

# Agent-based Modelling of the Ecosystem Services Diffusion through Urban Green Spaces

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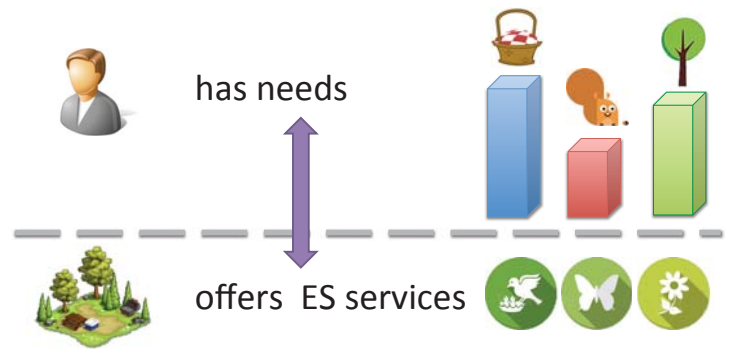
Ecosystem services definition proposed by the Millennium Ecosystem Assessment (MEA2005)  
 « these are the benefits that human groups obtain from ecosystems ».

## RESEARCH PROBLEMATIC

It belongs to the research project SERVEUR (ecosystem services of urban green spaces) funded by the Centre region in France: our objective is to identify cultural services brought by the urban green spaces for population and collectivities, in order to understand their tangible and intangible properties.

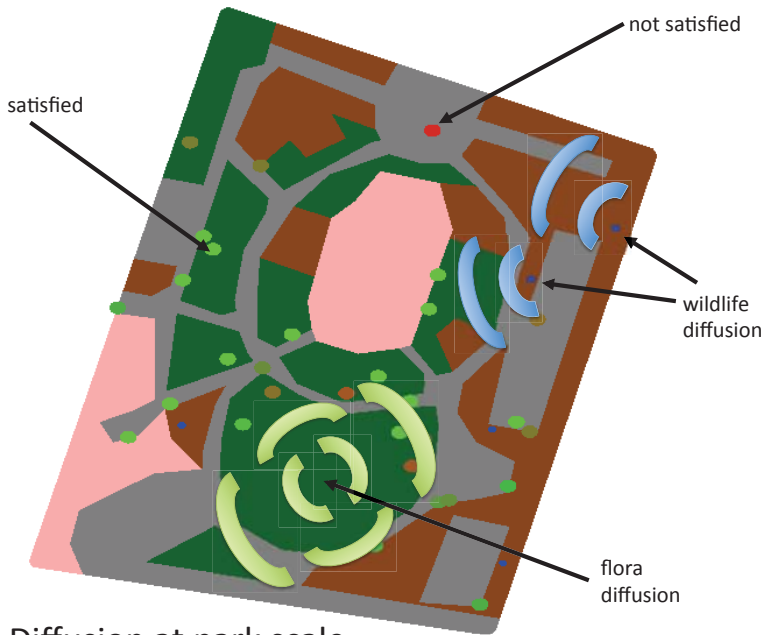
## MODEL

Sociological studies have been conducted to qualify and quantify the perception of the *nature offer* by the inhabitants. Our model confronts the needs of people to diffusion of criteria (wildlife, geolocation, etc.).



## AGENTS

Inhabitants are modeled as agents with a specific amount of « well-being ».



Diffusion at park scale

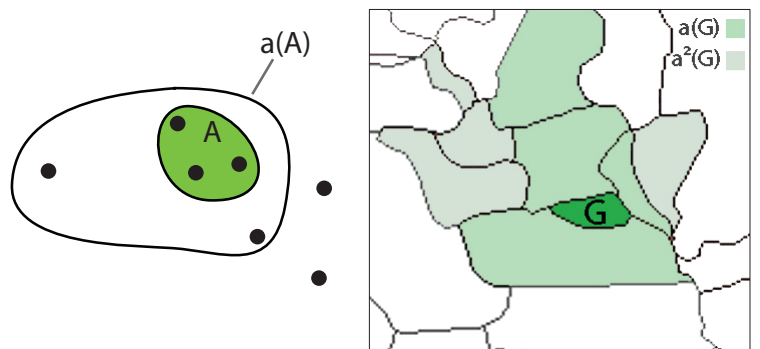
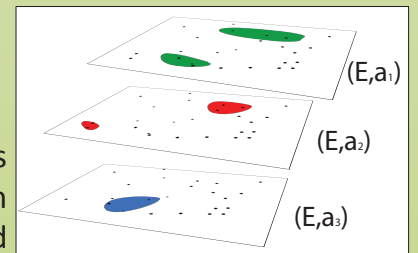
## MATH. FRAMEWORK

Agents walk randomly, searching for what they want. Diffusion of criteria is done using pretopology theory (Belmandt2011) and multi-random sets (Molchanov2005).

A pretopological space  $(E, a)$  is defined by:

- $a$  is an application (named pseudo-closure) on all parts of  $E$
- $a(\emptyset) = \emptyset$
- $A \subseteq a(A)$

Several types of diffusion are defined



Theory

Application

Diffusion at neighborhood scale

## REFERENCES

- Z.T. Belmandt. *Basics of pretopology*. Hermann, 2011.
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- Cornelia Staub and al. *Indicateurs pour les biens et services écosystémiques: Systématique, méthodologie et recommandations relatives aux informations sur l'environnement liées au bien-être*. L'environnement pratique, 1102:14p, 2011.