Research results of a new combined method in climate adaptation; Storytelling in City Climate Scans.

Results of 2 recent city climate scans which took place in Rotterdam in The Netherlands in collaboration between Rotterdam University of Applied Sciences, Groningen University of Applied Sciences in April 2018 with HTW Chur University of Applied Sciences (Switzerland) and in September 2017 with Technical University Gdansk (Poland).

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OBJECTIVES

Cities are becoming increasingly vulnerable for climate change and there is an urgent need to become more resilient. This research involves the development of the City climate scan Rotterdam (September 2017) methodology to measure, map, scan and assess different parameters that together give insight in the vulnerability of urban areas and neighborhoods. The research at recent City climate scan / Sketch your city in April 2018 used storytelling and sketching[1] as main method to connect stakeholders, motivate action, evoke recognition in a jointly formulated goal, such as taking climate action. The city climate scan also involved the development of a set of measurement tools that can be applied in different urban neighborhoods in a low-cost low-tech approach with teams of stakeholders and practitioners. The city climate scan method was tested in different cities around the globe (Rotterdam, Manila and Cebu) in groups of young professionals and stakeholders in rapid urban appraisals.

METHOD

The City climate scan method was developed by Groningen and Rotterdam University of Applied Sciences to gather in a short period of time (1-2 weeks) factual and objective data by young professionals and practitioners that enable them to assess the 'level of resilience' of a specific neighborhood or city[2]. The city climate scan method aims to use low-cost and low-tech tools and instruments. The first measurements took place in Manila Philippines, Rotterdam Netherlands and in Cebu Philippines. Parameters that were assessed in Rotterdam are: urban heat (temperature), urban water quality (several parameters as: nutrients, chlorophyll, oxygen), urban air quality (several parameters), urban floods (infiltration capacity) and waste pollution (plastic waste)[3]. Storytelling is recently added as a successful method to collect subjective data such as the opinion and perspective of the community and integrate these data in the city climate scan results. This Storytelling or narrative as part of the city climate scan method could be a motor of change. Other city

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[1] https://sketchcity.ch/
[2] Boogaard F., Heikoop R., van de Sandt K, den Oudendammer T, Oostra A., Internationale city climatescan Rotterdam, onderzoeksresultaten klimaatadaptatie: infiltratie in het stedelijk gebied, H20, 2018.
[3] Boogaard F, Heikoop R, Bosscher M, Akkerman O., *Research results of a new governance method in climate adaptation*; *the international City Climate Scan Rotterdam*, RRAU (Resilient Responsible Architecture and Urbanism), Groningen, 10-12 April 2018.

climate scan are planned in a number of European cities such as Gdansk and Barcelona and Asian cities as Cebu and Semarang.

FINDINGS
The City climate scan method is being developed, but the first results from city climate scan Rotterdam (in collaboration with international universities) show that the method gathers valuable multidisciplinary data that is currently not collected.
Water quality mapping with free apps gives insight in the water quality in canals or ponds at neighborhood level. Urban heat measurements at the street level gives insight how heat differs in different neighborhoods and streets. Plastic waste measurements at riverbanks can now be systematically measured and the data will give insight and awareness in the contribution of plastic waste pollution in our river systems. Infiltration capacity of open spaces and the contribution to reduce the impact of floods is measured at multiple locations in the city. The open green spaces show a 3-6 higher infiltration rate that paved areas. From detailed flood models locations have been selected to stimulate infiltration at green zones. More than 25 Best management practices (BMPs) in climate adaptation are mapped on an open source web based international knowledge exchange tool www.climatescan.nl. Some of the BMP's have been tested during the city climate scan: e.g. the infiltration rates of permeable pavements have been considered very low after being in service a couple of years. The discussion of this and other factual and objective results have been discussed in the triple helix consortium, with public, private and academic partners, which has led to a detailed strategy for the city to be more resilient. Storytelling has been tested and evaluated as a successful method to collect additional subjective data such as the opinion and perspective of the community in Rotterdam' neighborhoods. The storytelling method has also been successfully applied in Bangladesh and Vietnam[4] and enabled researchers and policy makers to tap subjective data that would otherwise have not been noticed.

SIGNIFICANCE OF THE WORK FOR POLICY AND PRACTICE
The City climate scan method is a low-cost, low-tech methodology that can be applied in cities around the world. The approach helps policy makers and practitioners to gather valuable data for decision makers in a rapid appraisal at the neighborhood and city level. The results of the City climate scan method gives insights and creates awareness and brings together triple helix partners (public, private and academic partners). Most appreciated are the concrete results from the scan e.g.: bio based floating gardens in Cebu, waste trap 'longanissa' in Manila and an interactive web based BMPs map in Rotterdam. The participatory approach brings residents and practitioners together and gives insight in local problems, while at the same time collects valuable data about the robustness of neighborhoods. The city climate scan will the topic of a large national research with 4 universities from the Netherlands and city climate scans are planned in a number of cities in Europe and Asia in the upcoming months.

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[4] Janssen J.A., *Living with the Mekong: Climate change and urban development in Ho Chi Minh City and the Mekong Delta*, Blauwdruk publishers, Wageningen, 2015