Urban Resilience through stocks: Static and Dynamic analysis

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Abstract

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Contents

1 Introduction

Security is classicaly one of the intagible assets that sovereign states are most keen to have. The Institute for Security and Open Methodologies defines security as "a form of protection where a separation is created between the assets and the threat" Herzog (2006). However, security has been evolving from the militar-centric notion to a wide scope of areas where a society can suffer damage, e.g. economic security, energy security or environmental security. Along with security concerns comes the interest in preventive concepts such as resilience.

As Obrist (2010) points out, "like the notion of sustainability, 'resilience' invokes a positive and prospective view. It focuses on peoples and/or systems capacities to cope with, recover from and adapt to various risks and adversities, and directs attention to the ways in which the state and the civil society can enhance or erode these capacities. Yet, our knowledge of what constitutes resilience, how it can be described and analysed, and especially, how it can be fostered is still limited."

Certainly from the urban planner perspective, resilience is ultimately linked with the well being provided to dwellers in the face of a socio-economic disruptive event (either with positive or negative consequences). In this work we aimed at providing different measures of resilience both from a static (input-output analysis) and a dynamic models (system dynamics).

Resilience in social-ecological systems has been studied for decades in several approaches from more ecological-centered (Holling, 1973) to more social (even antropological) centered (Bourdieu, 1995, 1986).

However, in this work we attemp to approach resilience from the urban metabolism (Wolman, 1965) point of view, this is, to assess the resistance of energy and materials stocks and flows against stocastic events. *The Economics of Ecosystems and Biodiversity* iniciative states in its lastest report (Sukhdev et al., 2010) that "maintaining stocks of natural capital allow the sustained provision of future flows of ecosystem services, and thereby help to ensure enduring human well-being." and follows:

> Sustaining these flows also requires a good understanding of how ecosystems function and provide services, and how they are likely to be affected by various pressures. Insights from the natural sciences are essential to understanding the links between biodiversity and the supply of ecosystem services, including ecosystem resilience i.e. their capacity to continue to provide services under changing conditions

Urban metabolism as a metaphore has been

around for quiet a long time now and the research around it has evolved towards some specific methodologies for urban areas analysis. The majority of the analysis in the area of Urban Metabolism today is linked to *Material Flow Analysis (or Accounting) (MFA)* essentialy as a tool compare regions performances in what regards to their demands, waste discharges or emissions. One of the many uses of MFA studies can be the production of input data for formal predictive models.

Another important concept that is usually linked to urban metabolism is the self sustainability appraisal. Self sustainabilty is a broad concept which is largely translated (i.e. reduced) to self suficiency, and should be gather more eforts for a formal definition. For this work, *resilience* is the key concept to assess the (self) sustainabilty of urban areas.

In this work I'll be focused on defining the conce

These models In this paper i'll propose some definitions, concepts and methodologies to the citys' metabolism (analysis) should be put to its own rescue

However not many authors have settled their opinions

2 Definitions

2.1 City

Plain text!!

3 Concepts

3.1 Urban Services

More plain text.

4 Methodologies

5 Static Model

5.1 High resolution Input Output coeficients

For the kind of resilience measurements at aim in this work arises the need for input output in very small regions (i.e. civil parishes *(port. freguesia)*)

The construction of input output matrices for very small regions or even individual entities is a disagregation exercise which has to be performed with the proper caution since a lot of assumptions.

Where survey-based information on regional sales and purchases is unavailable, the regional modeller often has to use simple (e.g. employment-based) location quotients (LQs) to derive estimates of regional input-output coeffcients from national tables.

(justify the use of location coeficients)

6 Dynamic Model

6.1 Measuring Resilience

6.2 System Dynamics

References

Bourdieu, P. (1986). *The Forms of Capital*, Volume 241, pp. 241–258. Greenwood Press.

Bourdieu, P. (1995). *Outline of a theory of practice*. Cambridge studies in social and cultural anthropology. Cambridge University Press.

Herzog, P. (2006). *Open-Source Security Testing Methodology Manual v2.2*. Institute for Security and Open Methodologies.

Holling, C. S. (1973). Resilience and Stability of Ecological Systems. *Annual Review of Ecology and Systematics 4*(1), 1–23.

Obrist, B. (2010, October). Editorial. *Progress in Development Studies 10*, 279–281.

Sukhdev, P., H. Wittmer, C. Schrter-Schlaack, C. Nesshver, J. Bishop, P. ten Brink, H. Gundimeda, P. Kumar, and B. Simmons (2010). The economics of ecosystems and biodiversity: Mainstreaming the economics of nature: A synthesis of the approach, conclusions and recommendations of teeb. Technical report, The Economics of Ecosystems and Biodiversity.

Wolman, A. (1965). The metabolism of cities. *Scientific American*, 276–296.