14th BIENNALE
OF EUROPEAN TOWNS
AND TOWN PLANNERS
NAPOLI

SPECIAL WORKSHOP 2 | ENHANCING URBAN REGENERATION AND SPATIAL JUSTICE WITH NATURE-BASED SOLUTION

MAPPING SUSCEPTIBILITY TO CLIMATE CHANGE EFFECTS AND TO SPATIAL INEQUALITY FOR NBS PLANNING AND DESIGN

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WHERE DO WE NEED (MORE) NATURE WITHIN CITIES?

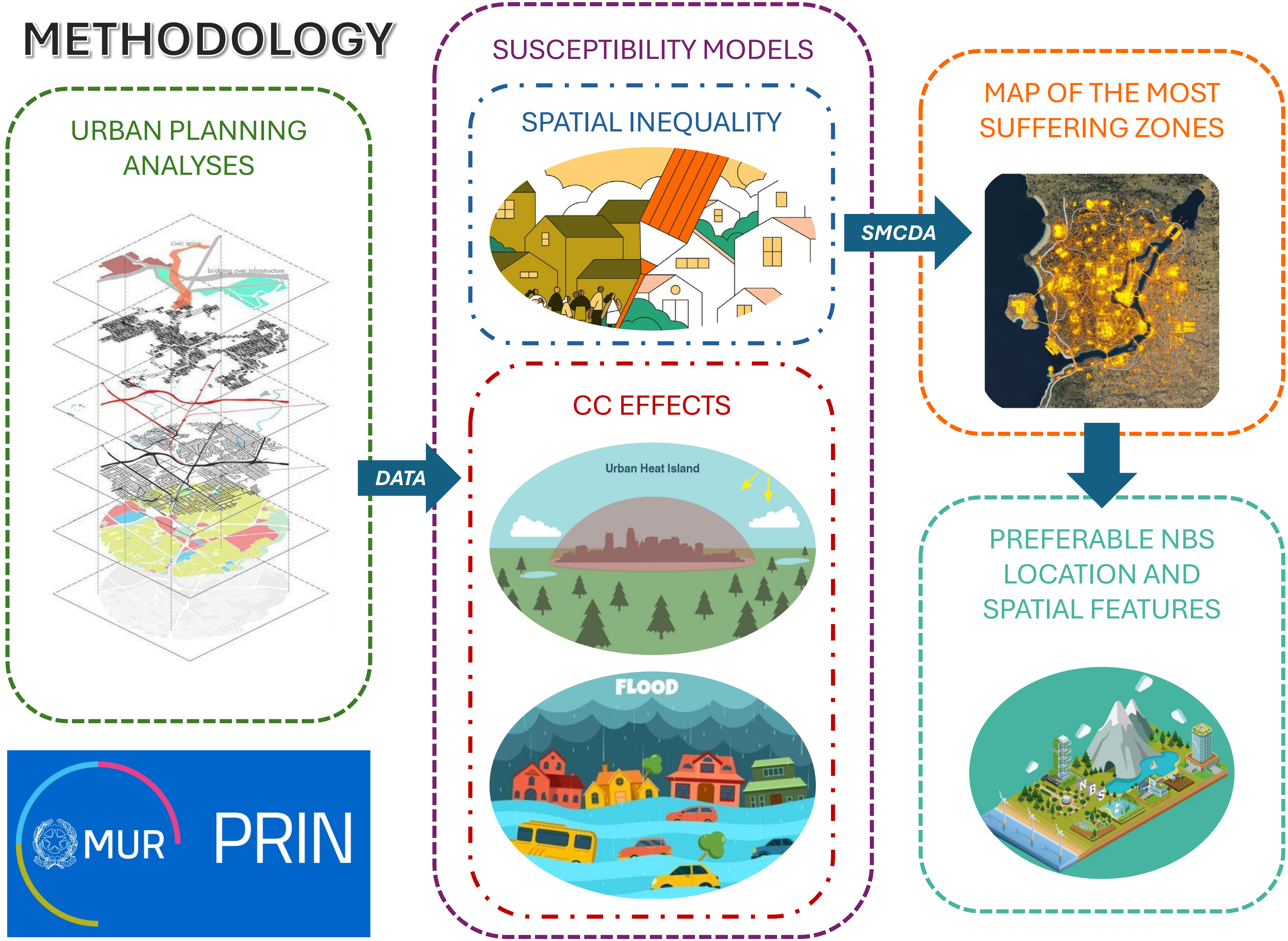
(IUCN, 2020)

can we shift the way we deal with NBS from the solely design approach to an organic planning one?

LOCATION

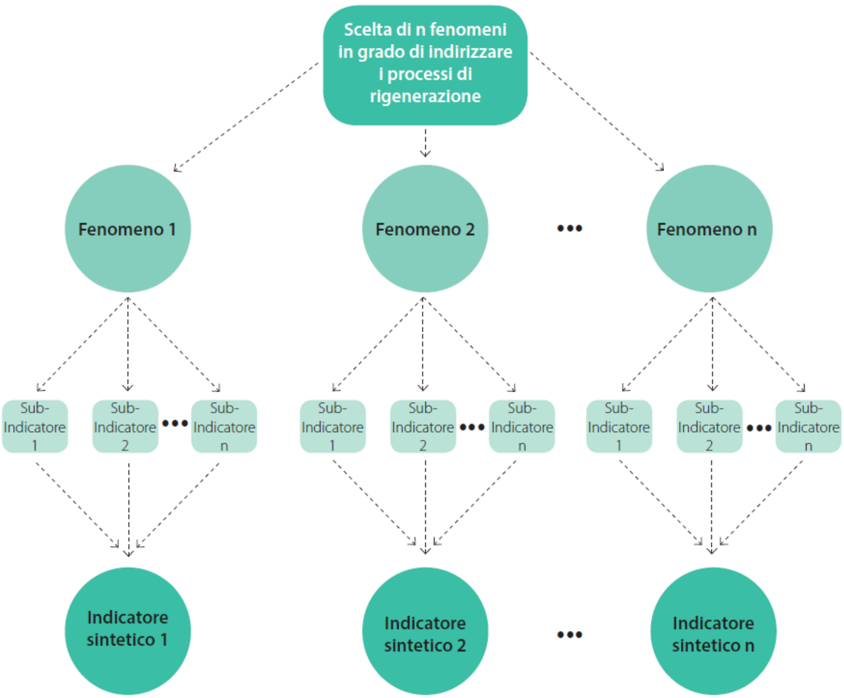
SPATIAL FEATURES

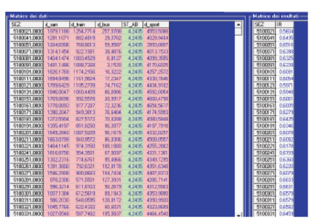
METHODOLOGY



SPATIAL INEQUALITY SUSCEPTIBILITY MODEL

SYNTHETIC INDEXES METHOD



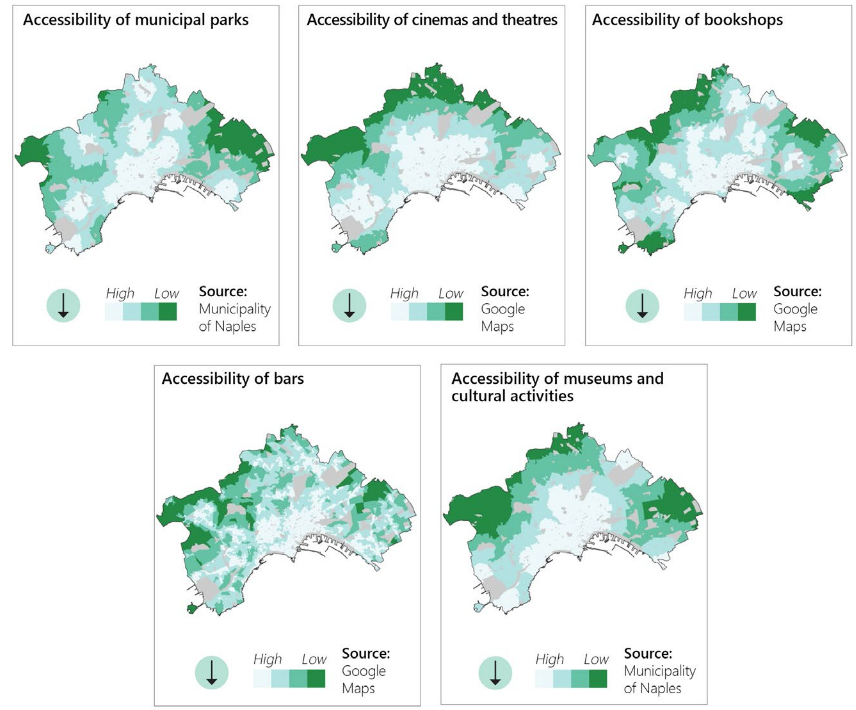


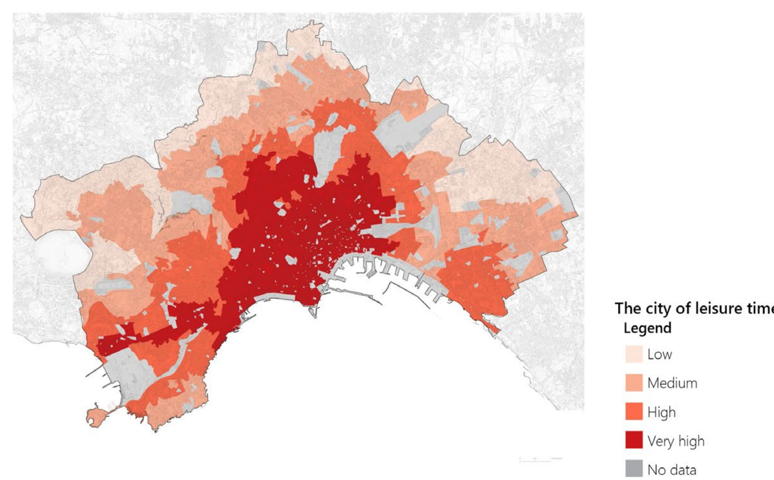
Metodo degli indici relativi

Valore dei sub-indicatori standardizzati

$$IR_i = \frac{\sum T_{ij}}{n} \leftarrow \text{- - - - - -} \ \mathbf{0\text{-}1} \leftarrow \text{- - - - - - - - -}$$

(Gerundo & Stanganelli, 2023)



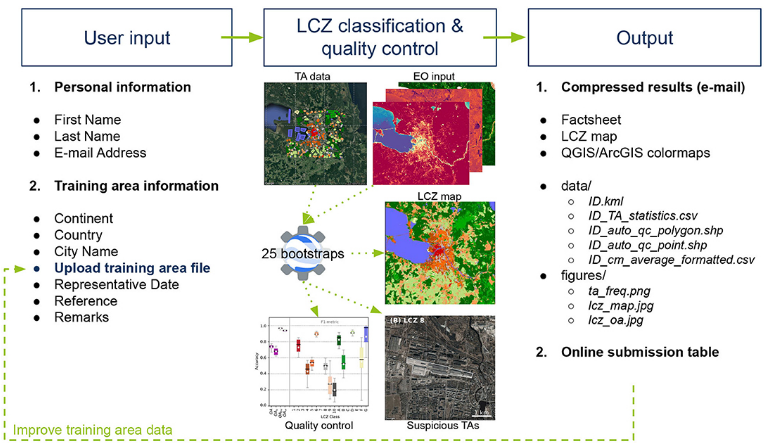


CLIMATE CHANGE EFFECTS SUSCEPTIBILITY MODELS (UHI)

LOCAL CLIMATE ZONES

RASTER BASED MODELS

WUDAPT protocol

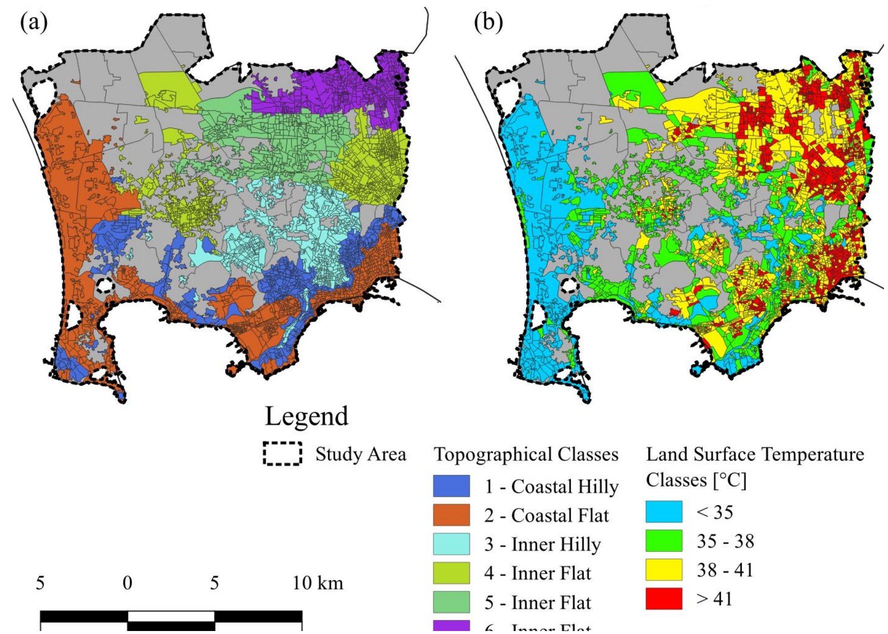


(Demuzere et al., 2021)

CONs

- Low spatial resolution output
- Difficult interpretation at the small scale
- Effects of third dimension on urban microclimate are not considered

A VECTOR BASED APPROACH



SVF | Green Surface | Building Height | Building Ratio

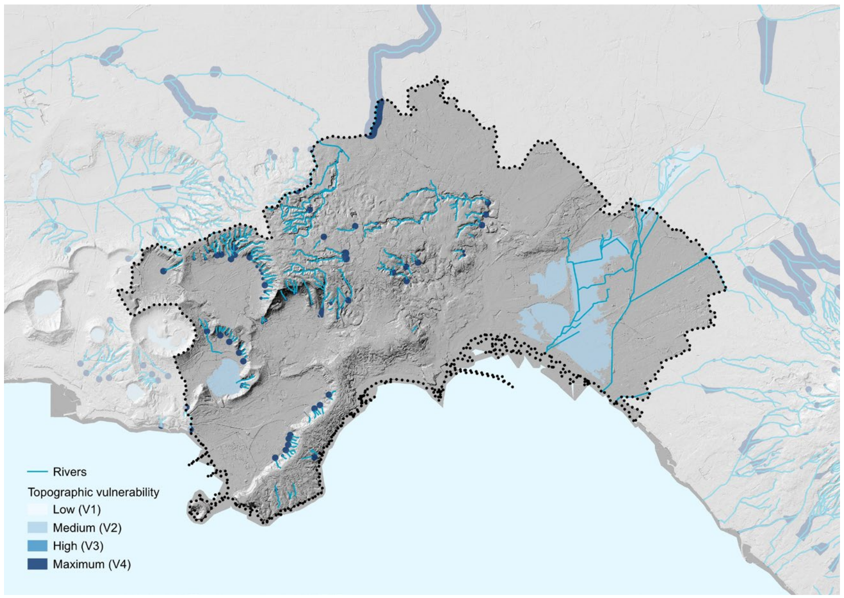
LST Class	Morphology Class											
	Coastal						Inner					
	Flat			Hilly			Flat			Hilly		
	min	*med*	*max*	*min*	*med*	*max*	*min*	*med*	*max*	*min*	*med*	*max*
Very High	0,29	0,55	0,95	0,34	0,56	0,83	0,37	0,59	0,91	0,44	0,58	0,79
High	0,28	0,57	0,87	0,37	0,58	0,81	0,36	0,64	0,91	0,39	0,57	0,78
Medium	0,29	0,64	0,88	0,42	0,61	0,88	0,47	0,68	0,88	0,37	0,58	0,77
Low	0,54	0,68	0,87	0,47	0,64	0,76	0,52	0,65	0,80	0,42	0,63	0,83

(Gerundo & Stanganelli, 2024)

CLIMATE CHANGE EFFECTS SUSCEPTIBILITY MODELS (FLOODING)

FLOODING PRONE AREAS

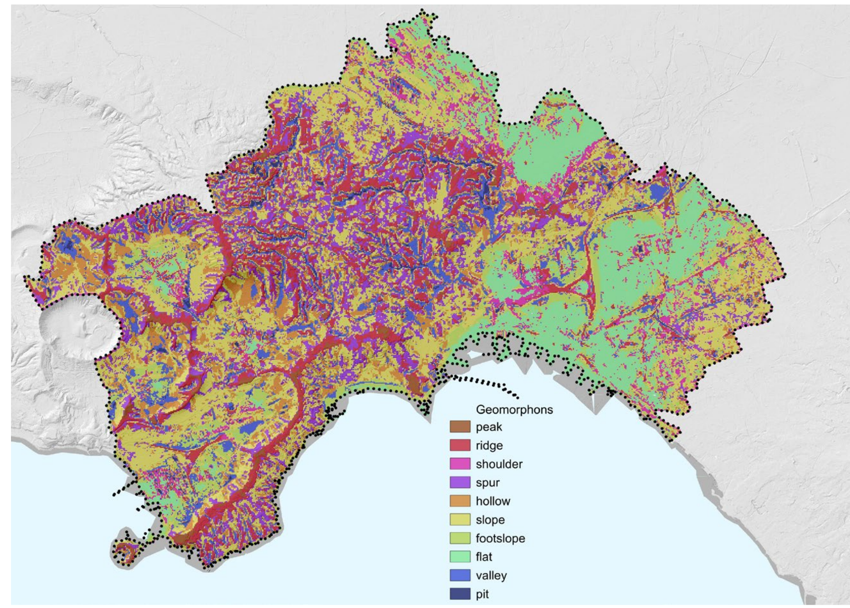
MAX FLOW DEPTH

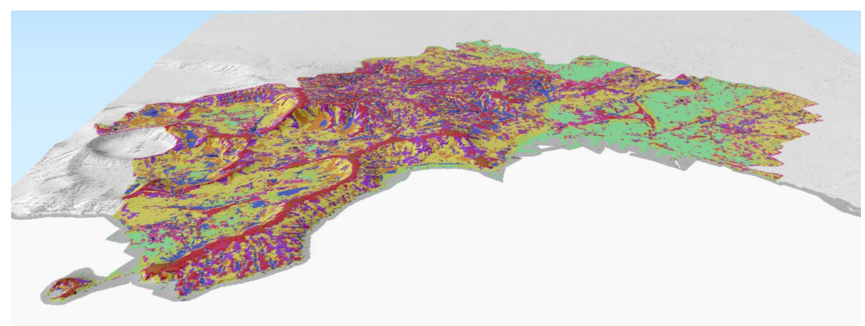


Susceptibility to be flooded can be assessed as a function of the maximum flow depth that can occurr during a flooding event with a given return period.

GEOMORPHONS

(Jasiewicz & Stepinski, 2012)





FUTURE STEPS AND CONCLUSIVE REMARKS

- Implement morphology issues into LCZ assessment;
- Aggregation and weighting procedures (SMCDA);
- Urban planning constraints and limitations;
- Replicability and scalability of the methodology;
- Machine learning and AI?