Urban heat waves in Paris: developing a methodology for multi-objective spatial planning of nature-based solutions

POLICY NEED If nothing is done, by 2050, Parisians will be experiencing longer, more **Conceptualisation.** Use of the following XLMR framework (source: author): frequent heat waves, with temperatures reaching 50 degrees. Despite some studies to assess this, no temperature reduction goals have been Enternal factors set. Some pilot projects already implemented some nature-based Natural solutions, and the soon-to-be-adopted Local Urbanism Plan rules to Economic implement those as much as possible. However, the need for temperature reduction is not linked with the effect of the solutions. This Performance metrics is although necessary to scale-up these solutions at the city scale. Policy levers Relationships in Net present value the system Refreshment On-street • What is the potential of each Parisian arrondissement for efficiency parking to park Equity (social justice) Green roofs Equality mainstreaming these solutions? • What are the effects of the nature-based solutions levers? • What are the costs and other co-benefits to expect? **Objectives (M)** Policy levers (L) Net present value Refreshmen (NPV) efficiency social justice **On-street parking to** Greenroofs Monetary cost-benefit Main goal, not only park Most vulnerable analysis including a monetary populations are Potential: 18% of Parisian roofs discount rate have a flat surface area > 50 Potential: more parkings m², only 3% of Parisian roofs spots than cars in Paris are green Costs: installation and maintenance Benefits: E -Health Cost Reduction and Productivity Increase -Energy Savings -Increased Property Values -Stormwater Management -Biodiversity Enhancement



Master thesis project (in progress) - Agathe Mommeja

METHODOLOGY



Machine translation. Use of a multi-objective spatial optimisation for land-use algorithm system. A Pareto front based method is followed, using ε-NSGA-II.

Performance metrics: Net present value Equity Equality Temperature reduction (at the local scale

(map))

arrondissement (example: Montmartre, Panthéon), a given quantity of the potential of each of the 2 considered nature-based solution is implemented. All of that gives some performance metrics, aggregated at the scale of the city (including 20 arrondissements): net present value, equity, equality. Refreshment efficiency being meaningful at the local scale only, a map will be provided. Source: Author.

Conceptual scheme of the

output of the tool for the policy-makers. For each