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- Please be aware that texts are to be read in small screen devices, such as e-readers and tablets.

Plagiarism policy

- The Journal will send warning notes to all its partners and international scientific societies in case of detecting plagiarism attempts.

First steps

After many years of working in scientific research, a number of old science-addicted fellows decided to form a group to support the adaptation of scientific research to the rigours of the digital world where rapid sharing of concise information is a must.

The Association for Development and Environment – ADEMED decided to host this group and to support publication and sharing of advanced, breakthrough and emerging scientific approaches, applying the Flash Talks methodology.

Editorial Board

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Exploring the vulnerability of Human-Environment Systems through Interaction-Outcome Processes

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Introduction

Disasters are being deliberated as a complex outcome of hazard, vulnerability, exposure, susceptibility etc. The introduction of socio-economic vulnerability proved to be a breaking point in disaster research. Scientific evidence from environmental, economic, engineering, and social sciences brought all these disciplines together to discuss Human-Environment coupled Systems (HES) affected by various hazards and to develop various frameworks and mathematical models for vulnerability assessment. Researchers from various disciplines tried to conceptualize and standardize the definition of vulnerability (Turner et al. 2003, Alexander, 2000 etc.). The abundance of existing frameworks elaborating HES vulnerability can be seen as a sign that none of them explains vulnerability concept sufficiently and consensus has not been reached yet.

Defining HES

The social, economic, environmental and physical dimensions in HES are discussed in various terms depending on the vulnerability frameworks. How to outline the systems and elements defining the HES, is a matter of resources and study topic. It has been seen as a combination of institutional, social, economic and cultural systems (Birkman et al, 2013), two sub-systems defined as social fabric and physical context (Cutter et al., 2000), system of various capital (Omann et al. 2010, Turner et al. 2003).

Eventually, HES representation in five forms of capital is proposed in this research and the definitions of capital are summarized as following:

Social capital refers to the union of social and human capital in their classical definitions from five forms of capitals model of Sustainable Livelihood Framework, apart from governance. Governance, however, is discussed as separate capital in view of of its central role in disaster risk management. Besides, the domain of natural capital is also expanded to incorporate both natural resources and ecosystem services.

Vulnerability as a process

Vulnerability is a process resulting from the complex interactions of HES multidimensional elements, their dynamic changes and interactions. It has been discussed in various forms and frameworks as a static property, linear or cyclic process etc. What is crucial to address, is how the hazards affect the overall structure and dynamics of HES. We propose a new framework, Vulnerability as Interaction-Outcome model (HESVIO), to illustrate that hazard as an external driver affects both HES subsystems and the interactions between their elements. This framework addresses the internal drivers as an interaction space with all the processes between and inside each of the forms of capital. This is to illustrate that the general interaction space has another smaller and/or intrinsic level of interactions, which is defined by a certain hazard, whereas the newly developed interactions define the outcome in terms of damages and losses etc.

Figure 1. HES vulnerability Interaction-Outcome framework

Conclusion

The main idea of redefining five capital is to make the definitions easy to interpret for multi-disciplinary audience by avoiding very narrow definitions and adding the missing ones.

Interaction-Outcome mechanism in HESVIO framework illustrates that amongst the elements representing the system of five capital the interaction of only some of them define the outcome.

UNDERSTANDING DISASTER RISK FINANCING

Dr. Kamal Ahmed[1], Dr. Lilit Gevorgyan[2]

Disaster risk financing helps to reduce theing fiscal vulnerability of a country to natural hazards and is therefore required to be approached in a systematic fashion. This paper revisits the conventional DRM cycle and incorporates disaster risk financing as an integral part of the cycle.

The traditional DRM cycle explains the pre-disaster part, i.e. prevention, mitigation and preparedness phases in a chronological sequence. However, all the three phases, i.e. prevention, mitigation, and preparedness are not sequential and are practiced simultaneously, as shown in Figure 1.

In the post-disaster realm, in many countries' history, a paradigm shift has been observed in the aftermath of an extreme catastrophe. For instance, in the case of Pakistan, the country's traditional emergency response-oriented system underwent a major paradigm shift and became heavily oriented to risk reduction after 2005 earthquake and the loss of 73,000 human lives.

Despite such successful paradigm shifts, spread across the globe in various countries, there is still a need to undergo yet another paradigm shift. The second paradigm shift needed for most of the developing countries is that of shifting from practicing ex-post budgetary reallocation to ensuring ex-ante financial planning and arrangements. It is for this reason that the conventional ex-post budgetary reallocation enhances country's fiscal vulnerability.

To overcome liquidity crunch and minimize the opportunity cost of capital, increasing the emphasis on ex-ante financial planning arrangements rather relying on ex-post budgetary reallocation is required. As a result of ex-ante financial arrangements already in place, ex-post financial disbursement would be swift with low opportunity cost. This could be explained by the following equation.

$$\text{Opportunity Cost of Capital} \propto \frac{\text{Ex post Budgetary Reallocation}}{\text{Ex ante Financial Planning and Arranegements}}$$

The political economy involved in disaster risk financing is critical and cannot be neglected. The recent flooding phenomenon in Venice has been one of the most serious in the city's history. Currently, the policy makers are deliberating the fact that a €900 million proposal was rejected prior to the flooding event, which would have prepared the city for rapidly changing climate. While the extent of economic impacts of the Venice flooding is still being calculated; a similar pattern was observed in the case of Pakistan. A $400 million program was rejected prior to the monsoon season of 2010. The year saw country's worst flooding event, being 1/100 years return period event, and an economic impact of $10 billion. While the program would have prepared the country for such an event; its sheer absence caused the country $10 billion.

Consultations with key informants reveal that the key interest of the policy makers lies mainly in low hanging fruits, which are easily achievable on a nearby intervention timescale. Any intervention and program reference offering long term and sustainable results but is distant on the timescale goes on a lower priority of the policy makers. Nevertheless, in order to enhance fiscal resilience of a country to natural hazards, both disaster risk management and disaster risk financing need to be taken up together at the policy level. This will not only enhance the risk retention capabilities of the country but will achieve more convenient terms of risk transfer and financing interventions more convenient (see Figure 1).

Microalgae, the 'green gold': promising advances and challenging dilemmas

Isabel Canto de Loura [1]

Algae are a complex, polyphyletic group of photosynthetic (and some heterotrophic) organisms of diverse sizes (from microscopic algae such as Chlorella, to macroscopic algae such as kelp). Algae are found mostly in aquatic habitats, although some microalgae (including cyanobacteria) can be found in soil, and others as symbionts (as zooxanthellae or as lichens) [1, 3].

At the turn of the century, algae started being addressed as 'the green gold', as their potential contribution to the bioeconomy is considerable. The intensification of research and investments on algal biomass production has resulted in an extensive array of products, attractive to diverse markets: ranging from low market value (e.g. biofuels), to animal feed and bioplastics, and to value-added products (VAP), such as Β-carotene, phycobiliprotein (blue food dye) and diverse poly-unsaturated fatty acids (PUFAs) such as arachidonic acid (ARA) and docosahexaenoic acid (DHA, of interest to the nutraceutical, pharmaceutical and cosmetic industries [8].

Algae are also recognized as good sources for the production of bioplastics, dyes (food, textiles), and potential sources of innovative textiles [2,11].

Other perceived immediate societal benefits of relying on algae stem from the fact that microalgae contribute significantly to absorbing atmospheric CO2 and have the ability to reduce the amount of heavy metals (e.g. mercury) in water bodies. On the other hand, the past decades brought about a significant increase of industrial cultivation of microalgae [1,4] as microalgae multiply very rapidly in areas which do not compete with agricultural land, thus contributing to regenerative agriculture and sustainable supply chains, aligning perfectly with the UN Sustainable Development Goals [12].

However, there are some drawbacks and dilemmas that need to be considered further. One illustrative case: at a time where the rise in awareness and willingness to adopt healthier diets and lifestyle is evident, the quest for low-fat protein-and vitamin-rich food supplements such as Spirulina are a reality. This genus of cyanobacteria is a natural source of protein, PUFAs, vitamins, minerals and pigments [8], and has been proved to be an ideal food supplement to help overcome diverse health issues.

But, as most cyanobacteria, Spirulina has a considerable amount of diverse cyanotoxins, and recent studies seem to indicate that these might have some negative impact on health of the consumers, and some recommendations have already been put forward to review and adjust the daily dosis to a lower level than the one in place to date [10].

This is a critical issue which indicates that, even though the CEN/TC 454 'Algae' provides the directives supporting these early stages of this promising area of the blue bioeconomy, emerging challenges such as this, indicate that it is imperative to ensure a systemic and agile update and consolidation of specific standards for algae-based products in the European and international regulatory frameworks.

One further challenge is that the sustainability and profitability of commercial production of algal biomass is still quite resource- and energy-intensive, and so far a relatively small number of species has been used, targeting low quantities of high-value compounds [4]. Nevertheless, technical improvements and financial investments in integrated biorefineries using industrial waste streams [6,7,9] for example, aiming to ensure all fractions of the biomass are valorised have been on the rise [5,7]; this might improve the case for producing lower-value products and contribute to more profitable processes in the algal biomass production overall.

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