



## Parametric tools over crowdsourced maps as means for participatory consideration of environmental issues in cities

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The increasing complexity of space use and resource cycles in cities, demands an understanding of the built environment as “ecological”: enabling mutation while remaining balanced and biologically sustainable. Designing man’s environment is no longer a question of defining types, but rather an act of inserting changes within a complex system. Architecture and urban planning have become increasingly aware of their condition as system-oriented disciplines, and they are in the process of developing the necessary languages, design tools, and alliances. We will argue the relevance of parametric maps as one of the most powerful of those tools, in terms of their potential for adaptive prototype design, convergence of disciplines, and collaborative work.

Cities need to change in order to survive. As the main human landscape (by 2050 75% of the world's population will live in urban areas) cities follow biological patterns of behaviour, constantly replacing their cells, renovating infrastructure systems and refining methods for energy provision and waste management. They need to adapt constantly. As responsive entities, they develop their own protocols for reaction to environmental change and challenge the increasing pressure of several issues related to scale: population, mobility, water and energy supply, pollution... The representation of these urban issues on maps becomes crucial for understanding and addressing them in design. Maps enhanced with parametric tools are relational and not only they register environmental dynamics but they allow adaptation of the system through interwoven parameters of mutation.

Citizens are taking part in decisions and becoming aware of their role as urban experts in a bottom-up design process of the cities where they live. Modern tools for dynamic visualisation and collaborative edition of maps have an important role to play in this process. More and more people consult maps on hand-held devices as part of their daily routine. The advent of open access collaborative maps allows them to actively extend and modify these maps by uploading data of their own design. This can generate an immense amount of unique information that is publicly available. The work of architects, planners, and political agents can be informed by the contributions of a community of volunteer cartographers. Counter-cartographies built through collaboration arise from spontaneous processes of knowledge and data collection, and demand continuous non-commercial revision. Both scientific and non-academic users have direct access to geostrategic information and actively take part in exploring, recording and inserting their contrasted contributions into the way in which our world is described.

This proposal explores the idea of a counter-cartography as a collection of maps that unveil territorial environmental conditions different from those shown in official maps. By using parametric tools we can incorporate information of this type directly into architectural documents and generate interlaced changes in the design. A parametric map is a flexible yet accurate tool for design and discovery: it integrates multiple particular views into a precise physical context that culminates in a generative design. Working with complex maps in this way is gradually becoming the ultimate document for designing the city in an integrated manner.