

# **Simulating the Impact on the Local Economy of Alternative Management Scenarios for Natural Areas**

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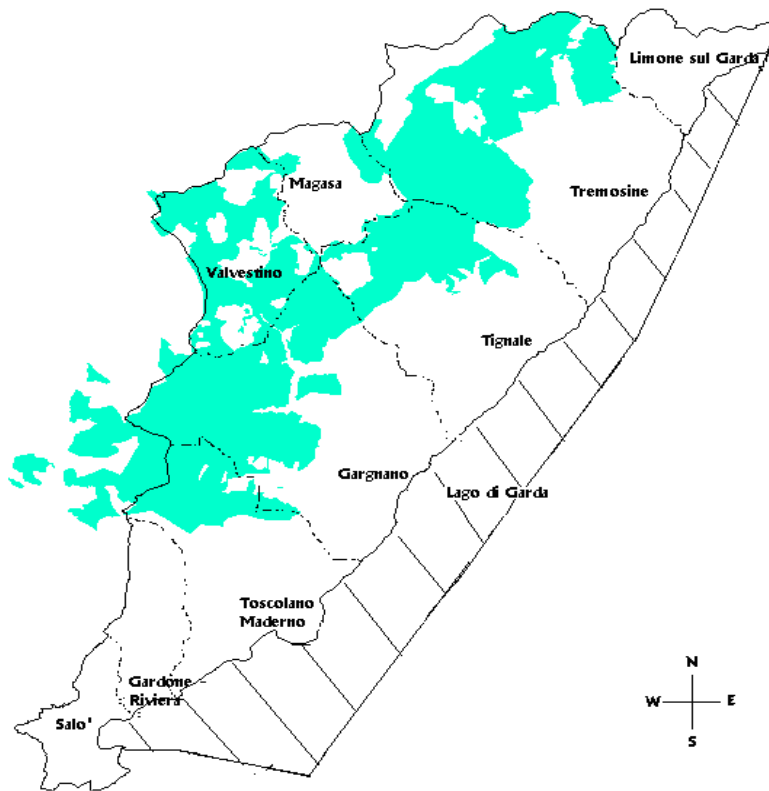
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# High Garda Natural Park



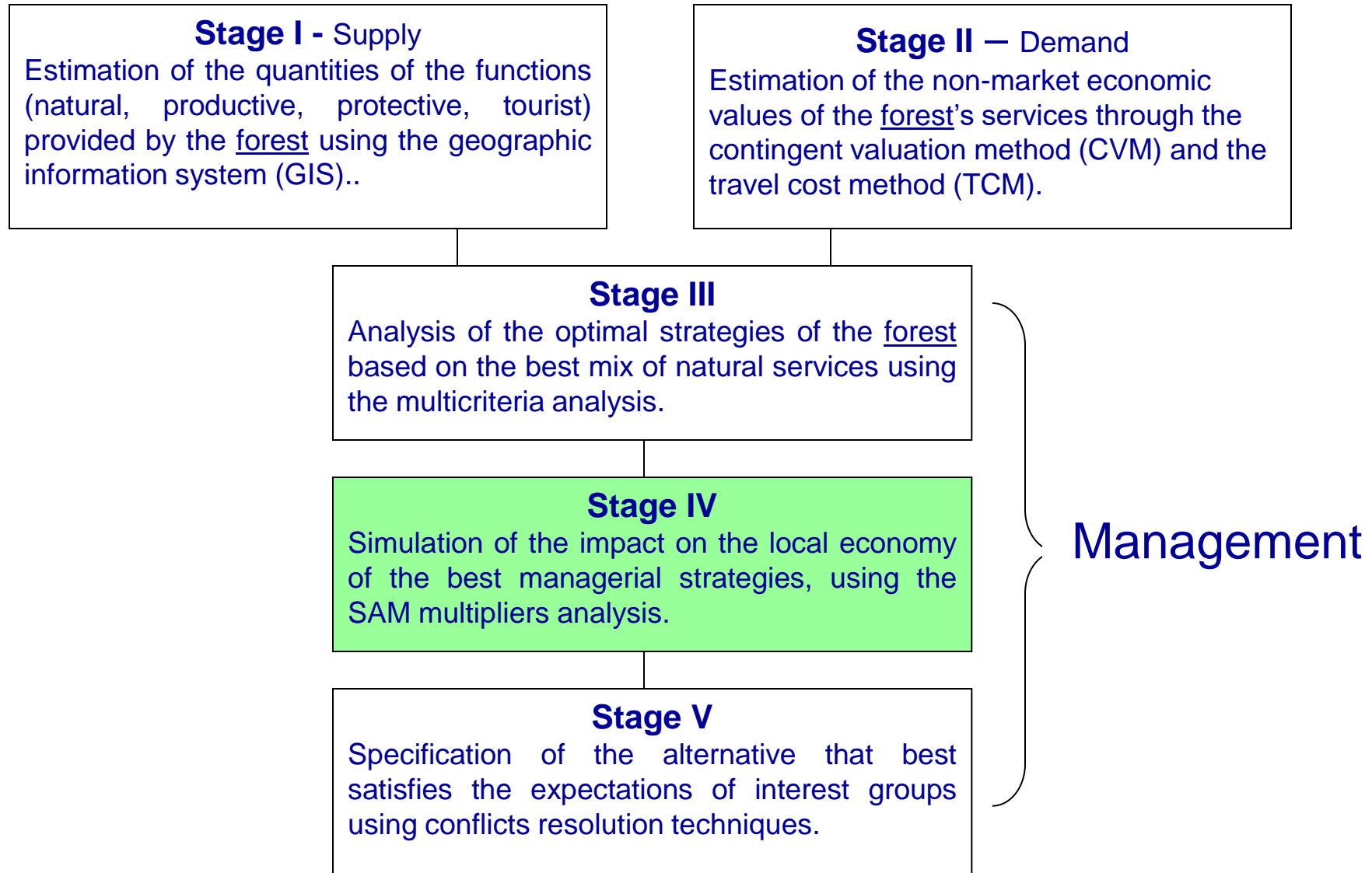
- The park is located on the north-west side of Garda Lake.
- It extends for about 38 000 hectares.
- It embraces nine municipalities, locally managed, of the Brescia province.
- The economy of the park is specialized in tourist services

# West Garda Regional Forest



- The Forest is part of the High Garda Natural Park.
- It extends for 11064 hectares.
- It is managed by the regional authority.

# Assessment

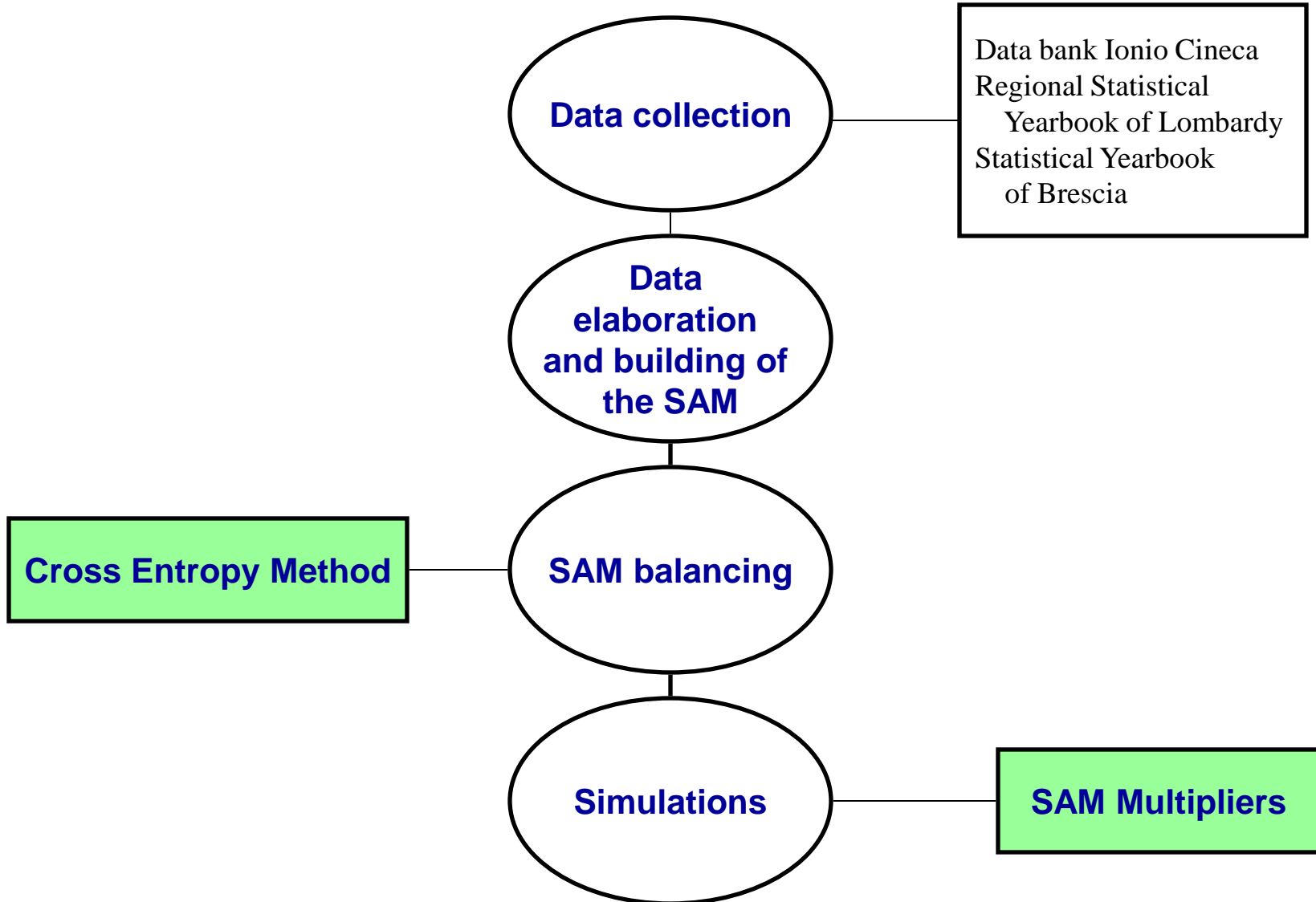


# Objectives

➤ We intend to estimate the impact on the local economy of the High Garda natural Park of 2 alternative management scenarios for the West Garda Regional Forest:

- The non participative scenario which involves only the regional manager preferences
- The participative scenario which takes into consideration the preferences of tourists and residents.

# Stages



# The Local SAM for the High Garda Natural Park

- The Local SAM is a system of social accounts which reproduces the economic flows of the Park area.
- It describes the relevant features of the socio-economic structure and the relationship between production, distribution of income and expenditure in the area.
- 3 sectors: Agriculture, Tourism and Other sector;
- 2 factors of production: Labor and Capital;
- the resident households are divided into:
  - residents employed in the tourist sector
  - remaining resident population.

# Cross Entropy Method

- Because data come from many sources at different point in time, the initial SAM is not balanced, the column sums does not correspond to the respective row sums.
- The **Cross Entropy Method** estimates a balanced and consistent matrix starting from an original unbalanced social accounting matrix using information available both at micro and macroeconomic levels.
- The CE method has the advantage of allowing the user to fix cells value in addition to row and column totals

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- Robinson, S., A. Cattaneo and M. El-Said (1998)
  - Robilliard, A. S. and S. Robinson (1999)



# The Balanced SAM for the High Garda Natural Park

	Agriculture	Tourism	Other sectors	Labor	Capital	Residents employed in tourism	Other residents	Rest of the economy	Total
<b>Agriculture</b>	382	268	905			258	1369	1415	4597
<b>Tourism</b>	52	1222	858			36	191	79442	81801
<b>Other sectors</b>	566	3180	18888			25217	133626	216428	397905
<b>Labor</b>	1246	30829	110487					42419	184981
<b>Capital</b>	1351	4610	66621						72582
<b>Residents employed in tourism</b>				28764				15882	44645
<b>Other residents</b>				151587				84990	236577
<b>Rest of the economy</b>	1001	41691	200146	4631	72582	19134	101390		440575
<b>Total</b>	4597	81801	397905	184981	72582	44645	236577	440575	

# SAM Multiplier Analysis

- The Matrix of Multipliers captures both the direct and indirect effects on production and income and also the circular effects that are the result of the circular flow of income within the local economy
- The SAM multiplier method implies prices as exogenously fixed and the following behavioral assumptions:
  - functional relations use fixed technical coefficients of Leontief technologies and it is therefore not possible to consider changes in the productivity of labor and capital;
  - there are no bounds on goods supply because supply satisfies demand by assumption.

# SAM Multipliers for the High Garda Natural Park

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	<b>Agriculture</b>	<b>Tourism</b>
<b>Agriculture</b>	<b>1.094</b>	<b>0.007</b>
<b>Tourism</b>	<b>0.014</b>	<b>1.016</b>
<b>Other sectors</b>	<b>0.377</b>	<b>0.316</b>
<b>Labor</b>	<b>0.406</b>	<b>0.473</b>
<b>Capital</b>	<b>0.385</b>	<b>0.112</b>
<b>Resident population</b>	<b>0.396</b>	<b>0.461</b>

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## SAM Multiplier Analysis (2)

The vector of impacts:

$$\Delta \mathbf{Y} = (\mathbf{I} - \mathbf{A})^{-1} \Delta \mathbf{X}$$

The leakages from endogenous to exogenous accounts:

$$\Delta \mathbf{L} = \mathbf{B} \Delta \mathbf{Y}$$

The SAM multiplier matrix:

$$\mathbf{M} = (\mathbf{I} - \mathbf{A})^{-1}$$

The vector of exogenous shock:

$$\Delta \mathbf{X}$$

# Simulations

Functions	Description	Combinations of functions (%)		
		Benchmark Scenario Actual forest plan	Scenario A Non-participative	Scenario B Participative
<b>Naturalistic function</b>	Conserving nature, wildlife and ecosystem	<b>26</b>	<b>65</b>	<b>94</b>
<b>Productive function</b>	Providing market with timber and non-timber products: fodder, mushrooms, resins, etc.	<b>21</b>	<b>2</b>	<b>2</b>
<b>Protective function</b>	Preserving structural features of the canopy and territory	<b>26</b>	<b>2</b>	<b>2</b>
<b>Tourist function</b>	Providing tourist-recreational services: sports, outdoor activities (hunting and fishing, horse riding, biking, etc.)	<b>27</b>	<b>31</b>	<b>2</b>

# Simulations (2)

	<b>SCENARIO A Non-participative</b>			<b>SCENARIO B Participative</b>		
<b>Change in the agriculture sector (%)</b>	<b>- 10</b>	<b>- 10</b>	<b>- 10</b>	<b>- 5</b>	<b>- 5</b>	<b>- 5</b>
<b>Change in tourists' expenditure (%)</b>	<b>0</b>	<b>+5</b>	<b>+10</b>	<b>0</b>	<b>+ 10</b>	<b>+20</b>

# Results

	<b>BENCHMARK SCENARIO Actual forest plan</b>		<b>SCENARIO A Non-participative</b>			<b>SCENARIO B Participative</b>		
Change in the agriculture sector (%)			- 10	- 10	- 10	- 5	- 5	- 5
Change in tourists' expenditure (%)			0	+ 5	+10	0	+10	+20
	Production	Labor	<b>Results</b>					
<b>Agricultural sector</b>	4.597	1.246	- 3.4	- 2.7	- 2.1	- 1.6	- 0.4	+ 0.8
<b>Tourist sector</b>	81 800	30 829	-	+4.9	+9.8	-	+9.9	+19.7
<b>Other sectors</b>	402 502	111 732	- 1.1	- 0.8	- 0.5	- 1.1	- 0.5	+0.5
<b>Total sectors</b>	484 303	142 562	- 0.0	+1.0	+2.1	- 0.02	+2.1	+4.3

## Results (2)

	<b>BENCHMARK SCENARIO Actual forest plan</b>	<b>SCENARIO A Non-participative</b>			<b>SCENARIO B Participative</b>		
Change in the agriculture sector (%)		-10	-10	-10	-5	-5	-5
Change in tourists' expenditure (%)		0	+5	+10	0	+10	+20
		<b>Results</b>					
<b>Income level of residents employed in tourist sector</b>	44 645	-	+3.18	+6.35	-	+6.36	+12.71
<b>Income level of residents employed in agricultural and the other sectors</b>	236 576	-0.02	+0.12	+0.26	-0.01	+0.28	+0.56
<b>Income level of total resident population</b>	281 221	-0.02	+0.60	+1.23	-0.009	+1.24	+2.49



# Conclusions

- The local SAM for the High Garda Natural Park provides a comprehensive view of the local economic scenario and its basic structural characteristic.
- The SAM multiplier analysis is a simple and costless method to estimate policy impacts on the local economy.
- The simulation analysis shows that the participative program is preferable to the non participative program both for the impact on production and the effects on income level.
- The presence of vested interests among local institutions, associations and actors may be a further source of conflict among the stakeholders (Baggio 2005).

# **Integrated assessment and management of public resources**

eds. Cooper, Perali and Veronesi, Edward Elgar (forthcoming)