GRID resiliency against climate change: Need for connecting social index to resiliency planning

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United nations outline for Social life cycle criteria

Assessment system from categories to indicators.
Source: UNEP (United Nations Environment Program)

Stakeholder's Categories	Impact Categories	Subcategories
Workers	Human rights	
Local community	Working conditions	
Society	Health and Safety	
Consumers	Cultural heritage	
Value chain actors	Governance	
	Socio-economic repercussions	

- Health and safety along with Socio-economic repercussions are Key factors needs to be formalized
- We need a social index by resolving a data a paradox

A Typical paradox Vs planning deficiency

- Paradox of emission in U.S.: energy efficient households have highest emissions.
- Per capita emissions are in general higher in Caucasian neighborhoods.-Fast Recovery
- African-American households less energy efficient than Caucasian households.
- Redlined" neighborhoods: "Redlining" was a common mid-20th century practice by U.S. banks to classify the quality of neighborhoods based on housing stock and demographics. –Slow recovery

Resiliency with social matric

- Bi-Variate Social matric: For special location SRI must be normalized for societal paradox
- SRI is replaced by n SRI, where n>1
- In the resiliency vector, weight is higher in non-redline neighborhood

$$SRI = \sum_{k=1}^{k=\mathbf{K}} P_k * Im_k \qquad 1$$

$$\mathrm{R} = \mathrm{r} + (1 - \mathrm{r}) \sum_{u=1}^{U-1} \mathrm{w}_u \mathrm{R}_u, \qquad 2$$

Pk is the probability of scenario k, Im_k is the impact of scenario k and K the set of selected failure scenarios. The risk assessment flow extreme weather-related event uses the vulnerable branches with K failure scenarios using the vulnerable branches and solves for power flow

- $R = [R_1, R_2, \ldots, R_U]$- U configuration resiliency vectors
- W_u - Normalized weight
- $r = \max[R_1, R_2, \ldots, R_U]$, and R_u a vectors composite resilient values

Severity Index and Resiliency must be modeled with social index using the paradox outlined in reference 1

We propose a b-variate scoring to show case the intensity directly based on context of user location and social context