

# IUFRO Conference Posadas 2018

*S.4.6. Multifunctional forest landscapes: conflicts,  
tradeoffs and synergies assessment towards  
sustainable forest policy design*



## Envisioning native forest conservation policy: An integrated assessment using discrete multi-criteria decision analysis

Diego Tello (UNRC)

Jorge de Prada (UNRC)

Estela Cristeche (INTA)



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# Introduction

- Caldén Native Forest generates multiple ecosystem services (ES), commercial and non-commercial, that society highly value
- However, farmers do not have economic incentives to provide those ES (specially non-commercial ones) and deforestation would be higher than socially desirable
- Types of policies to attend this problem:
  - **Compulsory**, i.e. prohibitions, restrictions, regulations, etc.; if not accomplished there might be sanctions
  - **Voluntary**, i.e.: payment for ecosystem services, extension programs, subsidies for desirable activities, etc.
  - A combination of the previous ones

# Objective

- To design and evaluate *ex ante* alternatives for native forest conservation policies in the Caldén Biogeographic Corridor (CBC) area, in the Province of Córdoba, Argentina combining Cost Benefit Analysis (CBA) and Multicriteria Decision Analysis (MCDA)

# STUDY AREA:

Biogeographic Corridor of Calden, Córdoba, Argentina



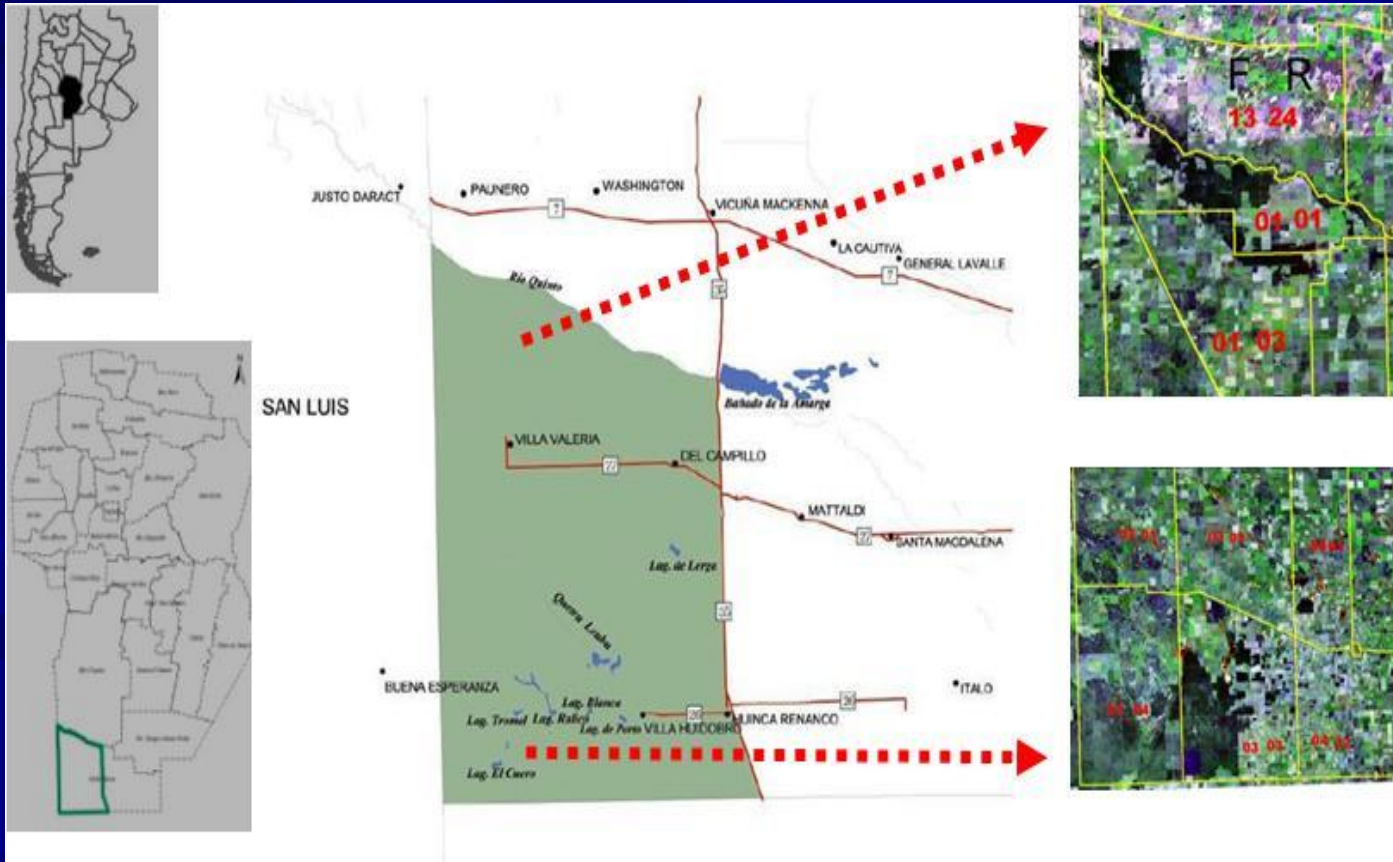
Population: aprox. 22.000 inhabitants



Caldén Forest Area: 77.589 hectares



Agricultural Area: 670.000 hectares



# Methodology

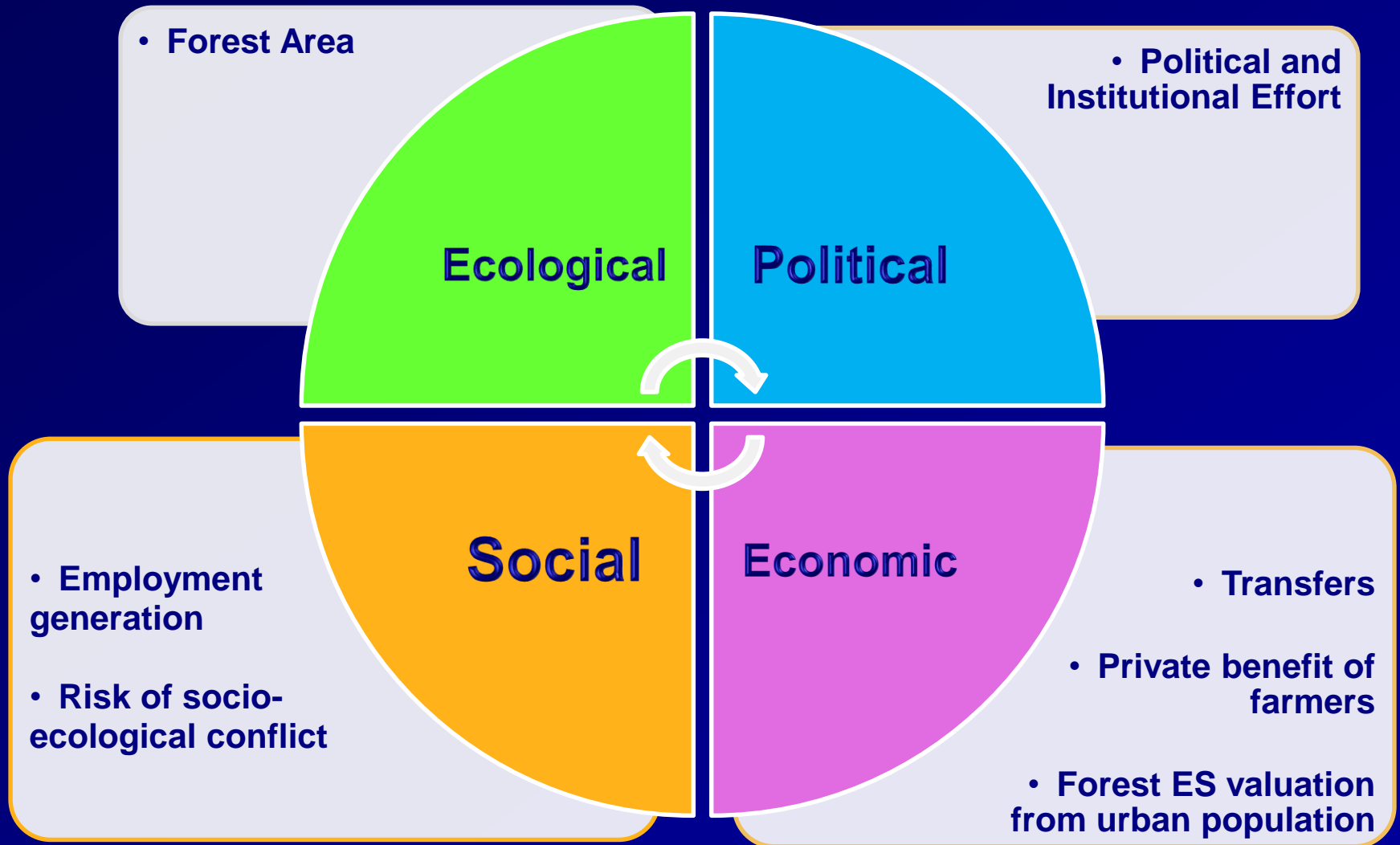
Discrete Multicriteria Decision Analysis  
PROMETHEE which integrates:

- **Private Cost Benefit Analysis** to model farmers decisions based on last agricultural census data
- **Contingent Valuation Study** to assess the benefits the urban population obtain from Caldén native forest ES
- **Secondary data and experts' views** to contemplate the social dimension

# Five (5) Policy Alternatives

- 1) **T:** *Tendency*
- 2) **D:** *Deregulation of Forest Conservation*
- 3) **EPMUF+P:** *Extension Program with Multiple Use of the Forest with Prohibition*
- 4) **EPMUF:** *Extension Program with Multiple Use of the Forest*
- 5) **RP + P:** *Reforestation Program with Prohibition*

# Seven (7) Criteria



# Decision Matrix

Alternatives (*)	Criteria						
	Ecological	Political	Social		Economic		
	Forest Area	Political and Institutional Effort	Employment generation	Risk of social conflict	Transfers	Private Benefit for Farmers	ES valuation by urban population
	Hectares	(index)	(employees)	(index)	(\$ mill/year)	(\$ mill/year)	(\$ mill/year)
Tendency	77.589	Low	3.080	Medium	5	4	0
Deregulation	52.953	Very Low	2.461	Very High	0	26	-71
EPMUF+P(*)	77.589	High	4.457	Low	27	30	0
EPMUF (*)	57.709	High	3.614	High	20	41	-57
RP+P(**)	114.056	Very High	5.815	Medium	71	76	105
Objective	Max	Min	Max	Min	Min	Max	Max

Note: (\*) EPMUF: Extension Program for the Multiple Use of the Forest + P: Prohibition; (\*\*) RP+P: Reforestation Program + Prohibition.



# 1: “Sustainably” profile

The decision maker balances the weights of the environmental, social and economic dimensions criteria

ALTERNATIVE	NET	STRENGTH	WEAKNESS
	Order	Order	Order
RP + P	1	1	2
EPMUF+P	2	2	1
Tendency	3	3	3
Deregulation	4	4	5
EPMUF	5	5	4

## 2: “Free market” profile

The decision maker prioritizes the freedom of the market and limited intervention of the State. More importance to: State Transfers (min), PIE (min) and PBF(max)

ALTERNATIVE	NET	STRENGTH	WEAKNESS
	Order	Order	Order
DEREGULATION	1	1	1
TENDENCY	2	2	3
EPMUF	3	4	2
EPMUF +P	4	5	4
RP+P	5	3	5

# 3: “Preservationist” profile

The decision maker prioritizes the conservation of the forest (max) and the economic valuation of forest ES by urban population (max)

ALTERNATIVE	NET	STRENGTH	WEAKNESS
	ORDER	ORDER	ORDER
RP+P	1	1	1
EPMUF+P	2	2	2
TENDENCY	3	3	3
EPMUF	4	4	4
DEREGULATION	5	5	5

## Statistical analysis of the workshop participants' preferences

STATISTICAL	PRIVATE BENEFIT OF THE FARMER	TRANSFERS	ECONOMIC VALUATION OF ES	FOREST AREA	EMPLOYMENT GENERATION	POLITICAL AND INSTITUTIONAL EFFORT	RISK OF SOCIAL CONFLICT
Mode	10	5	8	10	9	2	9
Minimum	2	2	0	7	6	2	0
Maximum	10	9	10	10	10	10	9
Average	7	6	6	9	8	6	6
Standard deviation	3	2	4	1	1	3	3
Variation coefficient	47%	35%	61%	14%	16%	56%	48%

# Frequency of Net Ordering of Each Alternative for Workshop Participants

ALTERNATIVE	ORDER				
	1	2	3	4	5
RP+P	100%	-	-	-	-
EPMUF+P	-	100%	-	-	-
Tendency	-	-	89%	11%	-
EPMUF	-	-	11%	44%	44%
Deregulation	-	-	-	44%	56%

# Conclusions

- The MCDA shows an almost generalized coincidence, both in the simulation of theoretical weightings and in the workshop: RP+P is the best performance alternative.
- The current policy performs relatively well under different simulated profiles
- Only when considering a free-market profile, deregulation has good performance
- The CBA subsumed under the MCDA enriches policy sustainability analysis

# Conclusions

- Multicriteria Decision Analysis enabled to gather the available information to help the decision maker to compare the alternatives subject to different criteria - sometimes in conflict and the diverse interests of the social actors.
- The application of the model from successive approaches, would bring the possibility of reaching agreements amongst the majority of the actors involved without ignoring the multiple interests at stake.

# Research limitations and future agenda

- The model does not contemplate the state of the forest and its fragmentation, such as indicators that simulate, in a georeferenced manner, the spatial distribution of the forest area (size of the patches), enabling to estimate the generation of different levels of non-commercial ecosystem services.
- This work does not incorporate the opinion of local actors. Integrating this information may allow us to have a more precise decision matrix and the possibility of reaching some sort of agreement regarding forest policy design.
- Both limitations are part of the future research agenda.





**Thank you!!**