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Strategic environmental and social assessment of Regional Land-use Plans

Waaub Jean-Philippe

Full Professor, Geography Department (UQAM)
Québec, Canada

Waaub.jean-philippe@uqam.ca

www.geo.uqam.ca

AUTHORS

Jean-Philippe Waaub, Ph.D. Full Professor, Geography Department, Université du Québec à Montréal (UQAM), GEIGER member, Montréal (Québec); waaub.jean-philippe@uqam.ca

Gilles Côté, PhD. Lecturer at UQAM and Université de Sherbrooke. President of the Federal Review Committee (COFEX); gilles.cote@sifee.org

Jean-François Guay, Ph.D. Territorial planner. Ministry of Agriculture, Fisheries and Food. Government of Quebec. Associate professor in decision support. Research Chair on the Transition to the Sustainability of Field Crops. Institute of Environmental Sciences – UQAM; jean-francois.guay@mapaq.gouv.qc.ca

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1. Regional Land-Use Planning in Quebec

- In the province of Québec in Canada, in accordance with the 1979's Land Use Planning and Development Act, every Regional County Municipality (RCM; including about 10 to 15 municipalities) must maintain in force, always, an RCM plan, and every included local municipality's urban plan, embracing to its whole territory in a coherent way.
- This RCM plan, and related urban plans, must determine the general aims of land development policy and identify the public policies on land use of the territory for its different parts.
- Moreover, it must allow the identification of zones where land occupation is subject to special restrictions for public safety or environmental issues. This RCM plan must be revised every five years or so.

2. Planning and assessment processes

Land-use planning and assessment: systems and complexity

- Plurality of administrative authorities and processes
- Multiple spatial levels and times horizons
- Multi-actors and diversity of decision makers
- Conflicting opinions, perceptions, beliefs, values
- Types of knowledges
- Multiples dimensions, preoccupations, needs, issues including environmental and social impacts
- Links and interconnections

Integrating planning, SESA, MCDA and participative processes

3. Participatory and contributive approach

- Actors are individuals or groups of individuals in a decision-making process. Through their value system, they directly or indirectly influence the decision, be it in the first degree because of their intentions, or in the second degree because of how they involve the intentions of others.
- Be proactive to search for societal representativeness
- Social acceptability and legitimacy
- A decision is legitimate when the procedures used are legitimate
- We associate the expression of stakeholders with organized groups of civil society and reserve the expression of public to individuals.

4. Adopting an issue approach: example

Issue: What we can win or lose in a competition or in a company

From effect/consequences to impact (significance – issue)

Economic development issue Maintenance of economic activities relating to the exploitation of agricultural resources	**Action / *Source of impact*** Growth scenario/ *Agricultural zones*	**Component of the affected biophysical environment / *Modification*** Exploited agricultural resources/ *Increase of industrial crops.*	**Component of the affected human environment/ *Modification*** Commercial crops/ *Increase of revenues from industrial crops*	**Social impact of the modification/ *Descriptor*** **Agricultural vitality/*Area under cash crops***

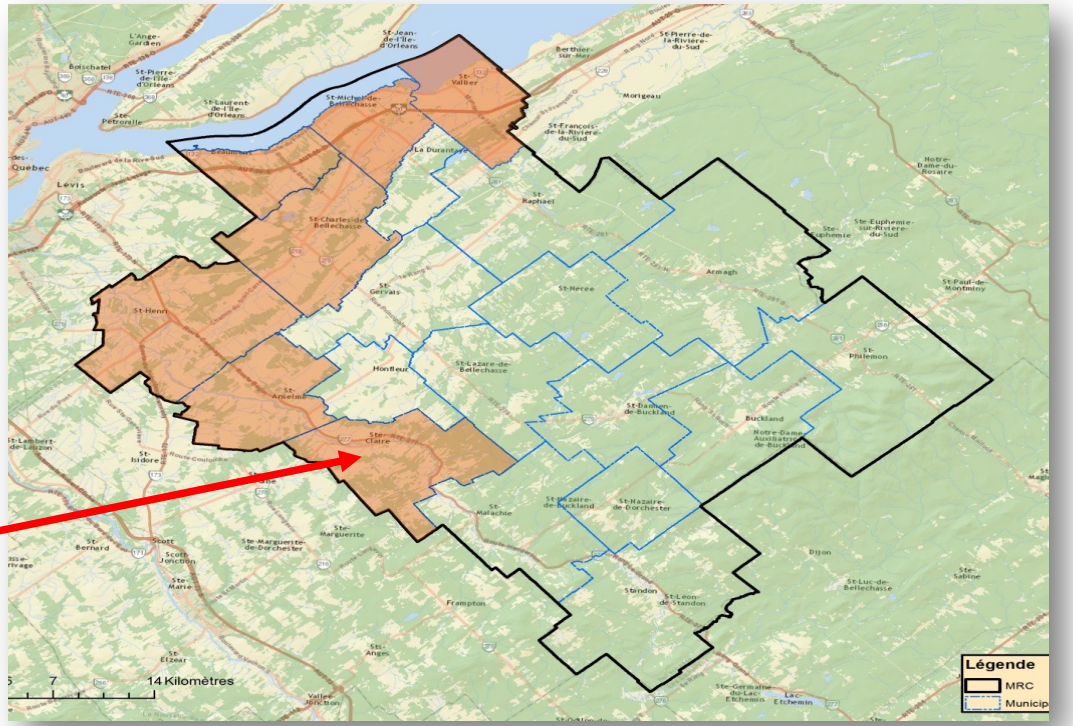
5. SOMERSET – Ste-Claire, Bellechasse RCM
5.1 Formulation (3 steps)

1. Problem setting - find the actors / stakeholders
2. List the scenarios
3. Identify and structure the issues in the form of criteria

5.1 Formulation (3 steps)
Step 1. Problem setting

Bellechasse RCM

- Area of 1759km2
- 20 municipalities
- Population of nearly 35,000 hab.
- Growing (Δ 17% 2011-2036)
- 4 important peri-urban municipalities:
  - Saint-Henri
  - Sainte-Claire
  - Saint-Anselme
  - Beaumont

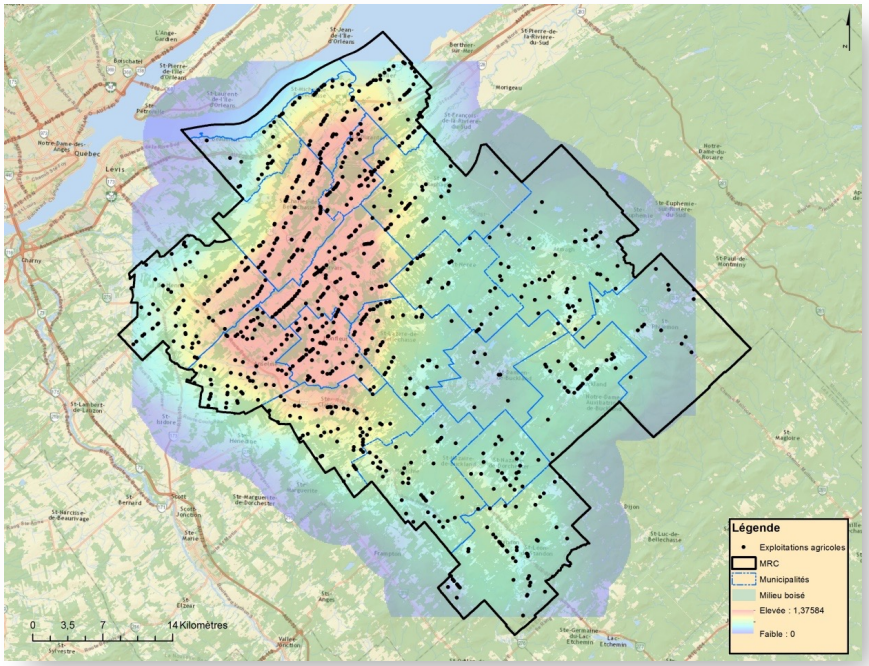


Guay 2016

5.1 Formulation (3 steps)
Step 1. Problem setting

Bellechasse RCM

- 146,263 ha zoned agricultural (85%)
- 526 ha in cultures (35%)
- 914 agricultural enterprises
- Farm income of $395M
- North: very dynamic, + insured crops, goods soils, high density
- South: viable, - insured crops, poorer soil quality, low density



Guay 2016

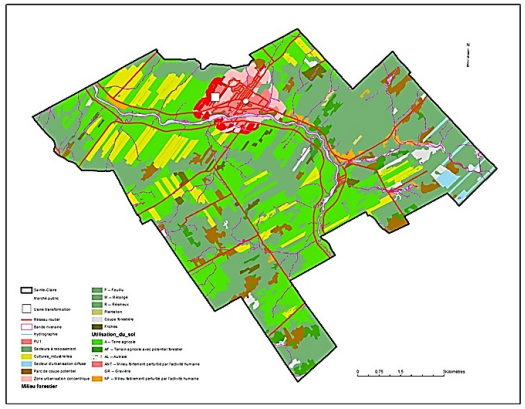
5.1 Formulation (3 steps)
Step 1. Find the actors / stakeholders

- 5 groups:
  - Owners
  - Foresters
  - Farmers
  - Neorurals
  - Ecologists

Deliberation to distinguish between:

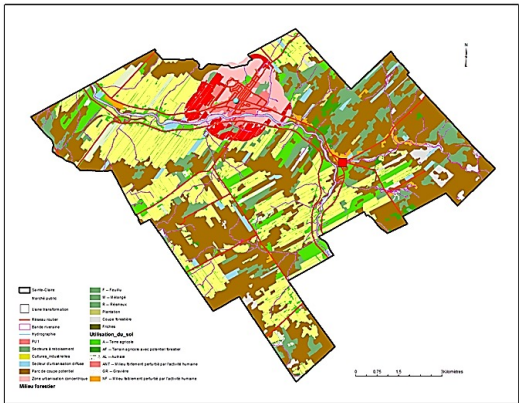
- Uncertainties: probabilistic reality
- Ambiguities: need verbal clarification of the meaning

5.1 Formulation (3 steps)
Step 2. List the scenarios: Ste-Claire, Bellechasse RCM

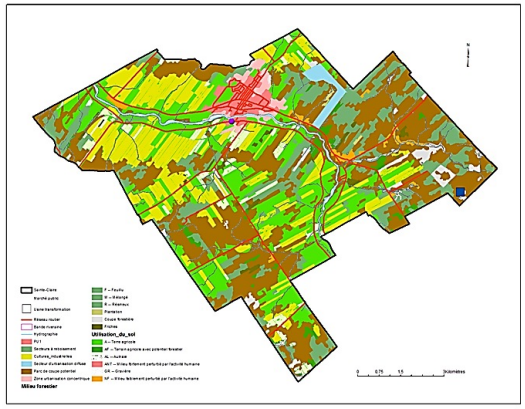


Base =
Status quo

$$A = \{a_1\ a_2\ a_3 \ldots a_m\}$$

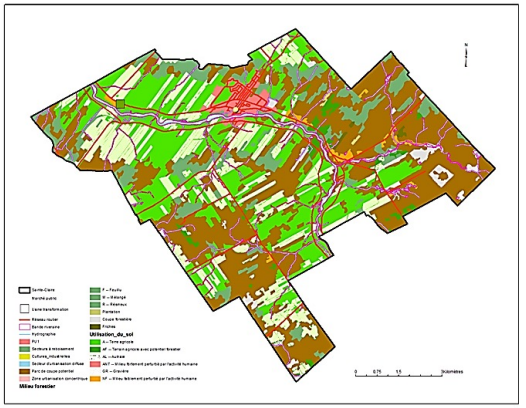


Growth



Ecotopia =
Environmental

Exurbia =
Rebalancing



Decision rules to implement contrasted visions

Guay 2016

5.1 Formulation (3 steps)
Step 2. List the scenarios: Ste-Claire, Bellechasse RCM

Questions about the scenarios considered:

- Which will be socially acceptable from an economic, environmental, social and political point of view?
- Which will rally the most actors (compromise)?
- Why are certain scenarios favored, for whom?
- Where are the conflicts, the coalitions, the possibilities for negotiation?

5.1 Formulation (3 steps)
Step 3. From issues to criteria

- Structuration of a limited set of issues and their translation into qualitative and quantitative criteria and indicators
- Working upstream towards a common and shared understanding of the problem; solving conflicts between stakeholders
- Iterations needed to check if the criteria reflect the issues
- Level of compromise between insuring the properties of a coherent family of criteria and the adhesion of the stakeholders (trust level)

5.1 Formulation (3 steps)
Step 3. From issues to criteria

Issues	Criteria	Indicators	Unit	Scale
Economic prosperity (ECO)	Agricultural vitality (ViAg)	Area under cash crops	Hectares	Cardinal
	Logging (Coup)	Available exploitable forest area	Hectares	Cardinal
	Agrotourism (Lcl2)	Distance from a public market to the urban centroid	Meters	Ordinal
	Agribusiness (Lcl1)	Level of agricultural dynamism	Classes of UEV/km^2	Ordinal
Urbanization management (URB)	Concentric urbanization (UrC)	Cultivated areas lost	Hectares	Cardinal
	Diffuse urbanization (UrD)	Number of residences in agricultural areas	Whole nb.	Cardinal
Biodiversity & environment (RES)	Protection of water resources (Hy1)	Width of riparian strips	Meters	Cardinal
	Organic crops (Cbio)	Area under organic crops	Hectares	Cardinal
Forestry and agricultural management (FOAG)	Agricultural deforestation (Dba)	Number of residences in agricultural areas	Boolean	Nominal
	Wasteland recovery (Fri)	Reforestable areas	Hectares	Cardinal
Territorial vitality: Moral health of the community (TER)	Social harmony (Str)	Level of harmony	Classes	Ordinal
	Contribution to empowerment	Value associated with contribution to empowerment	Whole nb.	Rank

5. SOMERSET – Ste-Claire, Bellechasse RCM
5.2 Assessment (3 steps)

4. Measure performance by criterion (choice of indicators, determination of measurement scales, structuring of preferences)
5. Formalize the existing value systems (weighting of criteria)
6. Aggregate overall preferences (ranking of actions, performance by criterion for each action)

5.2 Assessment (3 steps)
Step 4. Measure performance by criterion

Sources of information

Elaboration of the multicriteria table of performances requires the conduct of sectoral studies on specific themes mobilizing both scientific knowledge carried by experts in various fields (biology, sociology, archaeology, etc.) and vernacular knowledge and concerns carried by a diversity of actors (knowledge of the territory by local populations)

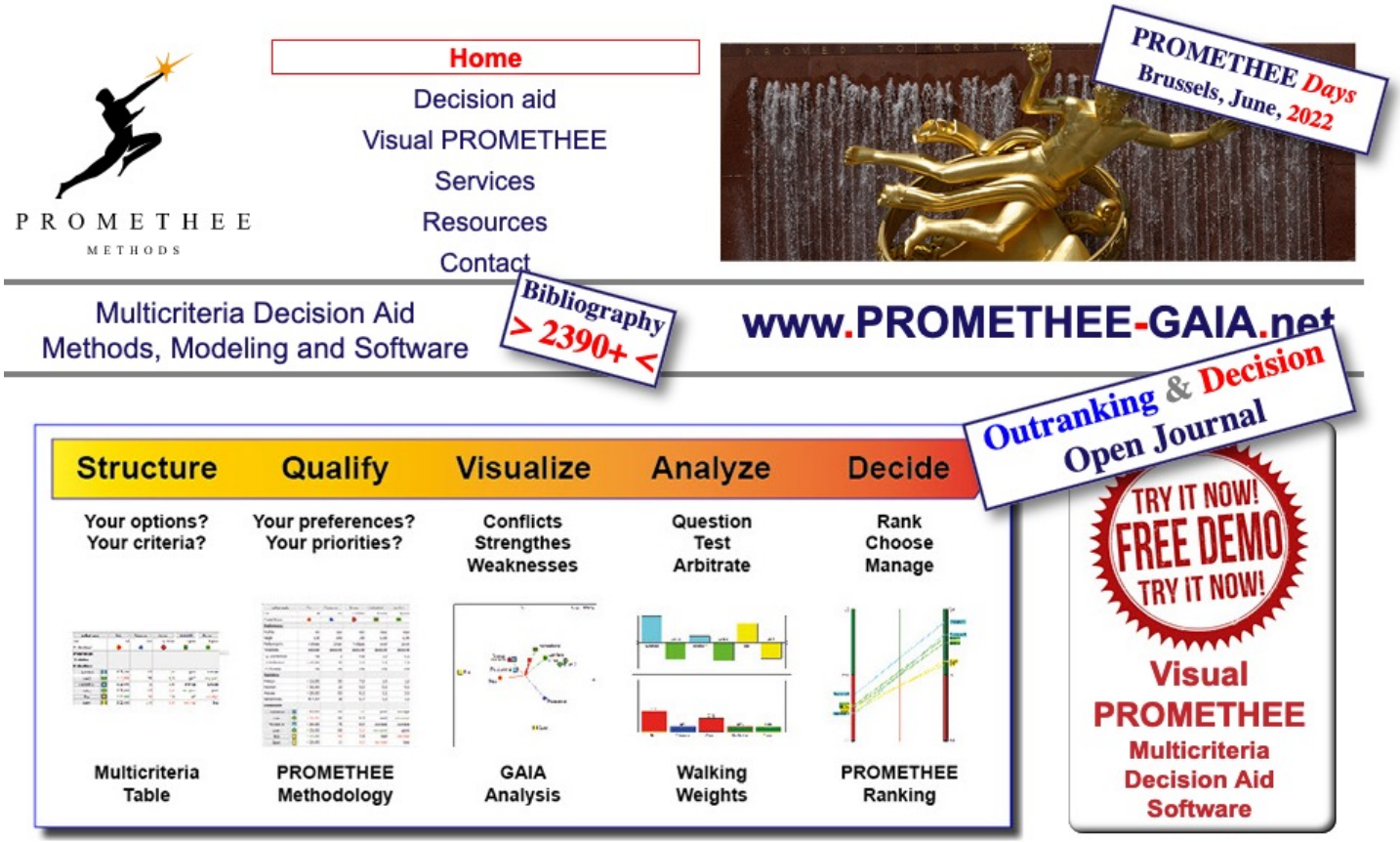
5.2 Assessment (3 steps)
Step 5. Formalize the existing value systems

- Stakeholder priorities : weighing the criteria
  - The criteria weighting stage enables the actors' value system to be formalized.
  - The relative importance of the criteria according each actor
  - This information directly affects the aggregation of preferences.
- Differentiate between our values and personal priorities, and those of the organization we represent.

5.2 Assessment (3 steps)
Step 6. Aggregate overall preferences

Owners	Agricultural ...	Forest cutover	Agro-tourism...	Industrial im...	Concentric s...	Diffuse sprawl	Riparian strip	Organic crops	Clearing for ...	Browfields v...	Social agree...	Empowerment
Unité	Ha	Ha	Meters	UEV class/km2	Ha	Integer	Meter	Ha	Boolean	Ha	Ordinale	Ordre
Cluster/Groupe	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Préférences												
Min/Max	max	max	min	max	min	max	max	max	max	max	max	max
Poids	7,50	7,50	7,50	7,50	17,50	17,50	10,00	10,00	5,00	5,00	2,50	2,50
Fn. de préférence	Forme en V	Forme en V	Forme en V	Usuel	Forme en V	Forme en V	Forme en V	Forme en V	Usuel	Forme en V	Usuel	Forme en V
Seuils	absolu	absolu	absolu	absolu	absolu	absolu	absolu	absolu	absolu	absolu	absolu	absolu
- Q: Indifférence	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d
- P: Préférence	1000,00	500,00	250,00	n/d	200,00	150,00	5,00	700,00	n/d	100,00	n/d	4
- S: Gaussien	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Statistiques												
Minimum	288,00	428,00	225,00	0,00	0,00	8,00	1,00	10,00	0,00	1,00	1	1
Maximum	2883,00	3769,00	900,00	3,00	209,00	190,00	5,00	1641,00	1,00	281,00	2	4
Moyenne	1333,00	2233,50	478,75	1,50	75,25	85,25	3,50	629,00	0,50	131,50	1	2
Ecart-type	985,13	1269,51	263,59	1,12	85,87	68,82	1,66	642,46	0,50	108,40	0	1
Evaluations												
☑ Base	720,00	428,00	225,00	1,00	92,00	8,00	3,00	10,00	Yes	61,00	1	1
☑ Growth	2883,00	3769,00	290,00	2,00	209,00	43,00	1,00	144,00	Yes	281,00	2	2
☑ Ecotopia	288,00	1739,00	500,00	3,00	0,00	100,00	5,00	1641,00	No	183,00	1	4
☑ Exurbia	1441,00	2998,00	900,00	0,00	0,00	190,00	5,00	721,00	No	1,00	1	2

5.2 Assessment (3 steps)
Step 6. Aggregate overall preferences



Several questions for each stakeholder

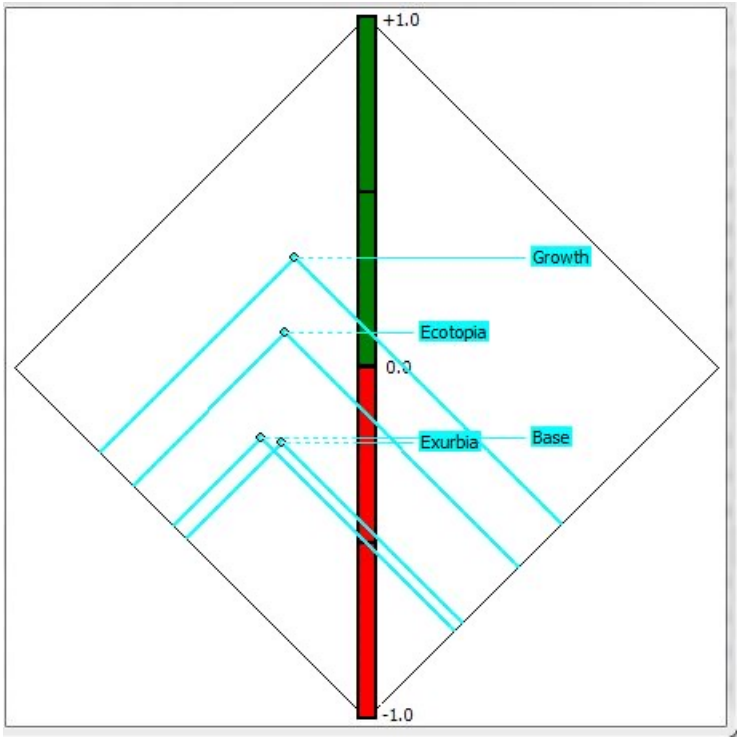
1. What is(are) the best scenario(s)?
   - PROMETHEE Rankings
2. Why is it a good scenario?
   - GAIA, Profiles, Rainbow
3. What about the weights of the criteria?
   - GAIA, Walking Weights
4. Why not another scenario?
   - GAIA, Profiles, Rainbow
5. Are there any missing criteria?
   - Brainstorming
6. Is the proposed scenario a robust one?
   - Visual Stability Intervals

Several questions for the group

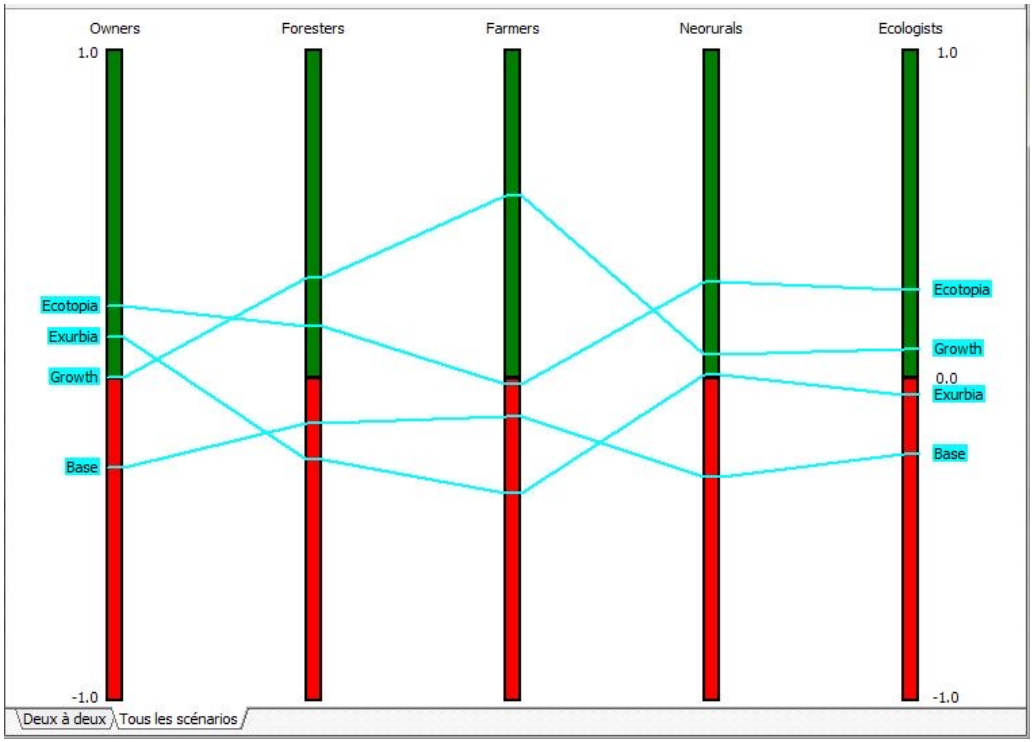
1. Is there a consensus about the best scenario?
   - PROMETHEE Group ranking, GAIA-Actors
2. Who disagrees with the proposed scenario? Why?
3. How do the stakeholders individually influence the scenario?
4. Is it a robust scenario?

2.2 Assessment (3 steps)
6. Aggregate overall preferences

Group ranking



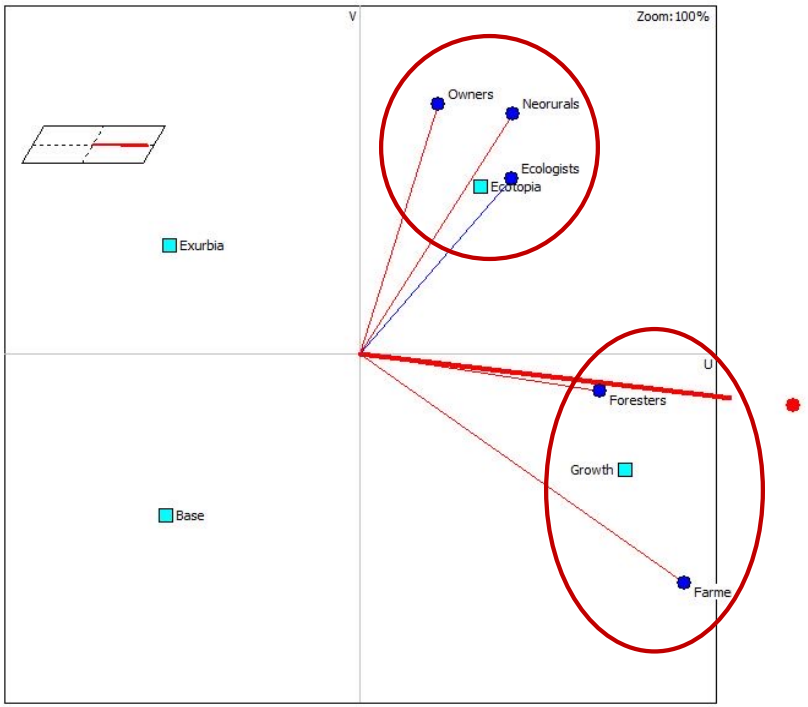
Individual rankings

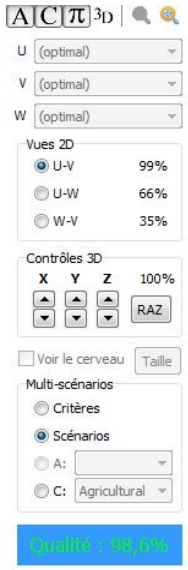


2.2 Assessment (3 steps)
6. Aggregate overall preferences

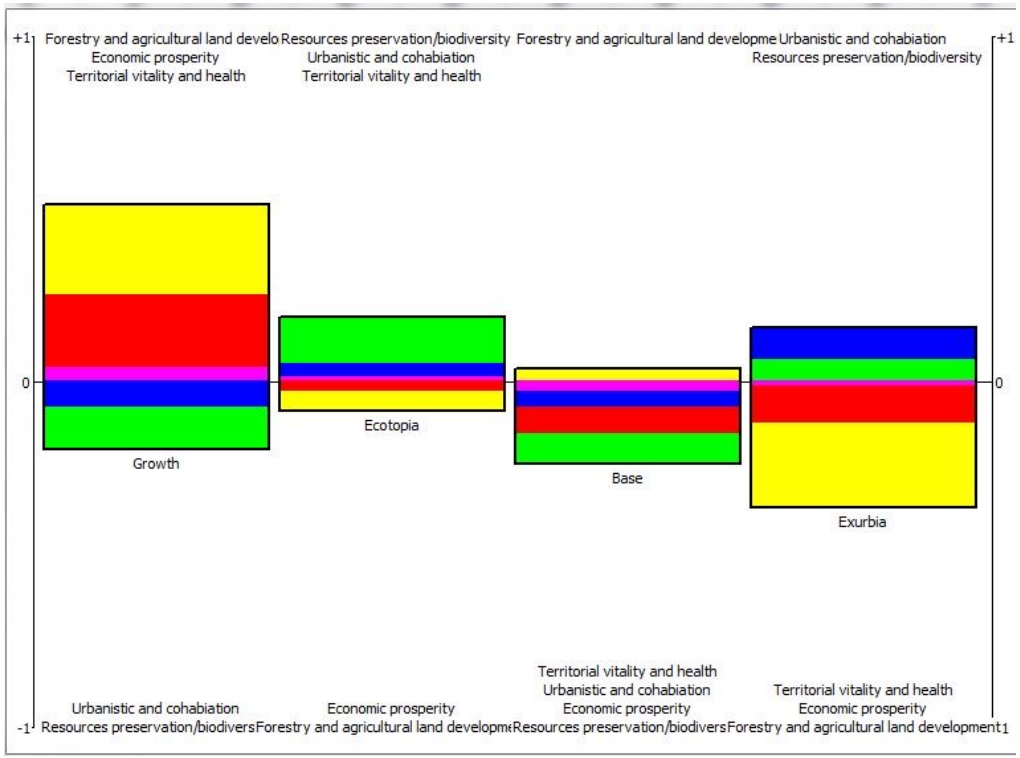
GAIA-actors: 2-dimensional graphic representation

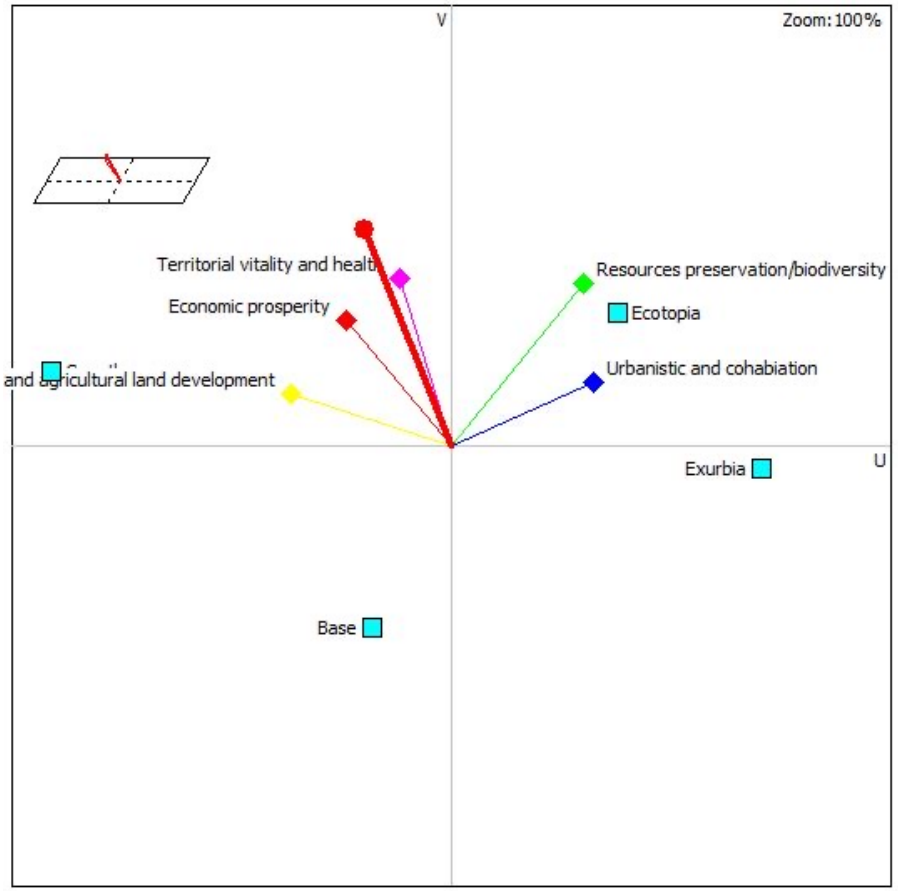
- Highlights conflicts between actors
- Helps identify possible trade-offs
- Helps identify coalitions





2.2 Assessment (3 steps)
6. Aggregate overall preferences





2.3 Choice (2 steps)

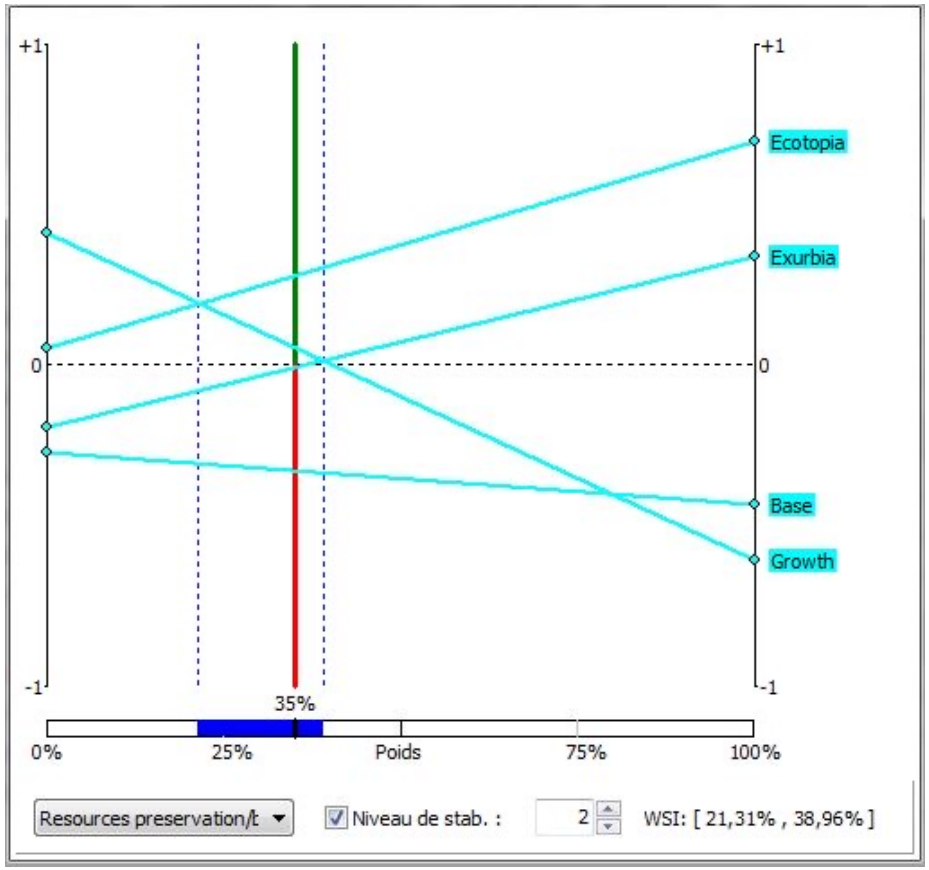
7. Construction of a robust group of scenarios (sensitivity and robustness analysis)
8. Recommendations and decision

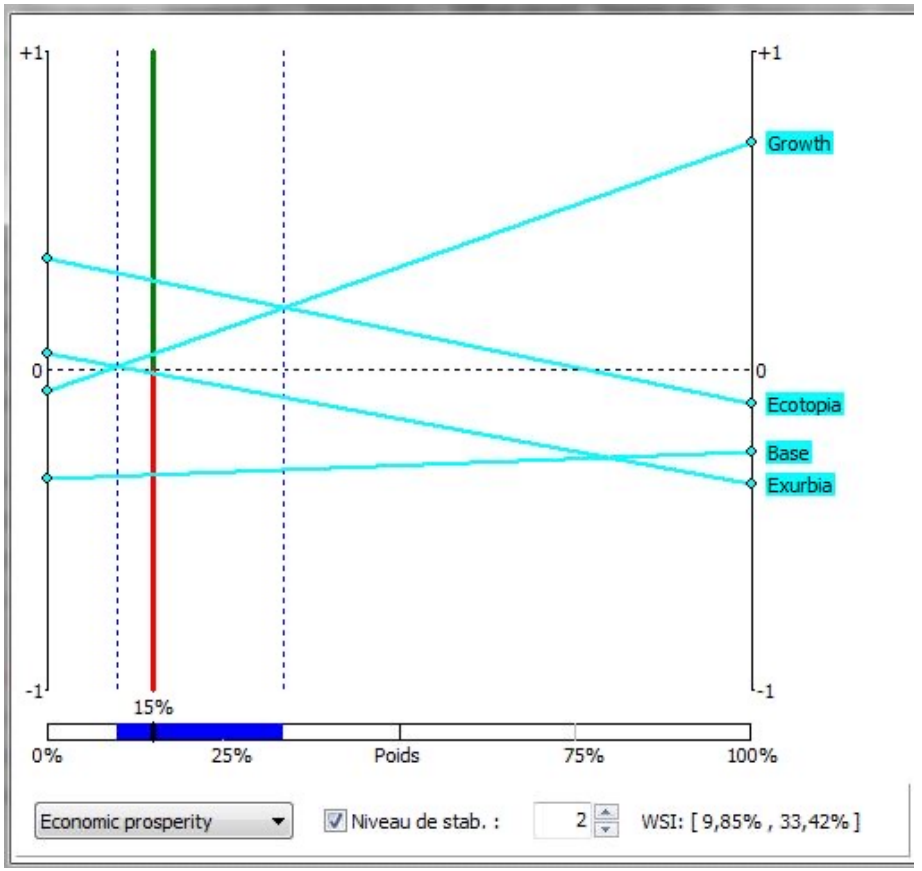
2.3 Choice (2 steps)
7. A robust group of scenarios

Varying the weight of the actors allows to see how the influence of a more demanding group could change the ranking

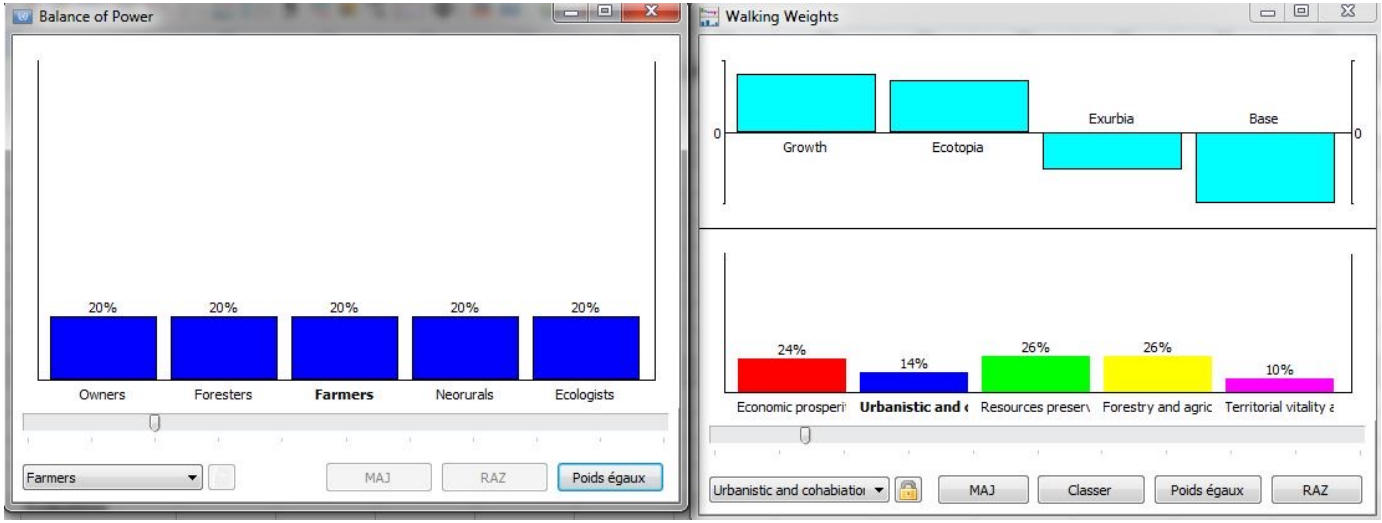
1. In general, no group has the "power" to change the complete ranking of scenarios
2. Even if the relative importance of each of the groups in terms of decision-making weight varies markedly, the ranking remains the same.
3. Exception for farmers: further claims by this group change the ranking. The economic scenario (Growth) comes first just ahead of the environmental scenario (Ecotopia).

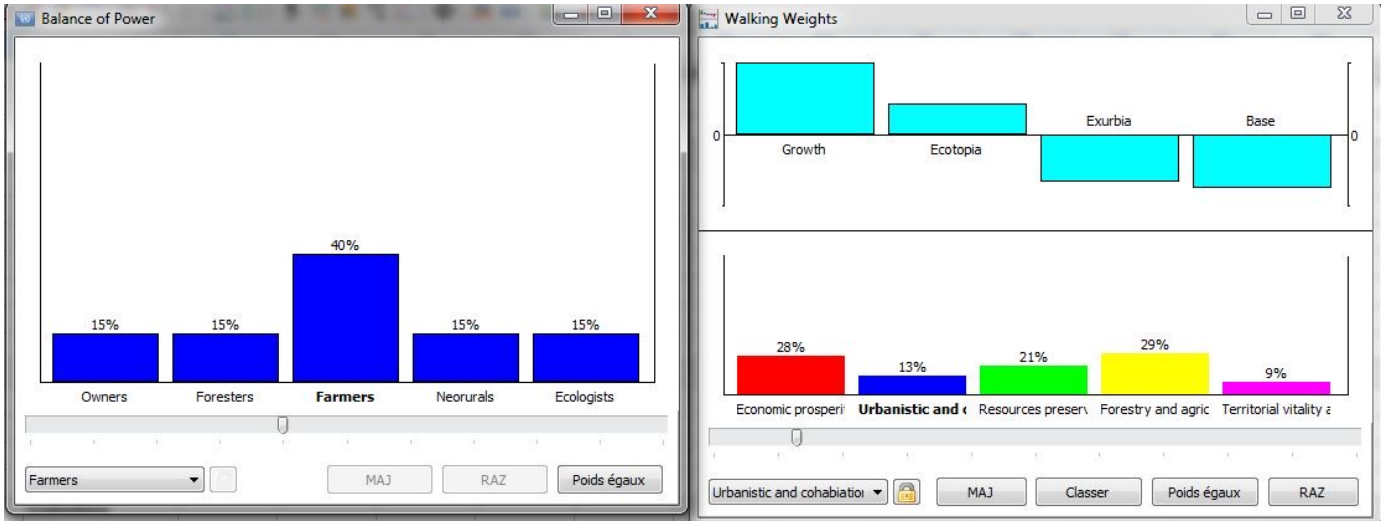
2.3 Choice (2 steps)
7. A robust group of scenarios





2.3 Choice (2 steps)
7. A robust group of scenarios

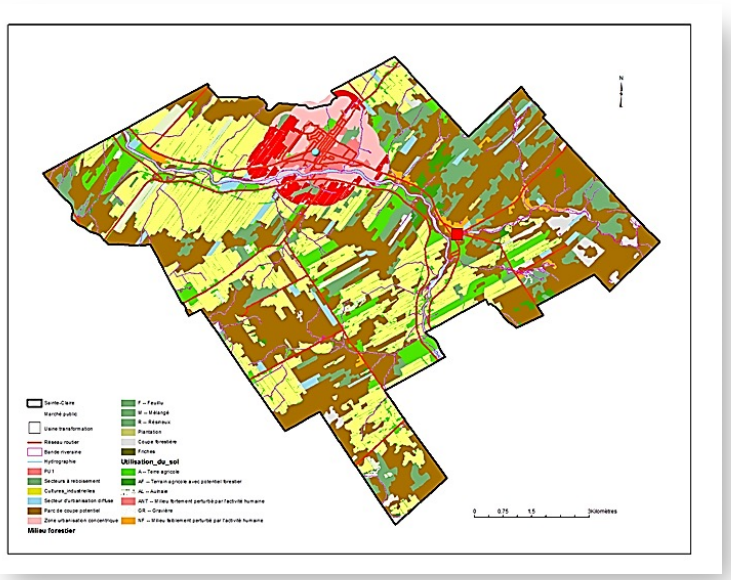


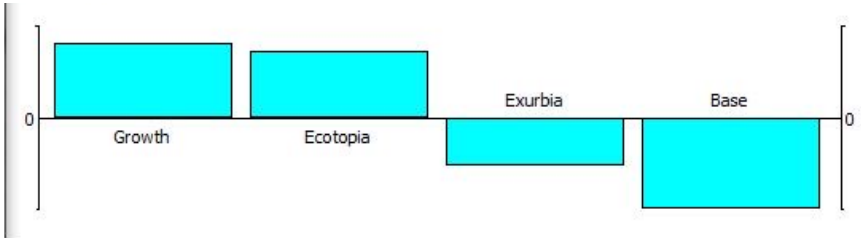


2.3 Choice (2 steps)
8. Recommendation and decision

The SOMERSET-P spatial and decision-aiding models:

1. Allows to visualize the possible futures subject to choose
2. Allows to evaluate and quantify the impacts of potential scenarios on the territory
3. Allows to reduce the black box effect = more objectivity in a necessarily subjective process.





3. CONCLUSIONS

The R-SESA and the application of MCDA methods in a multi-actor context make it possible to improve the territorial planning process by formulating several scenarios and analysing them by means of a multicriteria table of performance considering the environmental, social and economic consequences that each entails.

MCDA methods allow the integration of value systems carried by the actors at each stage of the process leading to the decision (the construction of the object, the identification and analysis of the issues of the decision, the decision).

Let’s continue the conversation!

Post questions and comments via chat in the IAIA22 platform.

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Waaub Jean-Philippe

Full Professor, Geography Department (UQAM)

Québec, Canada

Waaub.jean-philippe@uqam.ca

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