Factors in understanding and measuring resilience

“ 1. How do engineering, ecological and evolutionary approaches differ in their understanding and measuring of resilience?

2. In what ways does vulnerability thinking differ from resilience thinking in its approach to research and to developing practical responses to disasters in cities? ”

Question 1: How do engineering, ecological and evolutionary approachesdiffer in their understanding and measuring of resilience?

Introduction

In a seminal paper dated back in 1973, a Canadian theoretical ecologist Crawford Stanley Holling has distinguished between engineering and ecological resilience (Davoudi, S. 2012). This was the first time where the concept of engineering, ecological and evolutionary approaches of resilience have been discovered to be as different measuring systems.

Engineering

Engineering resilience is defined as the ability of a system to recover its equilibrium or stable state after a disturbance, which can be social unrest, such as a banking crisis, war or revolution, or natural disaster, such as a flood or earthquake (Davoudi, S. 2012). The ability to resist disturbances and the rate at which the system restores equilibrium are measures of resilience through the lens of engineering (Davoudi, S. 2012). We can see this as how city or country react to big disasters or social crises, and how fast they can rebuild or stable the status back to its usual look. Thus the faster the system bounces back, the more resilient it becomes (Davoudi, S. 2012). Engineering

is different from the ecological and evolutionary approaches because the other two are broader and need to consider from a bigger perspective.

Ecological

When we talk about resilience in the ecological sense, we need to introduce the idea of critical thresholds, and a threshold can be viewed as a maximum or minimum point where a system will be forced to transform once it hits that maximum or minimum threshold value. Therefore “ the ability to persist and the ability to adapt” (Adger, 2003, p. 1) is an essential part in resilience interpretation on ecology, it means that while experiencing multiple changes in the environment, the society can still adjust itself automatically and not to exceed its capacity of the critical threshold. The most effective way to achieve this state is to plan, according to Newtonian world view, the world is a giant clock that can be calculated and analysed in mathematical commands (Davoudi, S. 2012).

Evolutionary

Evolutionary resilience, also known as socio-ecological resilience, is different from the previous two, it sort of combines the idea of ecological and engineering resilience. The concept of resilience is “ complex, non-linear, and self-organising, permeated by uncertainty and discontinuities” (Berkes & Folke, 1998, p. 12), so when facing adversities, it is not necessary to do a rebuild back to its original form identically, it is okay to do some innovation and proceed to make alterations when needed. As pointed out in the paper: “ past behaviour of the system is no longer a reliable predictor of future behaviour even when circumstances are similar” (Duit et al., 2010, p. 367),

we should not rely on plans and afraid of breaking it. At the same time, we should not abandon the idea of planning; finding a balance between the two is the best option for us.

Conclusion

After all, ecological and evolutionary approaches have their understanding and measuring resilience. However, they all serve the world for a better tomorrow, consolidating the three would outperform any of them just by itself alone.

Question 2: In what ways does vulnerability thinking differ from resiliencethinking in its approach to researchand to developing practical responses to disasters in cities?

Introduction

“ Resilience refers to the magnitude of disturbance that can be absorbed before a system changes to a radically different state as well as the capacity to self organise and the capacity for adaptation to emerging circumstances; Vulnerability , by contrast, is usually portrayed in negative terms as the susceptibility to be harmed, vulnerability is the degree to which a system is susceptible to and is unable to cope with adverse effects” (Adger, W. N. 2006).

Research

When thinking in approach to research, “ Nelson et al.(2007) observed that resilient communities tend to prefer a systematic approach whereas climate

change adaptation and vulnerable groups tend to turn to an actor-oriented approach”(Miller, F., et al. 2010). As a result, resilience improves our understanding of system dynamics and interconnections, ecological thresholds, socio-ecological relationships, and feedback loops. The system presents a study of vulnerability, on the other hand, is often understood as an analytical unit such as a human environmental system or a drainage system, or a social group, life, or sector, rather than as a consideration of component and interactive relationships (Miller, F., et al. 2010). It can be shown now venerability is founded after in researching resilience because it is a foundation of doing resilience works and was not to be looked upon to until people realised it’s importance.

Practical response

Both resilience and vulnerability methodsare related to multi-scale time processes. As Gunderson and Holling explained in their 2002 panarch concept, resilience studies seek to investigate the interplay between long-term, slow changes and drivers of change, such as climate change, and rapid changes, such as floods, sudden changes in political leadership, or economic crises (Miller, F., et al. 2010). Vulnerability analysis focuses on human factors and hazards and tends to focus on a short time horizon, although it focuses on the root causes of vulnerability, there are few longitudinal or historical studies on vulnerability(Miller, F., et al. 2010).

Conclusion

The media can become a powerful weapon when fighting global warming and climate change, and we have to use it properly. With an increasing trend

of new media such as social media and e-news, more effort should be put in to enhance the abilities and potentials decarbonisation could possess. We might not realise that we have already made good progress on slowing climate change, the things we should focus on now is to further improve on our technology so that we can use traditional energies most efficiently and dig in how to apply new energies such as the clean energies at a larger scale.

References

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