NATURE 4 CITIES

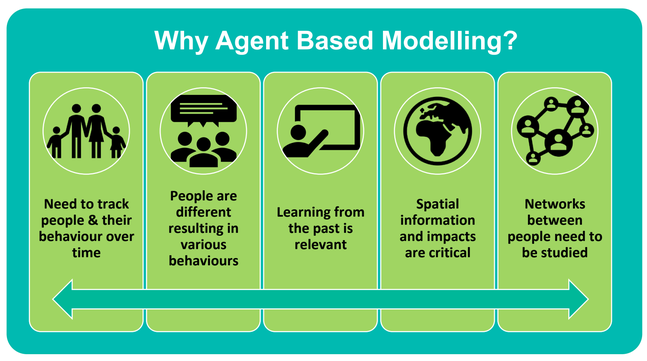
A knowledge diffusion and decision platform for renaturing cities

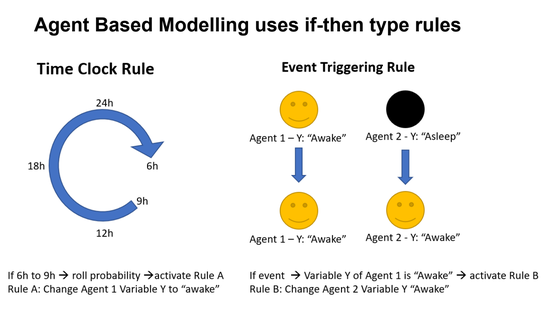
Agent Based Analysis Approaches

ekodenge | sustainability engineering

Agent Based Modelling

T3.2 Conceptual Development to Testing Models for assessing people's interactions with Nature Based Solutions

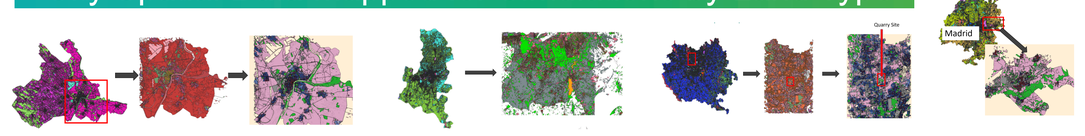




Ten Conceptual Scenarios for NBS Developed

1. People's Activities in NBS spaces
2. Building utilisation impacts with NBS
3. Demographic neighbourhood changes with NBS influence
4. Property value changes caused by NBS
5. **Water runoff improvement by NBS promotion in household gardens (implemented)**
6. Climate extreme events rescue improvement through NBS
7. Inclusive neighbourhood planning using NBS interventions
8. **Socio-economic and commercial development resulting from NBS changes (implemented)**
9. Motorway transformation to underground transport and green park areas
10. **Urban heat mortality impacts reduction through NBS (implemented)**

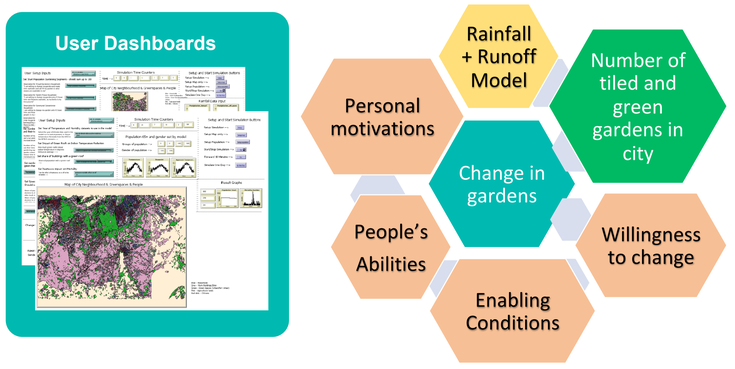
City Spatial Data Mapped for Simulations by Land Type



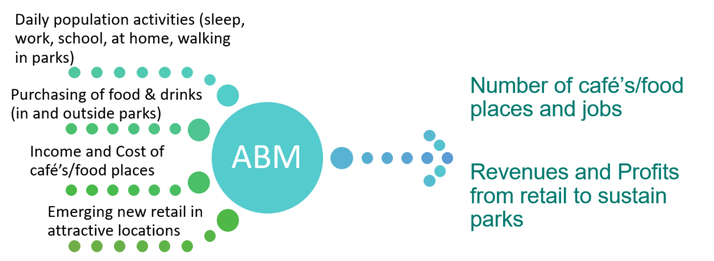
Developed Simulation Models

Urban Heatwave Mortality Reduction

Water Runoff Reduction from Green Gardens



Socio-economic impacts from urban parks

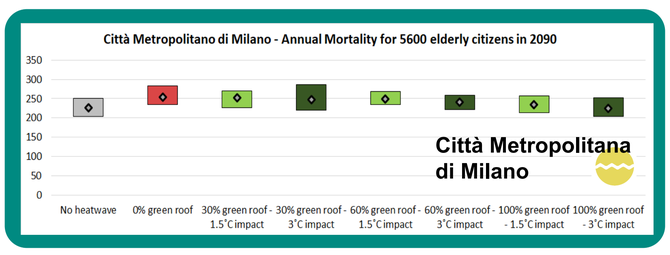


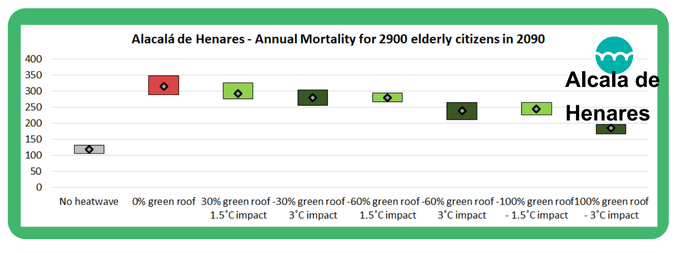
City Pilot Results

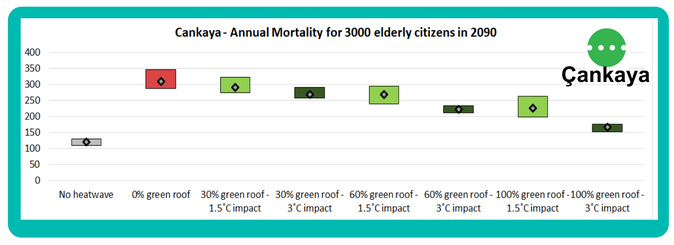
Urban Heatwave Mortality Reduction

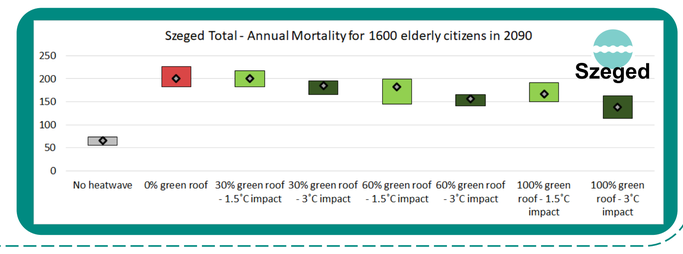
Mortality Results for citizens 65+ years of age

- 2016, 2030, 2050, 2070, 2090 (climate change scenarios)
- With/without Green Roofs (% and 1.5 °C or 3 °C cooling impact









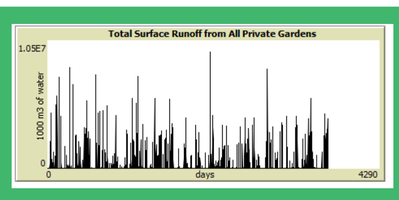
Water Runoff Reduction from Green Gardens

Green Garden Transformation and Water Runoff Results

- Different profiles for citizens (motivation/abilities/willingness)
- Availability of municipal subsidies and social support for gardening

Run set	Household mix	No gardening knowledge workshop influencers	No gardening Group Organiser influencers	No financial subsidies per year for garden transformation	No. Paved Gardens		No. Partially Green Gardens		No. Green Gardens		Cumulative Runoff final year (m³)
					Start	End	Start	End	Start	End	
1	100% proud gardeners	0	0	0	354	216	165	207	119	215	25,725,000
2	100% proud gardeners	0	0	0	383	230	184	243	91	185	26,220,000
3	100% backyard barbeques	0	0	0	380	353	162	181	104	112	27,860,000
4	100% backyard barbeques	0	0	0	359	338	174	187	104	112	27,943,000
5	100% proud gardeners	80	0	0	367	219	172	200	92	212	24,567,000
6	100% proud gardeners	0	100	0	367	188	168	193	91	245	25,100,900
7	100% proud gardeners	0	0	1000	385	94	178	65	97	501	24,769,000
8	100% proud gardeners	80	100	1000	367	47	170	53	94	531	22,750,000
9	100% backyard barbeques	80	0	0	368	346	155	161	106	122	28,460,000
10	100% backyard barbeques	0	100	0	405	369	150	168	108	126	28,630,000
11	100% backyard barbeques	0	0	1000	388	365	173	184	91	103	28,310,000
12	100% backyard barbeques	80	100	1000	366	304	198	198	97	159	27,810,000

Results Example for Szeged



Total Surface Runoff from Private Gardens over time

Socio-Economic Impacts from Urban Parks

Urban Parks Impacts on Retail Businesses

- Number of retail shops after five years of simulation
- Difference between availability of green spaces

Run set	Population	Population that walks in parks	Number of retail shops		
			At start of model run	At end of model run	Average across model run
1	2868	1559	1	8	9
2	2868	1498	1	8	9
3	2868	1511	5	7	6
4	2868	1440	5	7	8
5	2868	1448	10	8	7
6	2868	1461	10	8	7

Alcala de Henares

Run set	Population	Population that walks in parks	Number of retail shops		
			At start of model run	At end of model run	Average across model run
1	3000	1569	1	8	9
2	3000	1596	1	11	8
3	3000	1545	5	7	7
4	3000	1553	5	6	8
5	3000	1608	10	5	8
6	3000	1610	10	11	8

Çankaya

Run set	Population	Population that walks in parks	Number of retail firms		
			At start of model run	At end of model run	Average across model run
1	5592	2929	1	14	14
2	5592	2950	1	13	12
3	5592	2919	5	14	13
4	5592	2943	5	13	13
5	5592	2921	10	14	13
6	5592	2815	10	14	12

Città Metropolitana di Milano

Run set	Population	Population that walks in parks	Number of retail shops		
			At start of model run	At end of model run	Average across model run
1	1583	827	1	8	6
2	1583	783	1	3	5
3	1583	818	5	7	6
4	1583	873	5	6	5
5	1583	810	10	3	5
6	1583	845	10	5	5

Szeged

Nature4Cities consortium

> 6 leading Research and Technology Organizations

NOBATEK/INEF4 (FR) – Coordinator
Cerema (FR), Tecnalia (ES), Eurecat (ES), Cartif (ES), Luxembourg Institute of Science & Technology (LU)

> 4 universities

University of Nantes / IFSTTAR (FR), Agrocampus Ouest (FR), University of Szeged (HU), Middle East Technical University (TR)

> 2 leading industrial organizations

Acciona Construction (ES), Acciona Ingeneria (ES), Rina Consulting (IT)

> 9 Small and Medium-sized Enterprises (SMEs)

Green4Cities (AT), Terranis (FR), Colouree (IT), Duneworks (NL), Argedor (TR), Ekodenge (TR), Innova Integra (UK), R2M Solution (IT), Grün statt Grau (AT)

> 2 clusters of stakeholders

Plante & Cité (FR), Hungarian Urban Knowledge Center (HU)

> 4 pilot cities

Alcala de Henares (ES), Città Metropolitana Di Milano (IT), Szeged (HU), Çankaya (TR)

Join the community!

www.nature4cities.eu

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