A Resilience Analysis of the C40 Cities

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AN OVERVIEW OF CLIMATE-PROOFING STRATEGIES ADOPTED ACROSS THE WORLD

- Majority of the C40 cities have sought to "reduce carbon emissions" as a 'climate proofing' strategy.
- While this is critical as a long term, global strategy; reducing emissions is insufficient for tackling the short-term variability and mitigating impacts at a city scale
- OBJECTIVE - To assess the efficacy of the strategies adopted across the world from a resilience perspective

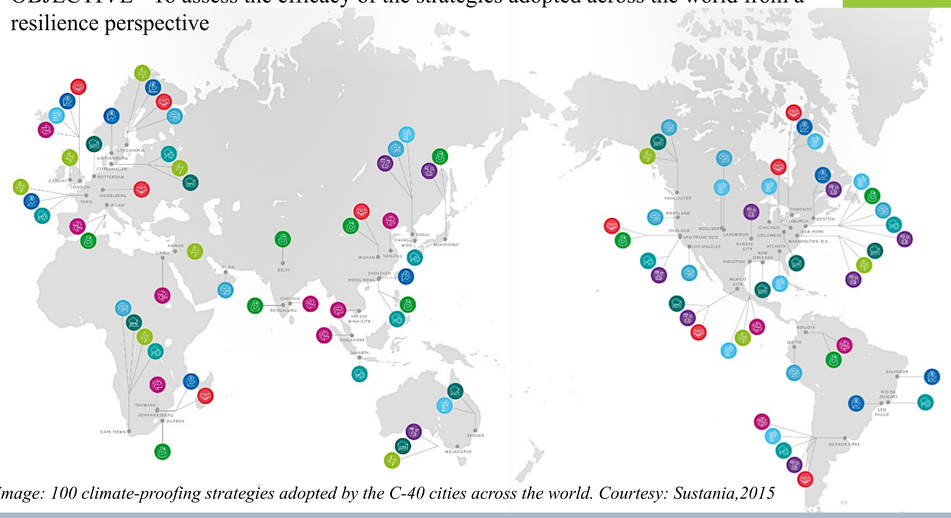
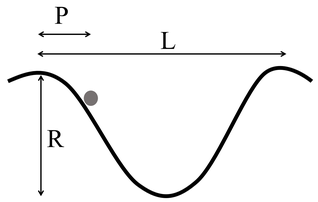


Image: 100 climate-proofing strategies adopted by the C-40 cities across the world. Courtesy: Sustania,2015

THE RESILIENCE FRAMEWORK



- The ***Stability Landscape*** using a ball-in-bowl metaphor (from Walker et al. 2004).
- The ball indicates the state of the system and the characteristics of the basin represents the stability and ability to recover from an external shock.

Components of Resilience

Adaptability: the capacity of human agents to modify any of the aspects of resilience

Transformability: to create a fundamentally new system when the existing systems becomes untenable

Latitude: the maximum amount the system can be changed before losing its ability to recover

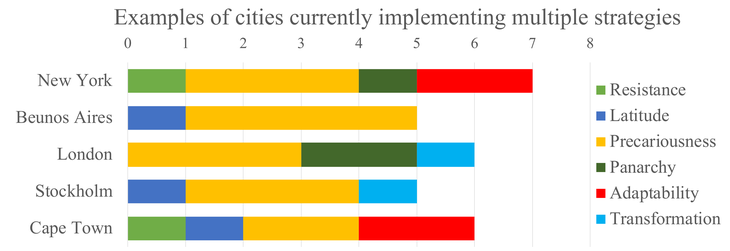
Resistance: the depth of basin representing the ease or difficulty of changing the system

Precariousness: the current trajectory of the system, and how close it currently is to a limit or "threshold"

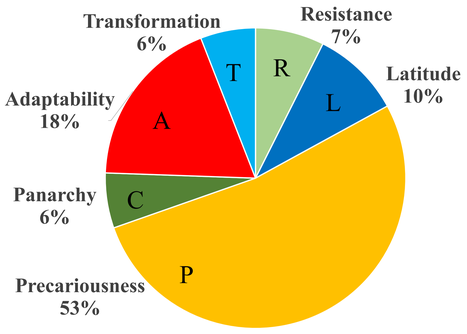
Panarchy: the influence of other scales on the states and dynamics of the system

KEY TAKE AWAYS

1. **A question of scales** - Extreme weather events happen at the city scale, and they are happening NOW. Therefore, they warrant LOCAL and IMMEDIATE solutions – Focus on regional adaptation
2. **Paradox of threshold** - In a dynamic system the basin characteristics as well as thresholds change stochastically. Thus, adapting to the changing environment is extremely important.
3. **Understanding Panarchy** - Impact at one scale might be the result of causes at a different scale.
4. **Recommendation** - A combination of strategies inclusive of all aspects of resilience are needed! Strategies adopted by these cities are available to emulate

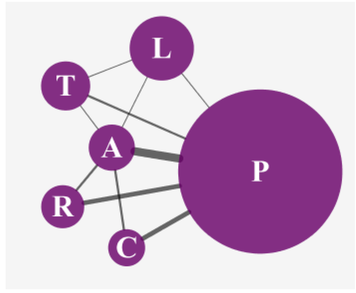


WHERE DO THE CITIES' STRATEGIES FALL ON THE STABILITY LANDSCAPE?



Pie chart showing the percentage of cases under each of the resilience categories.

- Each strategy was viewed as building one or more components of Resilience (Latitude, Resistance, Precariousness or Panarchy).
- For example, Copenhagen increased the urban blue green areas to absorb more rainfall and prevent urban flooding. This can be equated to increasing the width of the stability basin. Thus, this strategy is classified as building **Latitude**.
- On the other hand, Rotterdam built dykes to withstand the rising sea level. This can be equated to increasing the depth of the stability basin as it is now harder for the threshold to be breached. Rotterdam's strategy was thus classified under **Resistance**.
- Curbing of carbon emissions falls under the class of **Precariousness**.
- City of Wuhan transformed its landfills to community gardens. This is an example of landscape **Transformation**.



Size of the node represents the number of strategies exclusively falling under each of the categories. Width of the link represents the number of cases where a combination of two were adopted. (schematic)

REFERENCE

- Walker, B., C. S. Holling, S. R. Carpenter, and A. Kinzig. 2004. *Resilience, adaptability and transformability in social–ecological systems*. Ecology and Society **9**(2): 5.
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