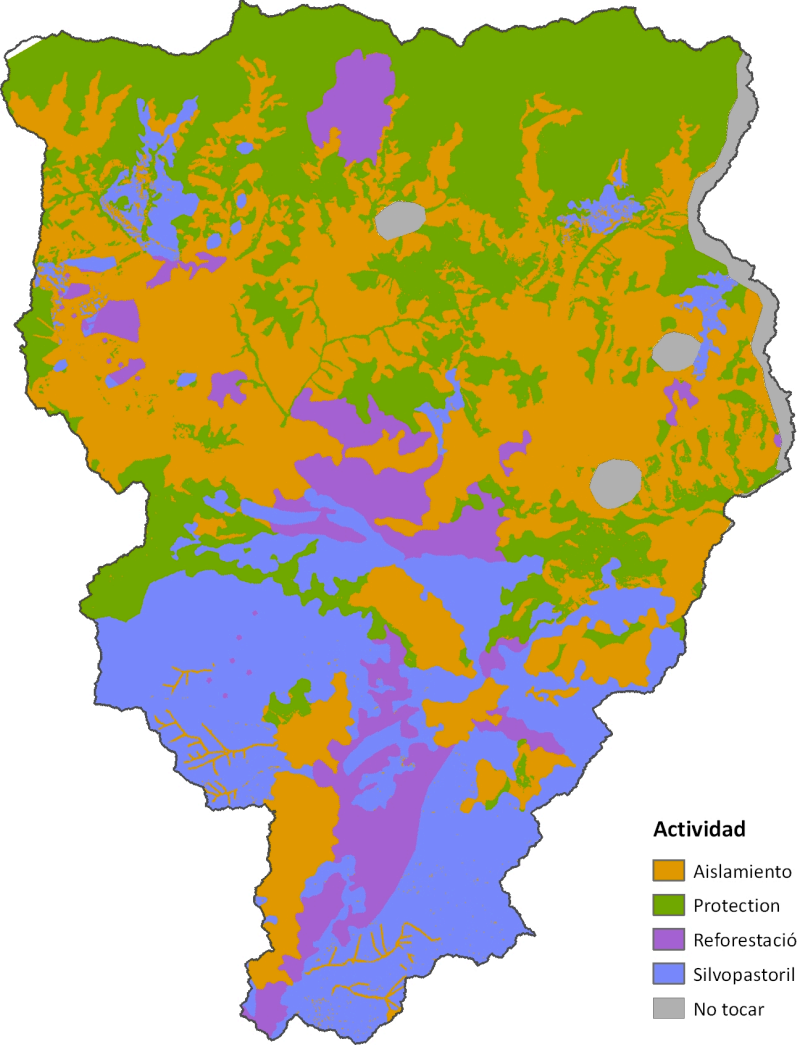
Fencing

Objective	Weight
social feasibility	100
erosion control	2
biodiversity	2
baseflow	1
ann avg yield	1

Protection

Objective	Weight
social feasibility	100
biodiversity	3
baseflow	2
erosion	2
ann avg yield	1

Activity Scores for Tuluá Watershed



Actividad

- Aislamiento
- Protection
- Reforestación
- Silvopastoril
- No tocar

Puntuación

- Alto
- Bajo

More Sophisticated Models: Fuzzy Logic

Same idea with set of factors

Saaty Matrix used to derive joint weights

Gives priority areas per objective

Create new joint objectives where logically sound

Multi-Objectives
Objectives
Direct combination?

Objective
Factors
Weights

Saaty Matrix
Fuzzy logic

Discuss Combining Factors

Are these useful approaches?

Need another approach to combining factors in ranking analysis?

