Rural Road Maintenance in Madagascar

Sylvie Ramanantsoa[1] Alexis Tsoukiàs[2]

[1]AGETIPA, Antananarivo, Madagascar
sylvie.ramanantsoa@agetipa.mg
http://www.agetipa.mg

[2]LAMSADE - CNRS, Université Paris-Dauphine
tsoukias@lamsade.dauphine.fr
http://www.lamsade.dauphine.fr/∼tsoukias

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Outline

Road Maintenance in Madagascar

AGETIPA is “Maitre d’Ouvrage” for the public works on behalf of the Minister of Infrastructure in Madagascar. In that capacity they have to establish a medium term plan for the maintenance of the rural road network of the country. For this purpose they manage a grant (from the BEI) to be used for the covering (possibly partially) the cost of the maintenance programme.

This has also been seen an an opportunity to enhance AGETIPA’s capacity in OR and project management.

Road Maintenance in Madagascar: Who?

The Actors

- The State
- The Management Agency (the client)
- The local Mayors
- Other local actors
- The Funding Agencies

Road Maintenance in Madagascar: Why?

The Concerns

- Improve Road Maintenance
  - Network Connections
  - Accessibility
  - Local Economy
  - Robustness against climate
- Improve Local Involvement
- Justify wrt to Funding Agencies

Road Maintenance in Madagascar: What?

The Problem Formulation

Γ: Given a set of possible road maintenance projects choose the ones to fund within the current budget so that strategic planning priorities are met and local involvement is pursued.

The Evaluation Model

$\mathcal{M}$: Assess the projects submitted to the Agency in order to classify them in “accepted”, “negotiable” and “rejected”. Use the criteria and the “negotiable” class in order to pursue the local involvement strategy.

Attributs and Criteria Structure 1

- Participation of the public actors (how much the local municipality contributes to the road maintenance project);
- Participation of the private actors (how much strong private actors contribute to the road maintenance project);
- Internal accessibility
- External accessibility
- Population Density
- Economic Density
- Costs

Attributs and Criteria Structure

- Internal accessibility
  - Access to administrative and socially important centers
  - Access to fertile land
  - Access to economic activity centers
  - Level of service presently
- External accessibility
  - Intersection with main road network
  - Condition of the intersections
  - Traffic Level
  - Shortcuts

Example

You have a number of rural road maintenance projects and you want to assess the “service level” of each road concerned by the projects.

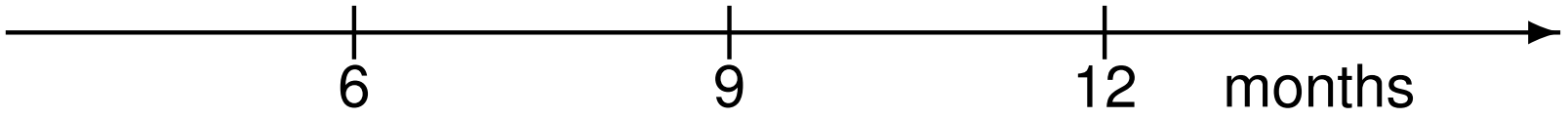
Such an assessment takes into account:

- how many months the road is accessible;
- what is the maximum speed you can use safely;
- how confortable is the road at that speed.

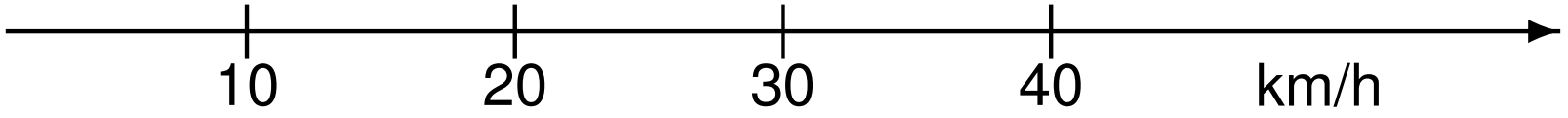
The “service level” can be 0, 1, 2, 3, 0 being the worst and 3 being the best.

How do you do that?

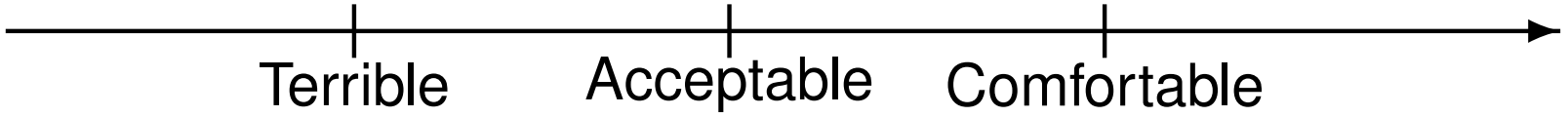
Circulation



Speed



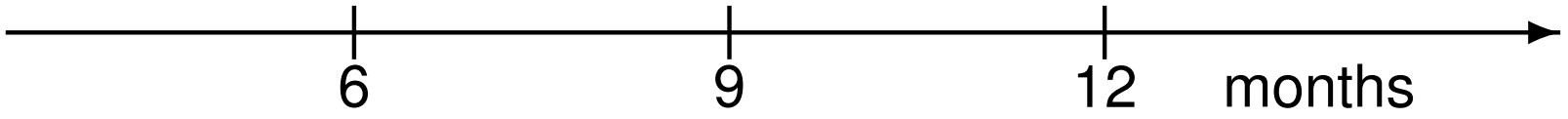
Comfort



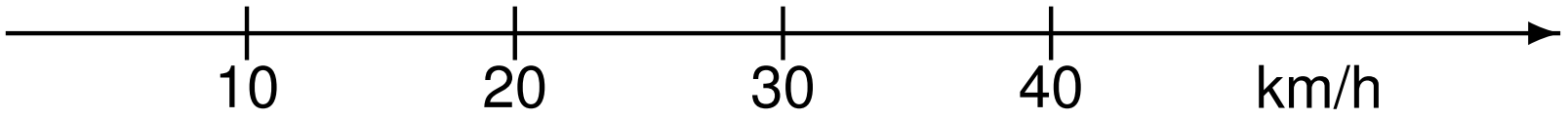
Service

How do you do that?

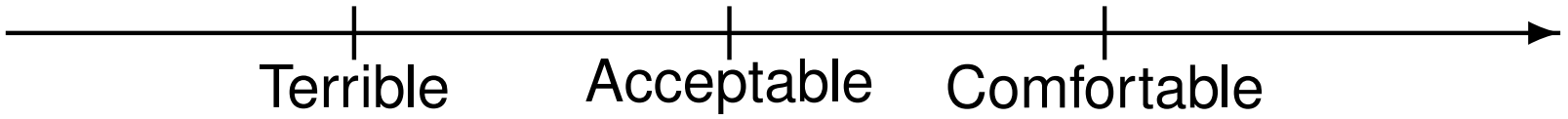
Circulation



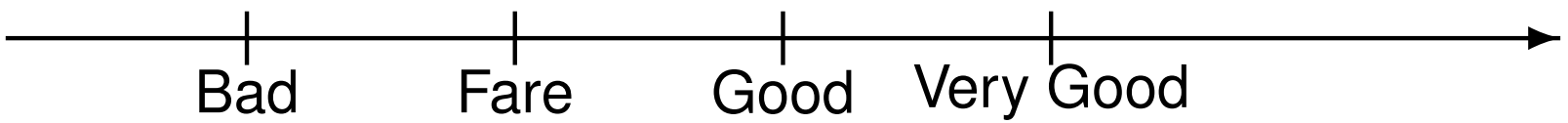
Speed



Comfort



Service



Results

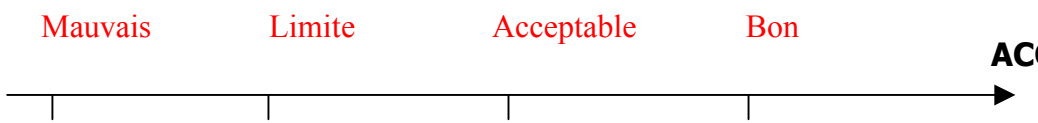
The method has been tested in a pilot study in an area near Antananarivo. 4 real projects already submitted for funding were considered as alternatives. Information has been retrieved from AGETIPA's databases on all relevant dimensions of the model.

The projects have been compared to the profiles of the categories of "acceptable", "negotiable", "to reject" and then classified to one among these classes.

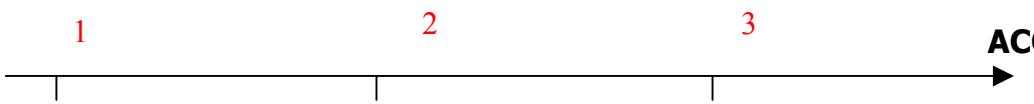
6. Schématisation des échelles de valeur

PARTICIPATION DU PUBLIC %

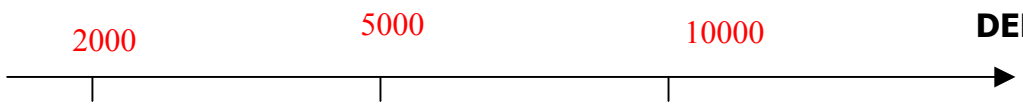
PARTICIPATION DU PRIVE %



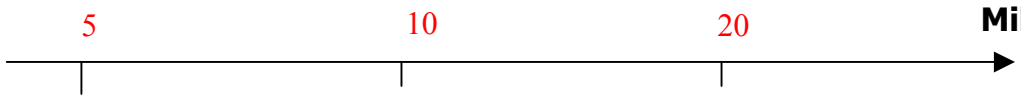
ACCCESSIBILITE INTERNE



ACCESIBILITE EXTERNE



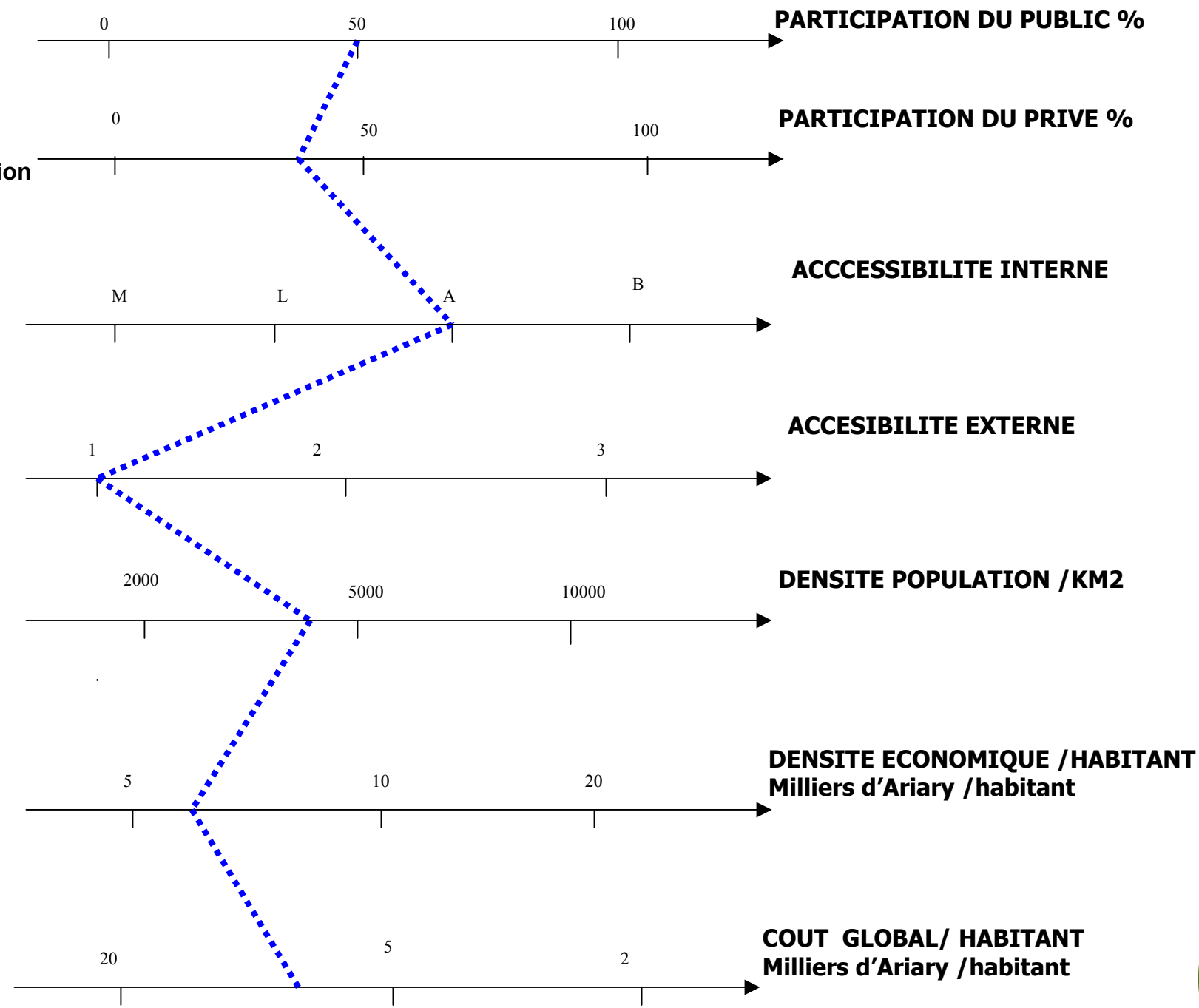
DENSITE POPULATION /KM2



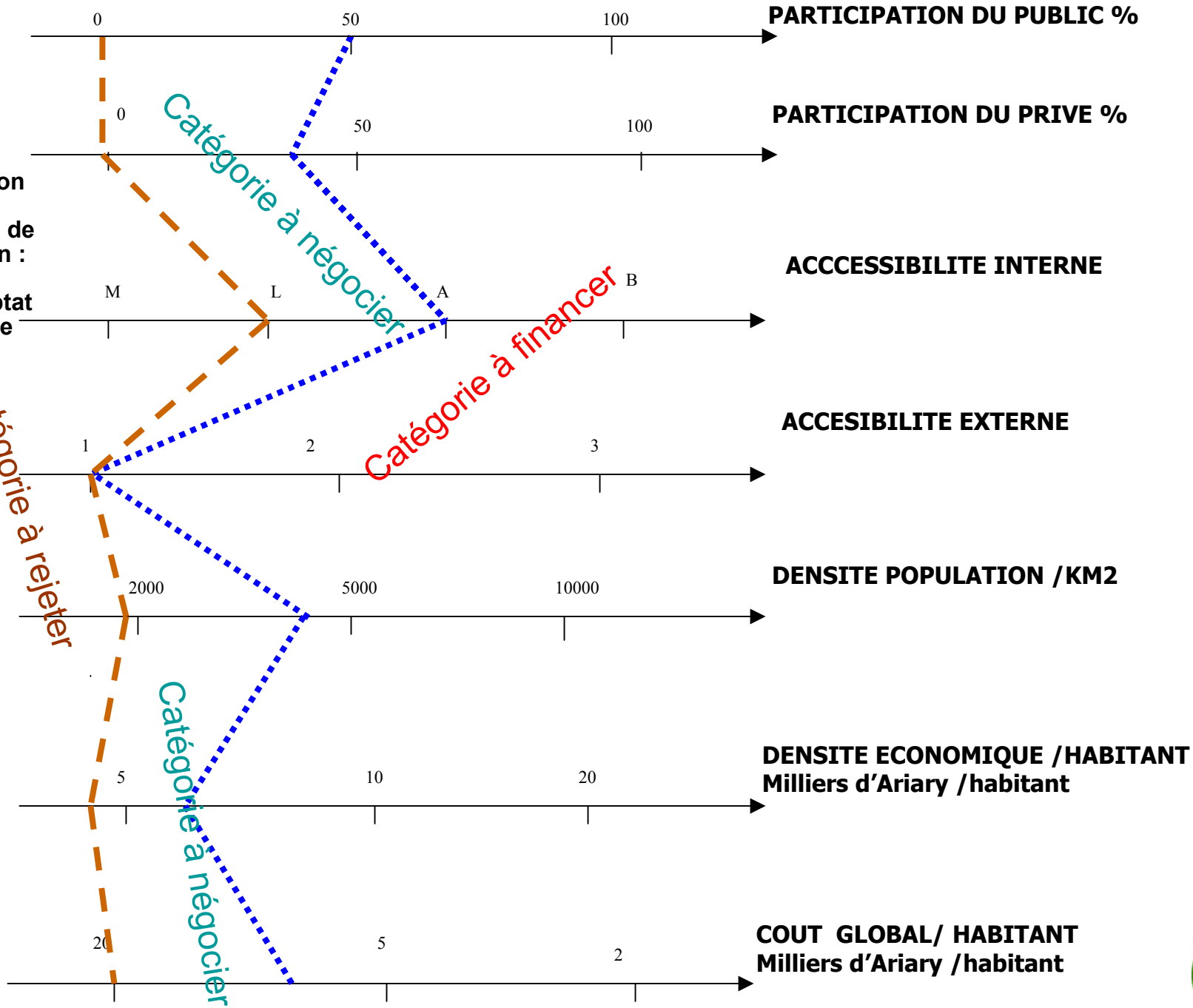
DENSITE ECONOMIQUE /HABITANT
Milliers d'Ariary /habitant

COUT GLOBAL /HAB
Milliers d'Ariary/habitant

7. Définition des profils

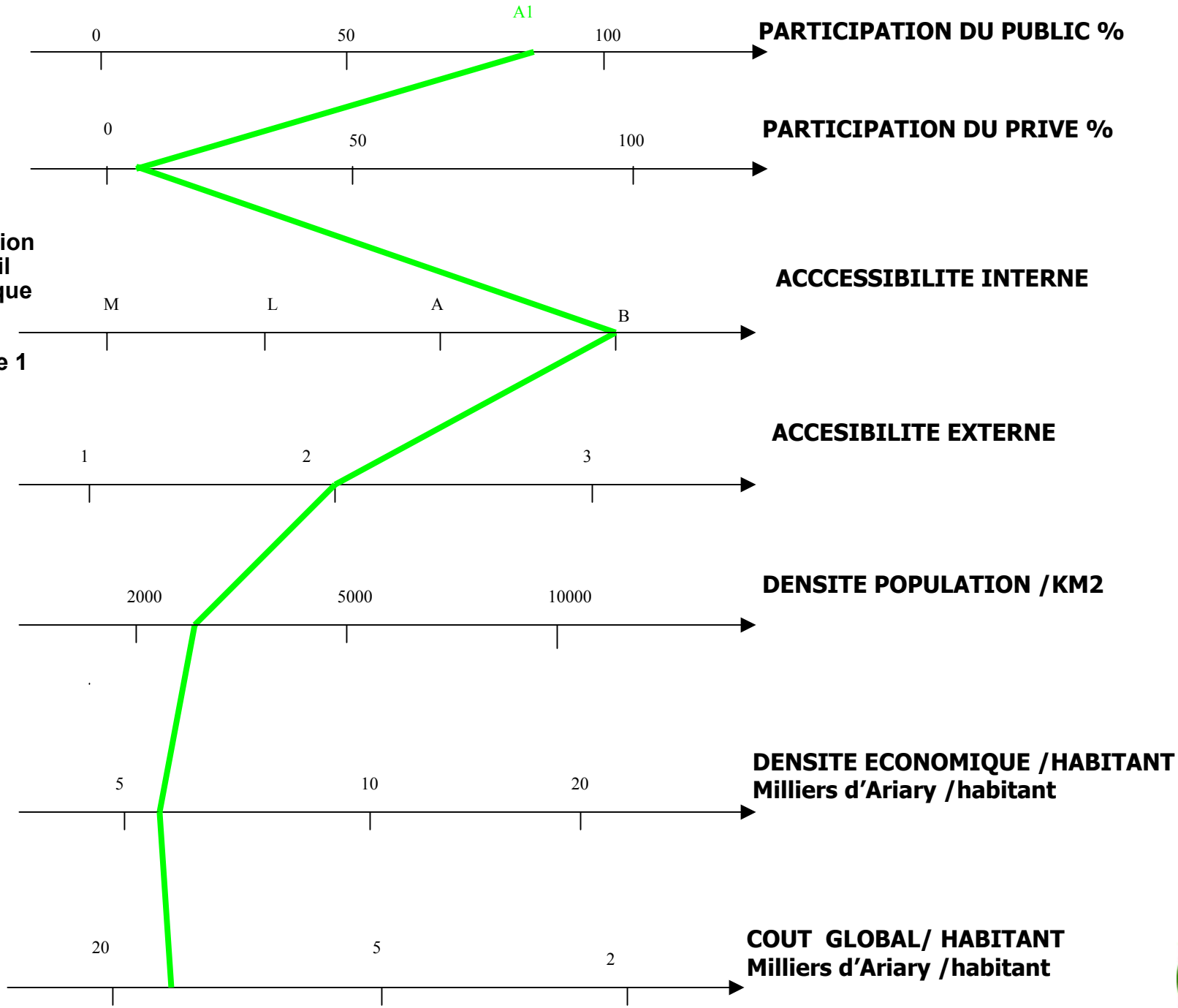


8. Définition des classes de décision : seuil d'acceptation et de rejet



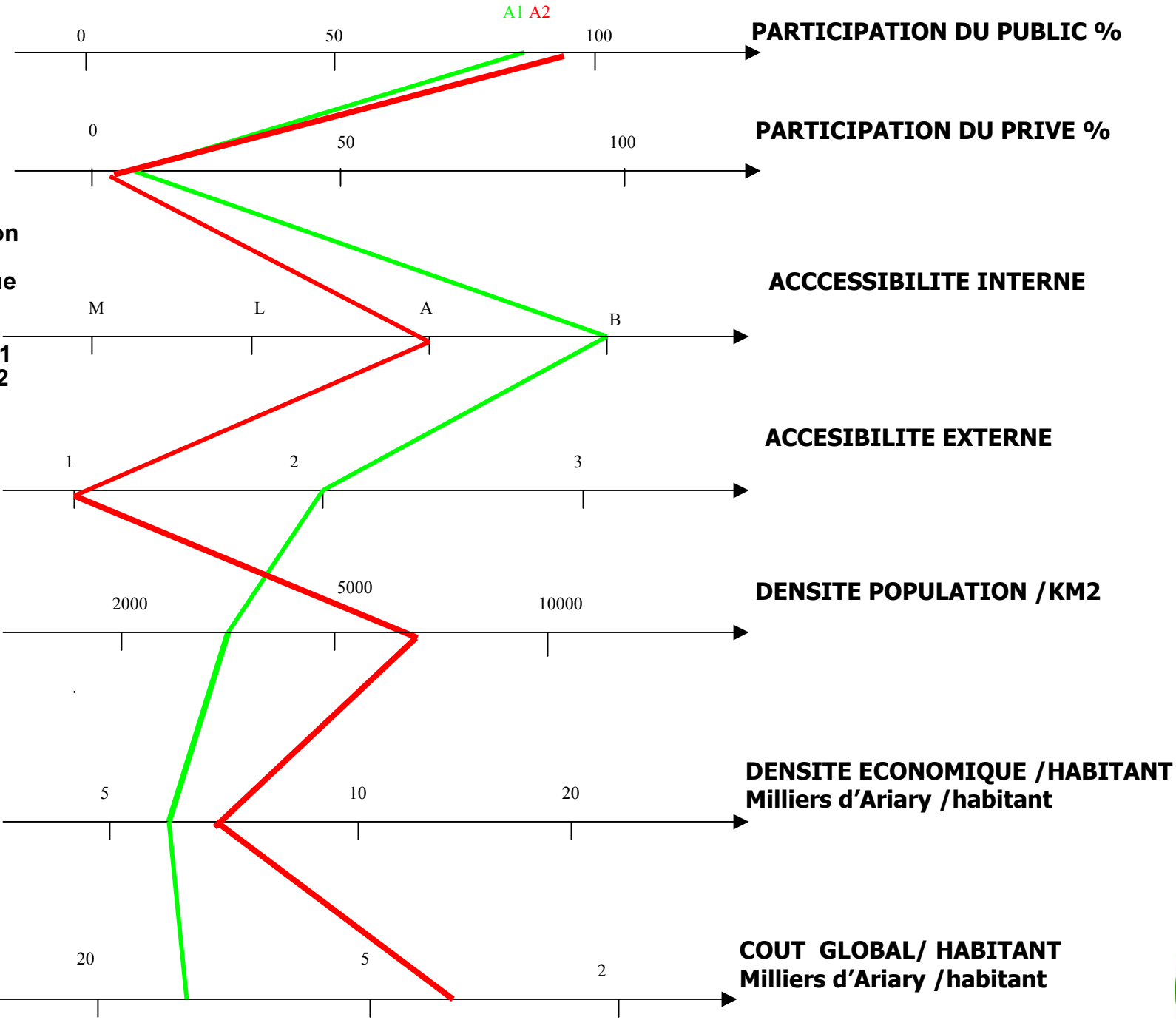
9. Évaluation du profil de chaque axe:

Cas Axe 1



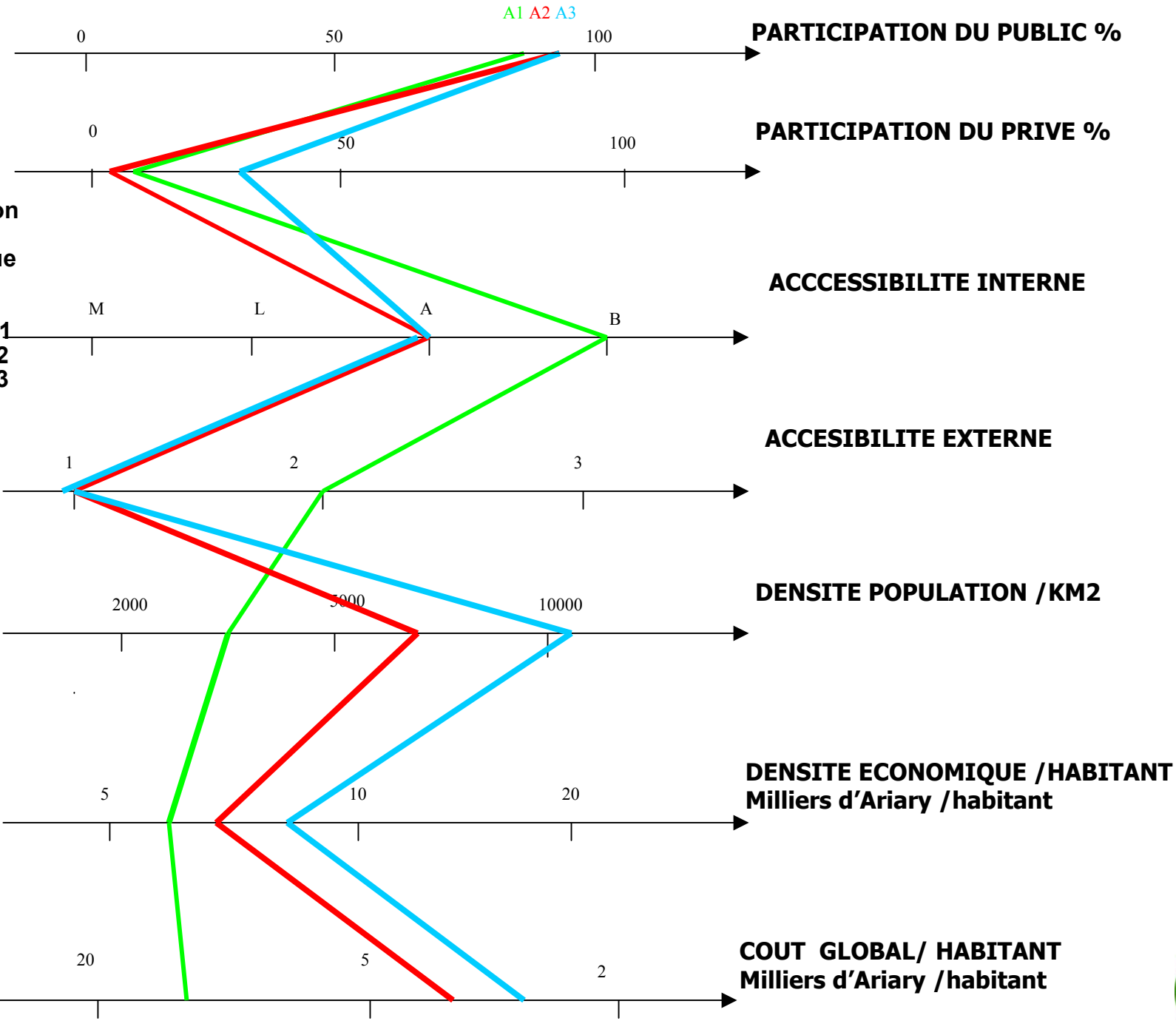
10. Évaluation du profil de chaque axe:

Cas Axe 1
Axe 2



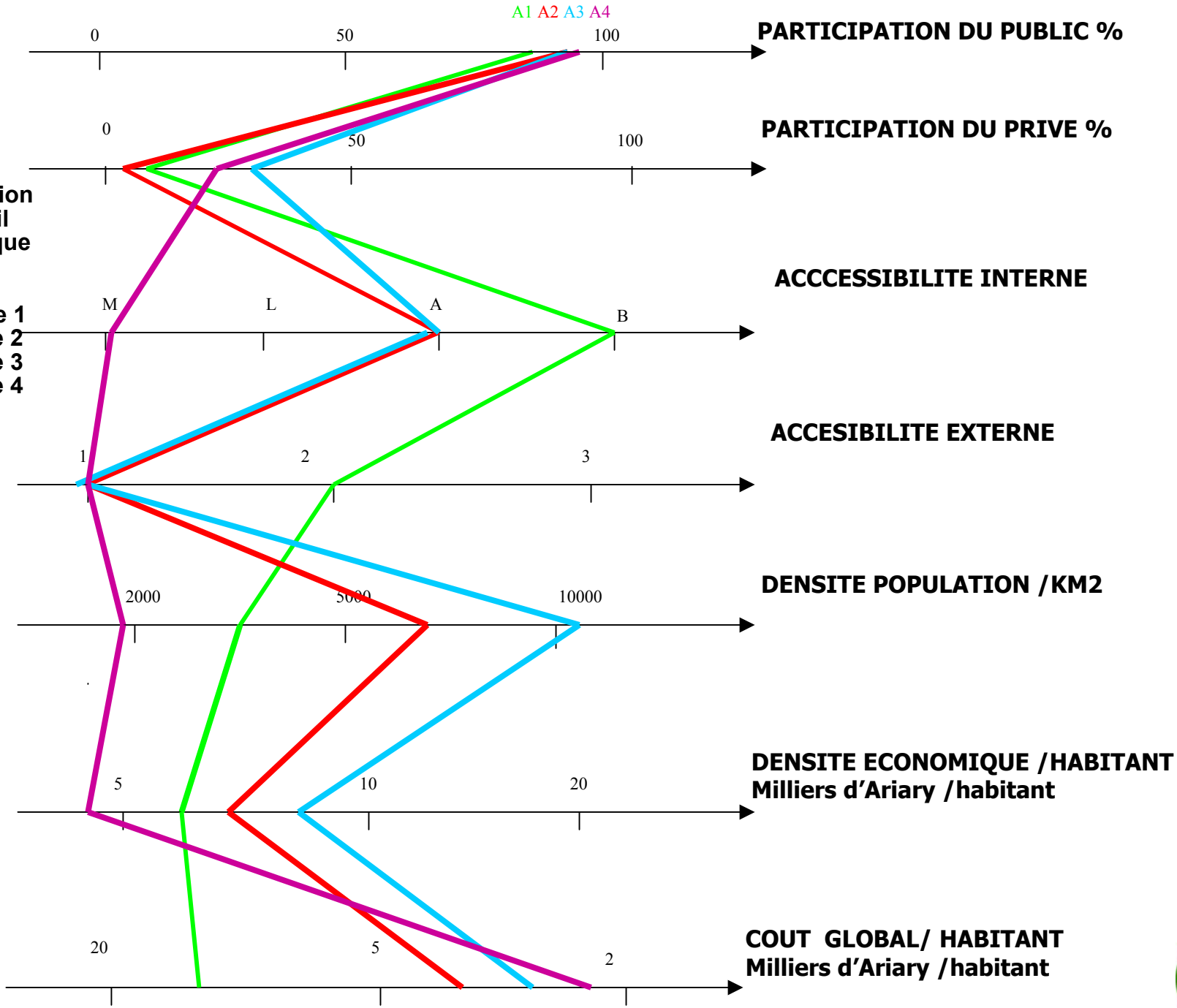
11. Évaluation du profil de chaque axe:

Cas Axe 1
Axe 2
Axe 3

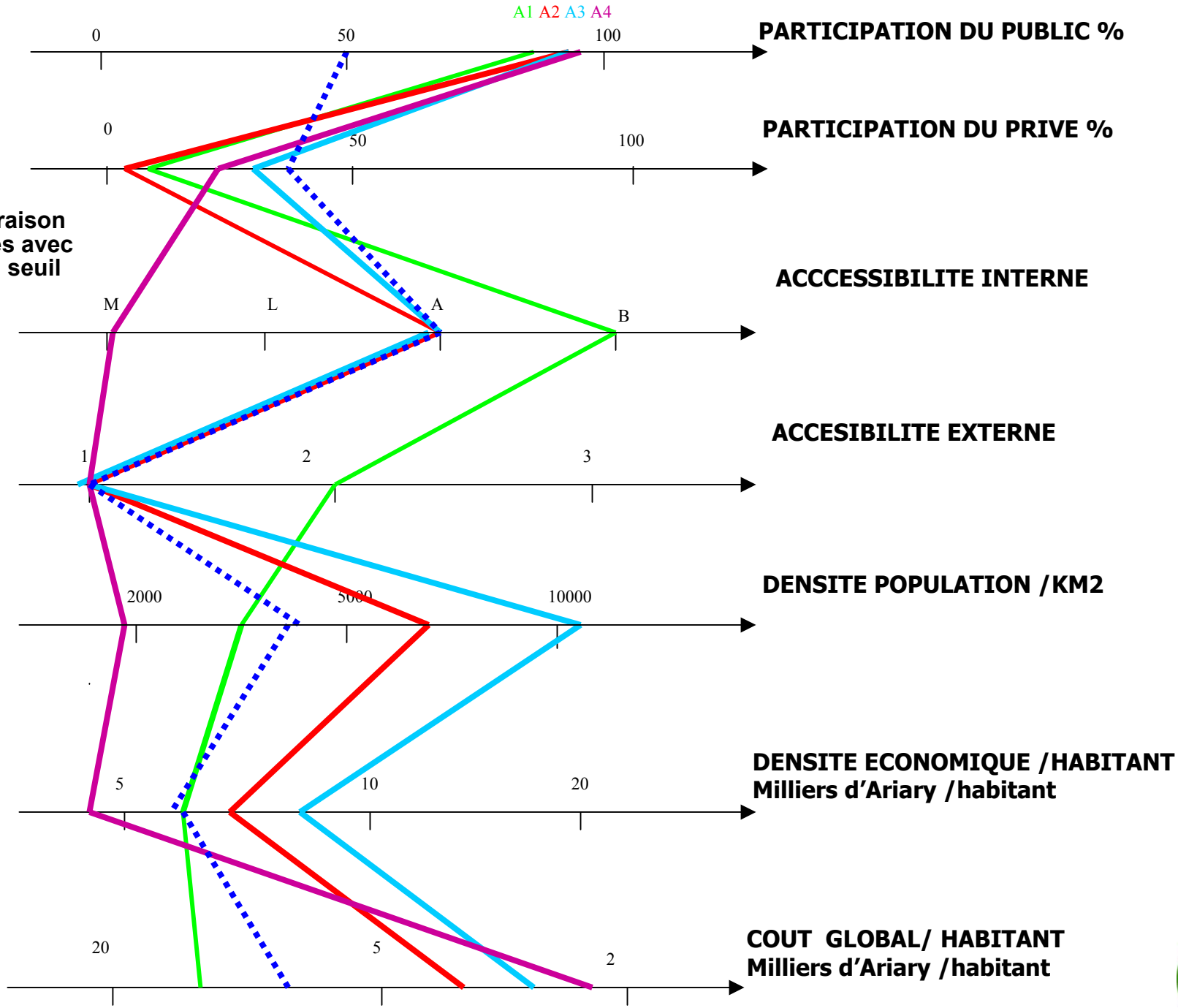


12. Évaluation du profil de chaque axe:

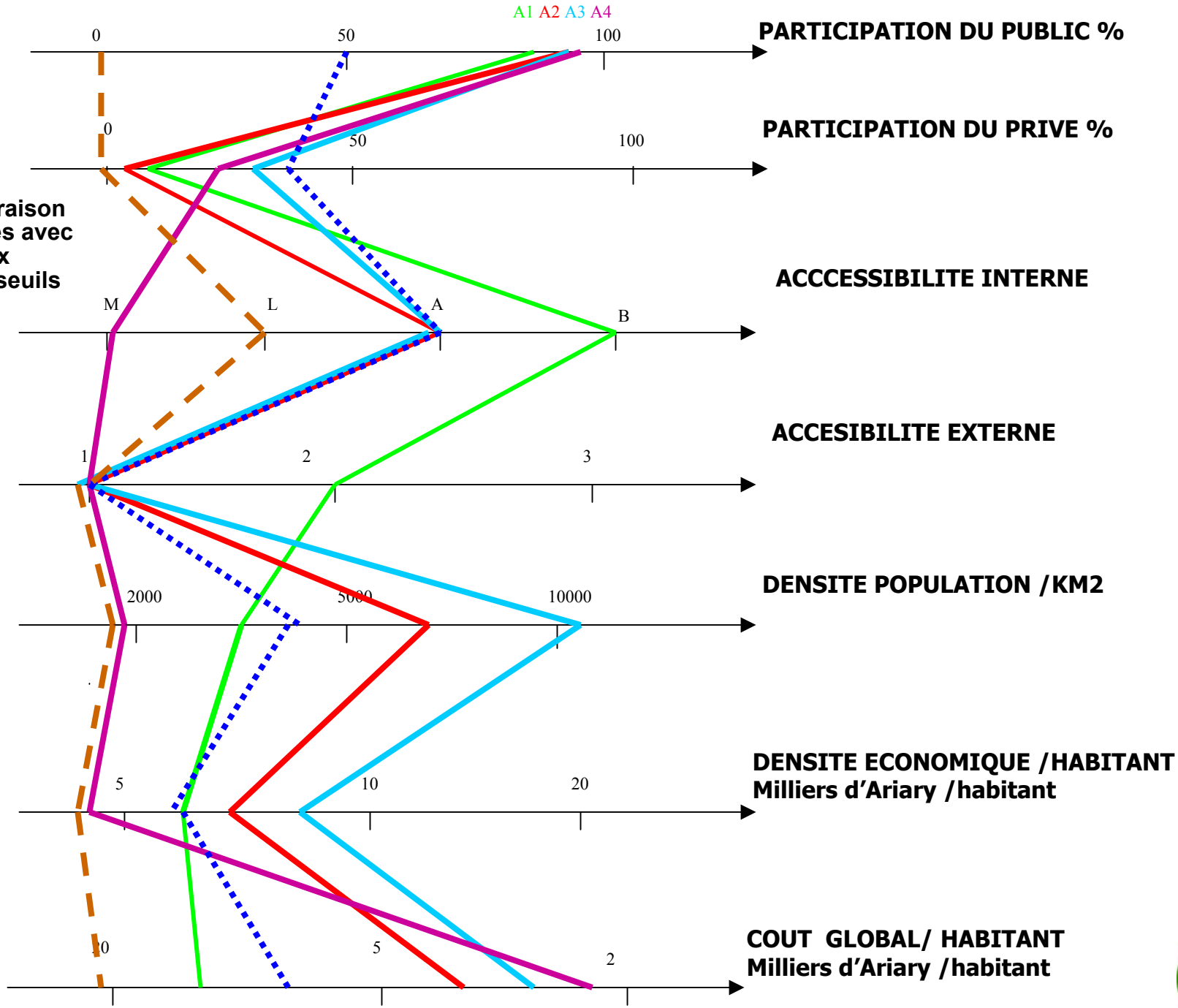
Cas Axe 1
Axe 2
Axe 3
Axe 4



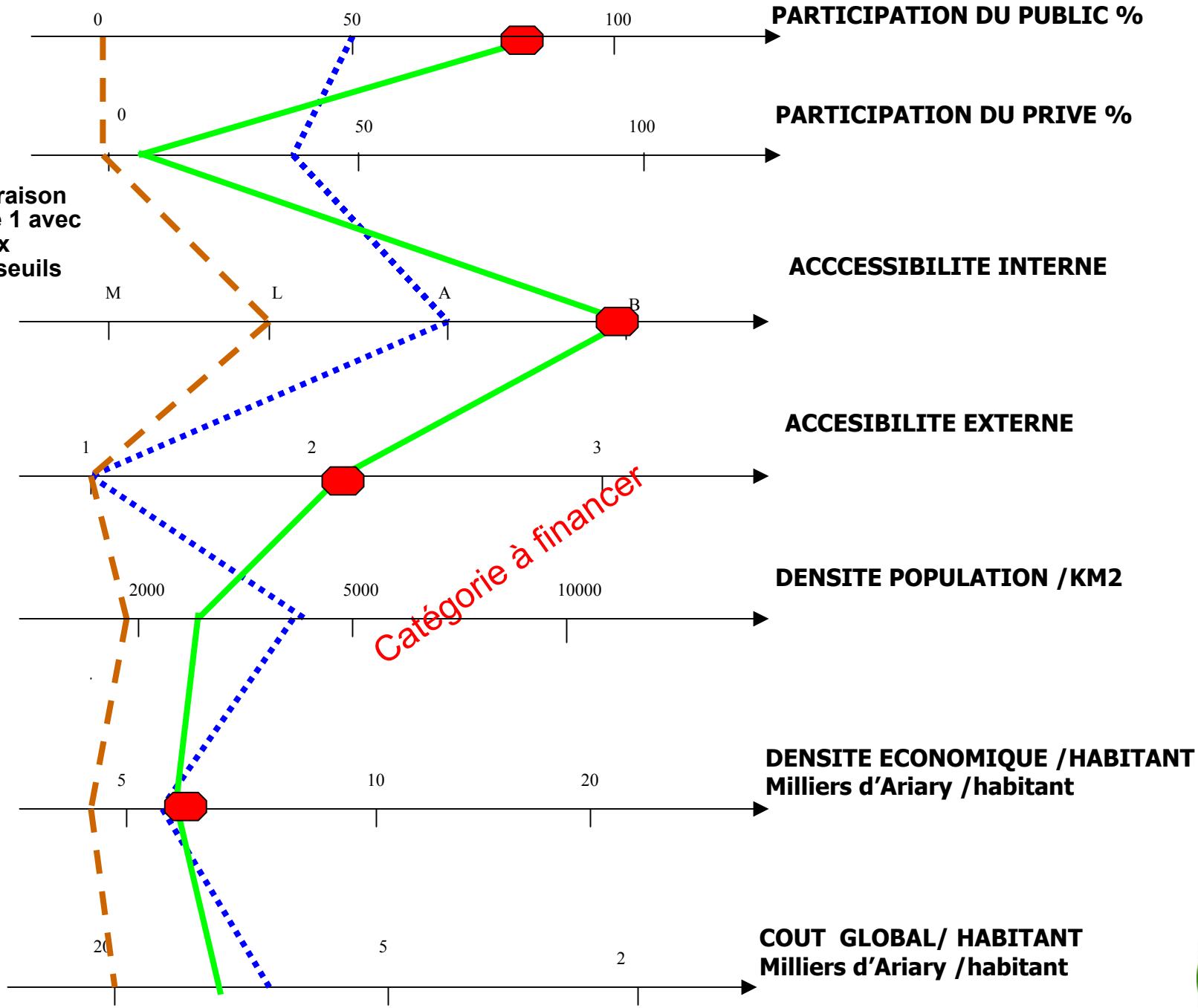
13. Comparaison des axes avec le profil seuil



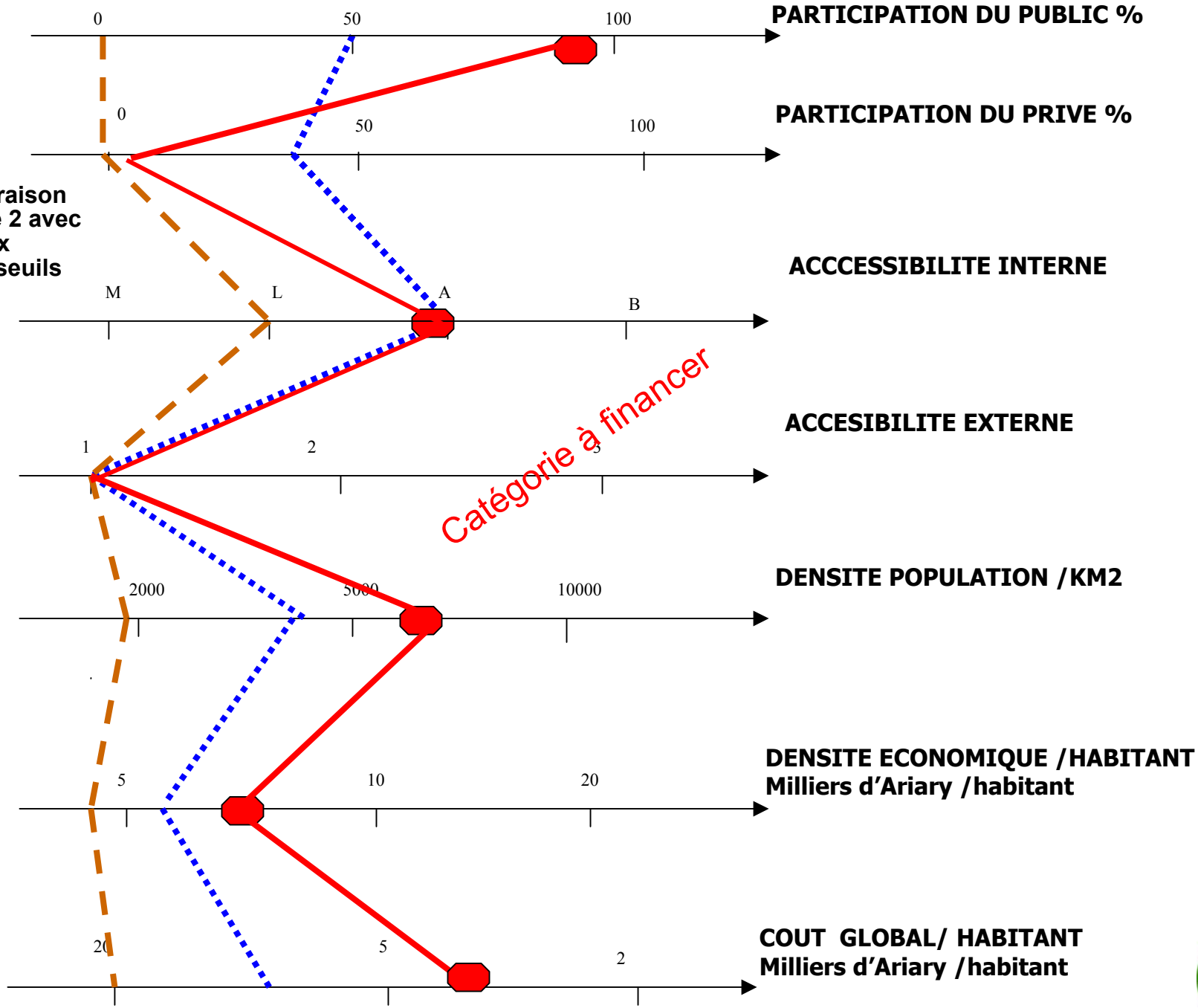
14. Comparaison des axes avec les deux profils seuils



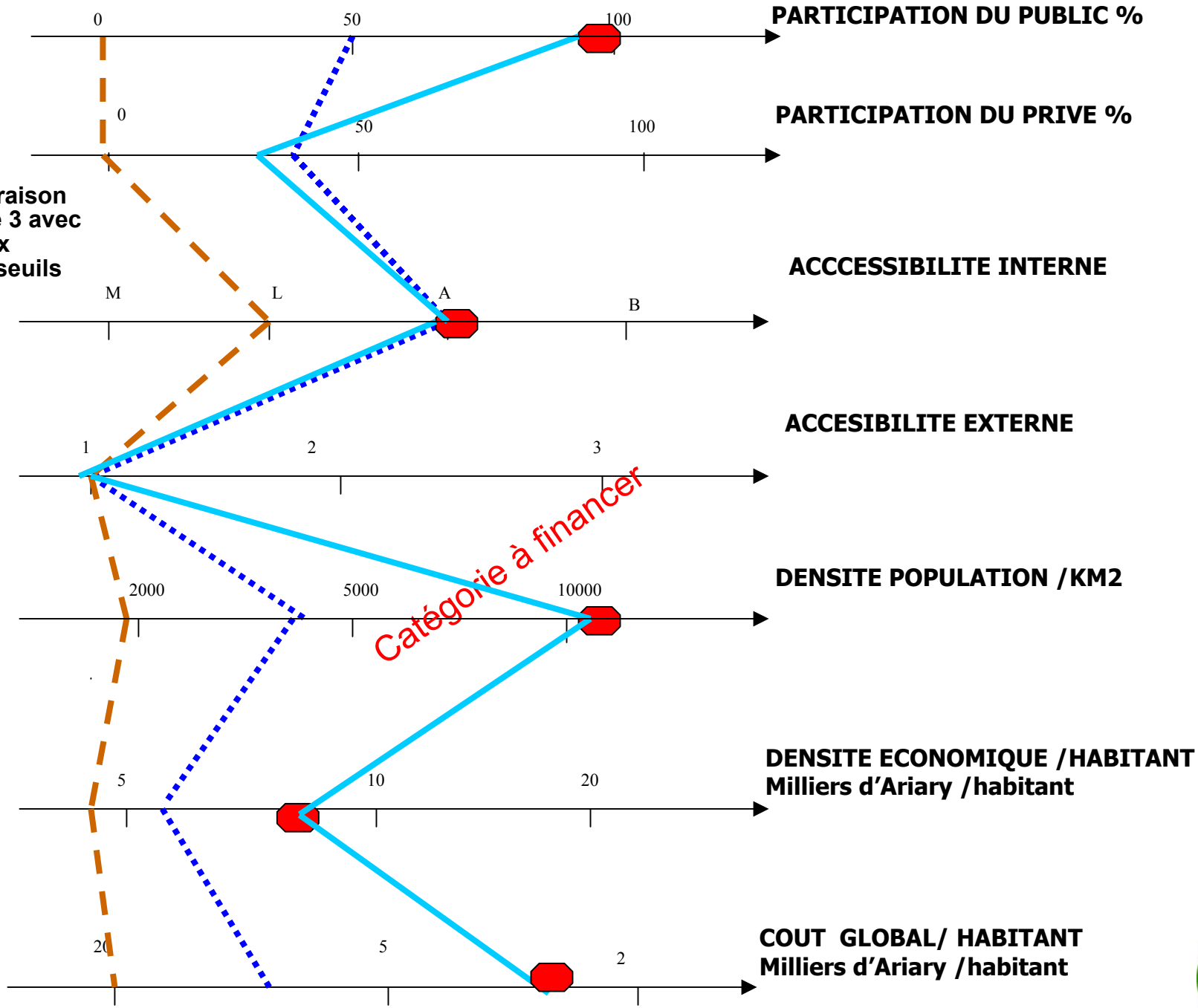
15. Comparaison de l'axe 1 avec les deux profils seuils



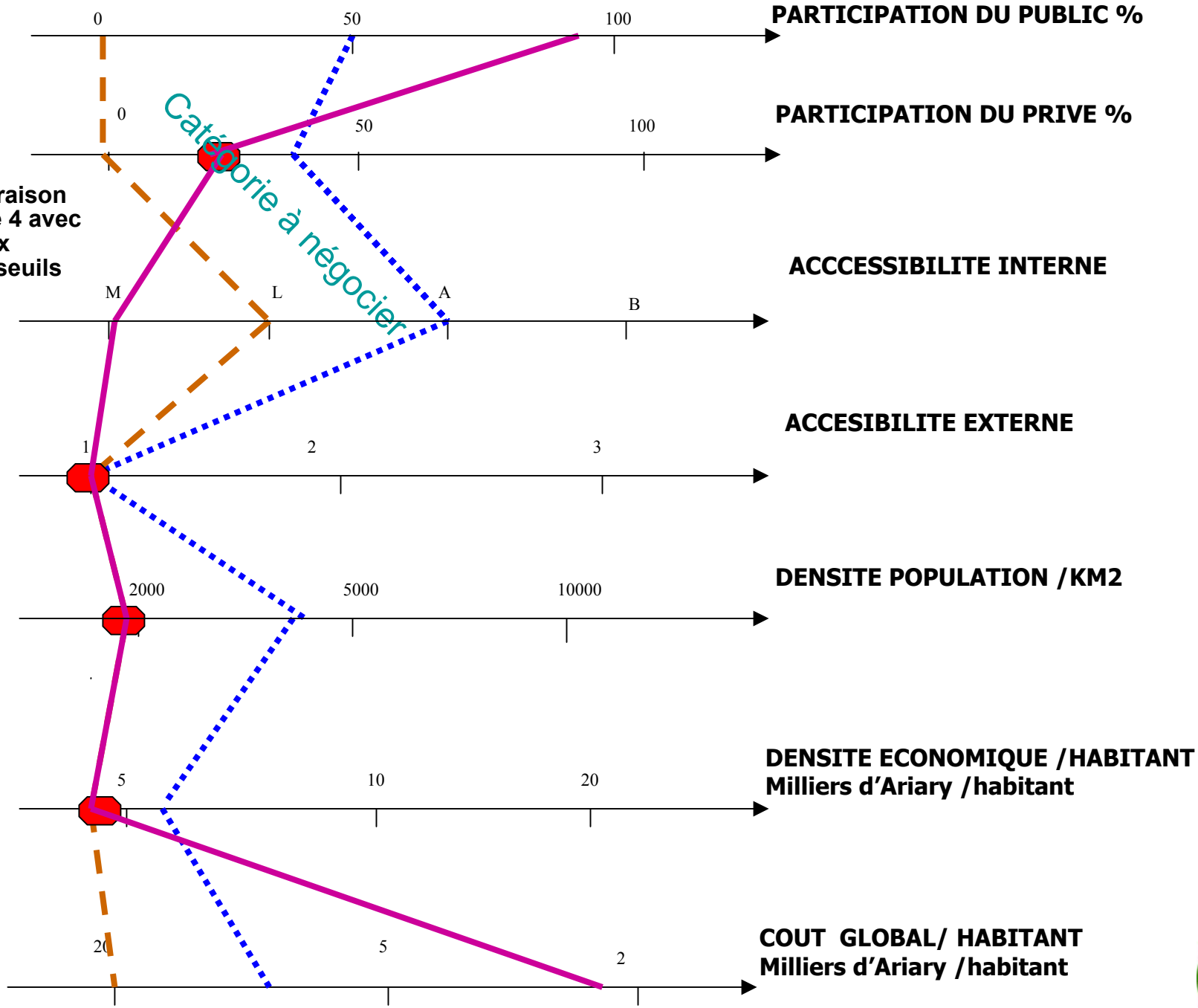
15. Comparaison de l'axe 2 avec les deux profils seuils



15. Comparaison de l'axe 3 avec les deux profils seuils



15. Comparaison de l'axe 4 avec les deux profils seuils



Conclusions

- The project positively reply to AGETIPA's demand to work with a decision aiding methodology more flexible wrt to the traditional CBA which did not allow to implement more strategic options.
- The proposed method belongs to the so-called "Ordinal measurement procedures", a class of methods to be further developed.
- The pilot study was satisfactory and confirmed AGETIPA's perspective to further enhance its capacity in OR and Decision Support.

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