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Participatory Disaster Risk Reduction in Developing Countries

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Abstract

As conventional Disaster Risk Reduction (DRR) in developing countries fails to create a real and long-lasting impact, a more community-based approach has emerged. However, even this approach struggles to be truly empowering and sustainable. On the other hand, participatory design has emerged as a design approach seeking empowering outcomes. This paper investigates the question if and how researchers and designers can utilize participatory design methods and strategies to improve collaboration with local communities and to reach meaningful and feasible outcomes. Following the introduction, the paper presents main concepts of Disaster Risk Reduction (DRR), Community-Based Disaster Risk Reduction (CBDRR) and Participatory Design (PD) in a literature review including case studies from developing countries in section two. Focusing on interactions between internal local and external organizational stakeholders, some theoretical suggestions on how organizations could improve their CBDRR practices are provided as well. Section three presents a case of social inclusion and disaster management in a local community in Nepal, conducted in Autumn 2019, and reflects on findings from section two in a real-life setting. Section four summarizes findings and gives an outlook to further research and practice. Conclusively, Participatory Design seems helpful to avoid common pitfalls in collaborative planning and development, and to reach more meaningful and empowering solutions for both design teams and local stakeholders. It is however difficult to estimate the real impact these solutions have over time and in different contexts. One reason for this might be that connecting DRR, CBDRR and PD is still in its infancy and needs more attention in terms of conceptual research as well as practical testing.

Keywords: Disaster Risk Reduction, Participatory Design, Design in Developing Countries, Design for Sustainability, Transdisciplinary Collaboration

1 Introduction

Due to rising global temperatures, changing climates and increased disaster risk, there is a growing, global need for humanitarian aid, climate adaptation and disaster risk reduction. Especially vulnerable are inhabitants of developing countries, due to their socioeconomic status, traditions, culture, and geographical climate. In 2019, an estimated 108 million people were in need of international humanitarian aid, and meeting today's humanitarian needs could cost funders and international organizations between $3.5 to $12 billion. By 2050, there could be upwards of 200 million people in need (International Federation of Red Cross and Red Crescent Societies, 2019).

The conventional DRR approach is neither sustainable nor long-lasting (Gaillard & Mercer, 2013). This old-fashioned, top-down approach typically focuses on a specific disaster or a specific aspect of resilience, excluding those directly affected from participating in the process (Twigg, 2015; Buckland & Rahman, 1999). Instead, CBDRR has emerged as a participatory bottom-up approach, promoting the importance of local knowledge and involvement (Pandey & Okazaki, 2012). Conceptual and case studies have however also highlighted various challenges of a participatory process, such as establishing clear roles and building trust (Blaikie, 2006; Klimes, et al., 2018). While the conventional DRR can fail to include relevant local knowledge and promote local ownership, CBDRR sometimes face difficulties including external knowledge and -resources. Either way, they are both uncertain in creating long-term resilience impact of vulnerable communities (Gaillard & Mercer, 2013). Ideally, a participatory process comprising a reconciliation of global and local knowledge might be most beneficial for all stakeholders involved (Gaillard & Mercer, 2013).

In terms of professional evolution, there is a growing number of designers feeling a sense of social awareness and responsibility. As the need for humanitarian aid increases, many designers are travelling across borders to conduct human-centered design in developing countries. In this context, Participatory Design (PD) has emerged over the last decades, where the end user's needs are not only met, but the end user is also empowered through participation in the process (Cantu & Selloni, 2013; Hussain et al., 2012). This paper responds to two questions: Which elements are empowering in PD, and can PD principles be applied in DRR and CBDRR to reconcile local and external knowledge? Addressing these questions, the paper will:

1. Explore factors related to how communities deal with disasters, and the core principles of DRR, CBDRR and PD.
2. Investigate how participatory and cross-cultural collaborations could reach more long-lasting, empowering and meaningful solutions.
3. Discuss how design methodology could help improve the DRR and CBDRR approach for organizations and transdisciplinary teams.

As the majority of people affected by disasters live in developing countries (Pandey & Okazaki, 2012; International Federation of Red Cross and Red Crescent Societies, 2019), the focus of this paper is on CBDRR in developing countries. As DRR and CBDRR are gaining increased relevance for different scientific communities, a plethora of articles and studies addressing both concepts is available. Regarding DRR, most scientific studies still discuss the dominant top-down approach. On the other hand, the CBDRR approach has been experiencing a significant rise in popularity over the last two decades (Heijmans, 2009), with a number of relevant papers,

case studies and researchers proclaiming the beneficial impact of a participatory DRR process (Djalante et al., 2011).

Gaillard & Mercer (2013) argues however that the research on CBDRR still lacks sufficient case studies with multiple stakeholders, and further argues that *"(...) there is a need to develop specific tools and approaches which enable the integration of both bottom-up and top-down actions, and local and scientific knowledge*." (Gaillard & Mercer, 2013, p. 104). To the authors' knowledge, the link between CBDRR and PD is poorly reflected, which creates a need of knowledge generation, for example by identifying possible and feasible connections. Connections between both approaches can in turn assist future projects where international organizations aim to comprehend and implement participatory processes. Although CBDRR is becoming a popular term, it is also facing the risk of becoming a buzzword (Blaikie, 2006), potentially creating more harm than good if not approached carefully. Developing helpful frameworks that reconciles local bottom-up strategies with global top-down strategies can help to mitigate the risk of washing out the CBDRR concept (Gaillard & Mercer, 2013).

This paper is based on an extensive literature review and a student project, to achieve a holistic overview of CBDRR and PD. Most literature was found and assessed through academic portals like Oria and Google Scholar. Finding relevant literature was done by using keywords such as "disaster risk reduction", "community-based disaster risk reduction", "resilience", "vulnerability", "empowerment", "participatory design" and "design for developing countries". The most helpful keywords were the ones addressing "community-based disaster risk reduction" and "participatory design", as they often included case studies conducted in developing countries. In addition, scientific papers published on Researchgate.net provided by Google Scholar, had a *Related research*-function that allowed for easy scanning of related and relevant papers of the same academic field. The project was done as part of a student exchange program, SAMAJ, from Norway to Nepal in Autumn 2019. The main objective of SAMAJ is to integrate the Sustainable Development Goals (SDG) in society by creating synergies between higher education and the Nepalese /Norwegian social stakeholders through: a) transdisciplinary education via stakeholder collaboration, b) developing methodologies for academia to collaborate directly with societal stakeholders and c) applying and refining methods such as co- design, contextual case studies and fieldwork within existing communities of practices to enhance dialogue, mutual learning and respect (SAMAJ, 2020).

2 Disaster Risk Reduction (DRR), Community-Based Disaster Risk Reduction (CBDRR) and Participatory Design (PD) - Concepts and Cases

2.1 DRR and CBDRR

Socioeconomic conditions, culture, traditions and climate play a key role in communities' vulnerability to disasters (Pandey & Okazaki, 2012), hence increasing their resilience is an important step in order to minimize the effects of the disasters. Exactly how resilience is defined, varies depending on the context. A common definition of resilience is: "*The capacity of social-ecological systems to adapt or transform in response to unfamiliar, unexpected events and extreme shocks.*" (Folke et al., 2016, p. 2). Another definition sounds as following: *"The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner (...)"* (IPCC, 2012, p. 5). A shared perspective is that resilience is both the desired goal and the complex process leading to that goal (Twigg, 2015). In addition, improving resilience requires a holistic approach where

the desired outcome is to permanently help communities out of their vulnerability (Buckland & Rahman, 1999; Twigg, 2015).

An explanation of key terms related to disasters and DRR can be found in the report from the UN Office for Disaster Risk Reduction (UNISDR, 2009). The scientific field of Disaster Risk Reduction (DRR) is a heated battlefield (Gaillard & Mercer, 2013) as the result of two opposing paradigms, each with their different approaches and global practices. The former paradigm, still dominant today, is the hazard-paradigm, which blames the people affected for failing to predict and prepare for disasters (Burton & Kates, 1978). One methodological consequence of the hazard-paradigm are top-down approaches, which tend to focus on the impacts of disasters. Here decisions are made by higher authorities, who view communities as "receivers of aid". This approach is criticized as inefficient, as it is failing to meet humanitarian needs and ensuring a long-lasting impact. Instead, it is accused of creating dissatisfactory experiences for all parts involved, and contributing to the need for further external resources (Pandey & Okazaki, 2012).

The more recent paradigm is the so-called vulnerability paradigm. It argues that many disaster affected people were already in poor in terms of socioeconomic conditions, lacking any means or resources to protect themselves or improve their resilience from the very beginning (Wisner et al., 2004). In a global effort to improve DRR, many non-governmental organizations and national policies are still relying heavily on a science-centred, top-down approach (Gaillard & Mercer, 2013). However, as the 'one solution fits all'-mindset of the top-down approach is unable to recognize local needs and contextual knowledge, it is often unsustainable at a local level after completion. Further, it does not contribute to empower communities and improve their resilience, and thus ultimately fails having a real impact (Gaillard & Mercer, 2013; Pandey & Okazaki, 2012).

Meeting the challenges above, Community-Based Disaster Risk Reduction (CBDRR) has emerged as a more sustainable approach and alternative to the conventional DRR. Assuming that governmental and international support proves insufficient to provide long-term solutions to help communities out of their vulnerable conditions, CBDRR aims to involve local stakeholders with a deep understanding of their needs and resources (Buckland & Rahman, 1999; Izumi et al., 2019; Twigg, 2015). CBDRR promotes a bottom-up approach, where local stakeholders are facilitated to comprehend their own vulnerability and resilience (Pandey & Okazaki, 2012). A community-based approach promotes active participation of community members working alongside external experts – a combined social scientific knowledge generation approach. Local hazards can be identified and analysed by different societal stakeholders to better understand the complexity of a community's vulnerability and possibilities for resilience. Local knowledge and skills are utilized in the process to create engagement, partnership and ownership making a strategy sustainable in the long run. In addition, community members should also be included in overall policy- and strategy plans following the completion of the project (Pandey & Okazaki, 2012).

In summary there are at least three fundamental principles that differentiates CBDRR from the conventional DRR approach:

a. **Promote sustainability**: Only when community members feel informed, included and engaged in a DRR project, they have the incentive to embrace DRR as part of their culture. Thus, external organizations should work as facilitators for capacity building on a local level (Izumi et al., 2019; Dufty, 2008).

b. **Reduce vulnerability**: Vulnerability can be reduced by facilitating for community initiatives and the social inclusion of e.g. marginalized ethnic groups, people with disabilities, elderly, and women and children (Izumi et al., 2019).

c. **Utilize local assets**: Acknowledging and utilizing local knowledge and resources contributes and promotes local engagement and ownership. By contributing directly, community members feel less like "receivers of aid" (Pandey & Okazaki, 2012), and more like active and empowered participators (Izumi et al., 2019).

CBDRR has proved to be methodologically and practically challenging. The scientific community argues that the overemphasis of local knowledge and diminishing of external knowledge and resources might result in suboptimal solutions and does additionally not contribute to reduce the overall factual disaster risk (Gaillard & Mercer, 2013; Blaikie, 2006). Further, methodologies for balancing and commonly analysing scientific and social knowledge to grasp complexity is lacking. For example, when external knowledge and resources come in the participatory process, local knowledge and skills are less prioritized in contexts, especially when considering global scientific practices and frameworks such as the SDGs (Blaikie, 2006; Keitsch & Singh, 2020). Then external researchers pursue an agenda conforming to their externally driven scientific research, they face difficulties to facilitate participatory processes (Blaikie, 2006). A researcher specializing in DRR might choose the most science-centred solution, rather than a solution that engages and empowers the local community.

Regarding practice and real-life settings, a case study from Botswana (Taylor, 2001) in which a team of global researchers worked on Community Based Natural Resource Management (CBNRM), discovered that the researchers preferred technical-instrumental solutions before community-based ones. One researcher admitted that *"(…) their real aim is conservation, and community development is included as a means to achieve this."* (Taylor, 2001, as cited in Blaikie, 2006, p. 1945). The participatory process was hampered because the external stakeholders had a scientific agenda differentiating from that of the locals, resulting in a poorly executed participatory process that neither engaged nor empowered (Blaikie, 2006).

In 2002, the UNCRD conducted six case studies in different developing countries in Asia, focusing on three disasters: earthquakes, floods and cyclones (UNCRD, 2003). Their aim was to investigate the effectiveness of grass-root initiatives and suggest possible policy changes.

Their most important findings on engagement and empowerment were:

1. Community empowerment enhances CBDRR sustainability.
2. A holistic approach to securing livelihood also contribute to CBDRR sustainability.
3. Community-based approaches including actions plans and training, facilitate for improved problem-solving skills.
4. CBDRR project sustainability and community awareness is crucial in the case of unpredictable hazards and disasters.
5. Community members are engaged by action transparency and knowledge sharing.
6. CBDRR projects need secure financial resources.
7. In participatory CBDRR approaches, "What is accepted by the community" outweighs "What is necessary".
8. An institutionalizing of communities could lead to more sustainable CBDRR programs.

(Rewritten from UNCRD, 2003).

In addition, the UNCRD identified several key aspects relating to the sustainability of the CBDRR project. Community participation needs to be genuine and all local stakeholders should be included and encouraged to participate, as much as all assets should be mapped to get a full understanding of the community's capacity. In addition, the organization needs to facilitate the community's adoption of DRR into their culture and daily life. Furthermore, DRR projects should be integrated into the community's development strategy, to ensure the survival of the project. Finally, local and global stakeholders need to ensure good communication, transparency and shared project ownership UNCRD (Pandey & Okazaki, 2012; UNCRD, 2003).

These principles bode well with similar findings from a case study on DRR in Peru (Klimes et al., 2018). Without external help, the community had limited resources and DRR actions were merely based on local knowledge. As external stakeholders joined, the community continued to exist in a state of self-help, refusing outside intervention. This was due to the external stakeholders failing to communicate properly with local stakeholders, and instead making assumption-based decisions. As they changed their practice by improving their communication, applying participatory methods, and defining all stakeholder roles, the community slowly started integrating the proposed DRR projects into their existing self-help-culture. Thus, factors such as communication, genuine participation, clear description of stakeholder roles and a renewed perspective of local knowledge, altered the DRR process towards sustainability. Although improving communication and facilitating for a knowledge-sharing process can be time-consuming and challenging, these necessary measures build trusting relationships and create sustainable impacts (Klimes et al., 2018).

2.2 Participatory Design

Design research is far from presenting a straightforward approach. Depending on context, there are multiple variations of design research and practice. Many designers creating solutions for developing countries tend to look at IDEO's definition of Human-Centered Design (HCD) for input on their process and techniques. However, HCD is not a fully participatory process. IDEO describes HCD as a people-centered approach consisting of three phases: Hear, Create and Deliver. Through these three phases, the designer will use relevant design methodology to understand the user's needs, create a solution that would solve the user's needs, and then deliver the solution (IDEO.org, 2009).

HCD is a broad term with a varying degree of end user participation, while Participatory Design involves the end users as active participants from start to finish (Cantu & Selloni, 2013; Sanders, 2008; Hussain et al., 2012). This approach reflects the mindset of participants as experts on their own challenges and behavior, and designers as mere facilitators (Hussain et al., 2012).

When designing across borders, especially facing different cultures and traditions, the designer needs to take on a more active role as listener and facilitator. Based a literature review of more than 230 sources, Wood (2017) identified the following nine key insights as a guide for engineers and designers creating solutions in and for developing countries:

1. Co-design encourages empathy, promotes user ownership, and empowers resource-poor individuals.
2. User testing in context should be a continuous process, not a final step.
3. Technology must be adapted to the specific context.
4. Poverty alleviation efforts benefit urban and rural communities.

5. Marginalized groups, such as women and children, benefit the most from poverty alleviation efforts.
6. Context-adapted project management techniques are more efficient for the design.
7. Interdisciplinary teams produce more impactful products.
8. Designers need to cooperate with governmental and local stakeholders to enable poverty alleviation plans.
9. Distribution strategies for developing world markets already exist.

Wood (2017) also conducted a literature review to identify typical *failures* designers make when implementing physical products in developing countries. The third author of this paper modified this list into design principles within three areas: *knowledge generation, practical application and dynamic, contextual implementation*.

1. Attain sufficient contextual and systems knowledge, exercising a hermeneutic understanding.
2. Ideographic knowledge is equally as important as nomothetic knowledge.
3. Knowing is better than assuming.
4. Learn the skills and expertise needed professionally, understand contextual and situated skills and expertise.
5. Facilitate communication and build trust.
6. Collaboratively discuss implementation strategies for the selected solution and professional provide possibilities to realize it.
7. Ensure plans for overall, long-term sustainability of the solution, also related achieve SDGs in the surroundings.
8. Keep in mind that communities and context change over time.

Based on a case study by Mattson et al. (2017) on implementing human-powered drills for water wells in 15 countries, Wood (2017) identified two assumptions of design teams which hinder progress. First, that designing a product that meets users' needs alleviates poverty. If designers fail to recognize the system they are designing within and for, the solution in fact not just fail but worsen the situation. Second, that technically, a design team can meet all tasks in a project such as manufacturing, packaging, distribution, etc. themselves. The comparative case study above has shown that inclusion of stakeholders, for example partnering with local manufacturers (see point 4-6) significantly improved the impact and sustainability of the project. It is therefore essential for designers in developing countries to invest time and resources to build adequate relations and partnerships (Wood, 2017; Cantu & Selloni, 2013).

In addition, when designing for people in developing countries, designers should have realistic expectations. Building relationships requires time, which is necessary to gain profound insights into stakeholders' and users' needs, and in local culture, values and traditions. This attempt is often acknowledged in a project, participants report to feel empowered and heard, which in turn might increase their motivation to contribute (Cantu & Selloni, 2013). PD methods and tools can facilitate the empowering process (Hussain et al., 2012).

A case study on community participation from Milan discovered that participants reached a level of *"pre-empowerment*" at the end of a co-design session (Cantu & Selloni, 2013). As citizens were excluded from making political decisions, they could not reach a full empowerment, but instead "(…) *reach a collective awareness of the possibility of playing a key role in designing and changing things*." (Cantu & Selloni, 2013, p. 13) Another example is presented in a case study from Cambodia, where a design team used participatory design tools and techniques to help children with prosthetic legs (Hussain, 2011). *Figure 1* below shows the

PD conceptual basis for the process. Feedback from the children indicated a sense of psychological empowerment: "(…) *before I didn't dare to talk with other people, but now I dare to speak to them [...] Because when she [the designer] came, I spoke to her; then I started to dare to talk with other people.*" (Hussain, 2011, p. 102)

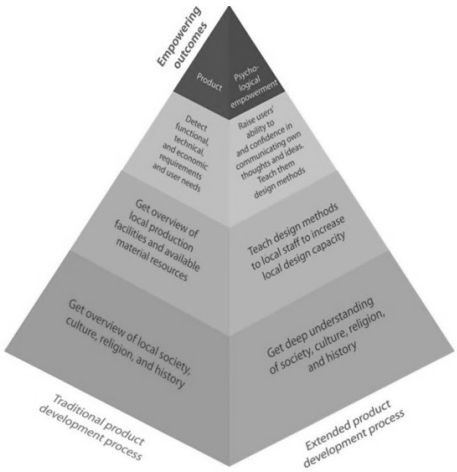

Figure 1: Empowering design process. (Reprinted from Hussain et al. (2012, p. 102))

Finally, a case study conducted on the Red River flood in Canada (Buckland & Rahman, 1999) discovered a link between social capital and resilience. The better the social, physical and human capital, the better the communities responded to disasters (Mathbor, 2007). Thus, designers should aim to build social and human capacity, which could be achieved by empowering them. *Figure 1* shows a two-sided pyramid model, where the left side is a normal design process, and the right side is the design process needed to empower the participants. Here, Hussain et al. (2012) visualized how *empowering outcomes* should be the overall goal, in contrast to the conventional product-based design mindset.

3 Social Inclusion and Disaster Management in Nepal

During the Autumn of 2019, author 1 and 2 went to Nepal as part of the SAMAJ collaboration project between NTNU and IOE, Tribhuvan University, Nepal (https://www.samaj.online/). Author 3 was the SAMAJ project leader and supervised author 1 and 2 throughout the project. The project was part of the Design Departments course PD9 'Design theory and Project' (https://www.ntnu.no/studier/emner/TPD4505#tab=omEmnet, 22,5 credits). The aim of the project was to apply service design methodology for disaster management and social inclusion, with a specific focus on women and marginalized groups. Author 1 and 2 also wanted to mature as designers by testing design methods and theoretical insights in a real case setting. Nepal was chosen as the authors wanted to face a complex challenge and reflect upon their mindset and problem-centred approaches as designers.

The initial research questions were "*How can we make a meaningful impact, and is our western mindset and design approach applicable to Nepal?*". Neither author 1 nor 2 had any pre-existing knowledge about Nepal or disaster management, and therefore conducted four semi-structured interviews with Norwegian experts on disaster management prior to the trip. In Nepal, the focus was on extensive in-depth research, via collaboration with local stakeholders. This included several field trips to different sites, interviews with locals through the help of translators, focus groups and several immersive home stays. One area of exploration was

Khokana, a satellite town in the Kathmandu valley, which was hit hard by the 2015 earthquake. In 2019, many residents in Khokana were still living in temporary shelters, due to bureaucratic hindrances slowing down the housing projects. Successively, the authors realized that empowering a community is generating a valuable ripple effect in terms of economic stabilization (e.g. via micro-financing for women's' groups, awareness generation for cultural values and traditions, and disaster resilience).

Picture 1: Khokana four years after the earthquake

Picture 2: Meeting with local stakeholders

Findings from applying the methods and experiences with Nepalese stakeholders resulted in a revision of the initial research question. This decision was based on the insight that sustainable DRR solutions with a human-centered design focus have to be community based, including local resources, skills and values, in order to have a meaningful impact. Being in the communities for a comparatively short period, author 1 and 2 found it presumptuous to suggest solutions. They also realized that making concrete design decisions on disaster-related solutions without including the communities was highly hypothetical and also counterproductive regarding basic principles of human-centered design.

The project question was thus reformulated in accordance with the students' competence: "*How can we generate meaningful interactions as a designer for stakeholder inclusion in a different cultural landscape*?". The new goal was to inform the next generation of design students and designers working with Nepal-based projects on how to create communication space and allowing for diverse interpretations, values and possibilities. As for the design solution, a concept that facilitates for future Norwegian designers to better plan and collaborate with communities in developing countries in the form of a booklet, was seen as the best option. To confirm that this was a valuable contribution, 15 design students from different grades at the Department of Design NTNU were questioned to share their most immediate associations with Nepal. Findings supported the hypothesis that working in Nepal was put in context with working in a mainly poor and chaotic country - a harmful stereotype which could hamper future design projects.

The concept was not meant to devaluate these views, but to show that working in a Nepalese context also provide other opportunities for a designer than 'doing good deeds' for poor and underprivileged people. This is important for advancing a pluralistic, inclusive and non-hegemonic attitude towards stakeholders in developing countries. Therefore, author 1 and 2 created a story-oriented booklet told in a first-person perspective. The aim of this booklet includes giving designers a cultural pre-understanding other than ethnographic stereotypes, a pre-understanding comprising among others empathy and appreciation of and respect for diversity. This might balance the designers' views, allowing them to be aware of earlier, tacit assumptions and initiating the process of a reflective practice which can facilitate planning and conduction of the collaboration process.

Picture 3 (left): The physical copy of the booklet reflects Nepali handcraft traditions and culture
Picture 4 (right): A few chosen pages have flaps for increased reader engagement

To meet design requirements of user testing of the booklet concept, it was discussed with co-students and, based on their feedback, iterated and refined. The outcome is a visual booklet (*Picture 3 & 4*) with stories and experiences from Nepal with a clear, common thread and message. The booklet has since been published digitally for increased accessibility (*https://issuu.com/idunramstad/docs/storiesfromnepal_issuu*).

4 Conclusion

DRR and CBDRR are complex subjects due to the multitude of stakeholders and challenges, and especially so in developing countries. Conventional top-down approaches, such as a team of global researchers implementing a technical product, might fail to be sustainable in the long term due to the researchers not including and engaging the community in the process (Pandey & Okazaki, 2012). On the other hand, PD approaches such as co-design, focus group meetings or workshops (IDEO.org, 2009), seem to facilitate transdisciplinary collaboration between researchers, designers and other professionals, as well as local community members. One advantage of PD methods is to map diverging world views, interpretations, needs and values in transdisciplinary teams. PD methodology promotes inclusion of all members of the community, so the solution is more acceptable for the majority. Epistemologically, researchers miss out on a holistic and deep understanding when only talking to selected community members (Wood, 2017).

HCD design needs 'Reflective Practitioners' (Schon, 1983) rather than mere 'Problem-solvers'. 'Reflective practitioners' are characterized by achieving a balance between a design-led and research-led processes and between desirable, feasible and viable solutions (Singh & Keitsch, 2020). PD approaches might facilitate succeeding in CBDRR, which is especially relevant for developing countries. Design methods can here be supported by democratic processes such as Citizen science for disaster risk reduction and can be successful in advancing information to communities e.g. in providing early warning of hazards. The case study conducted also illustrates that the designer often has to start with themselves and reflect own their own views and stereotypes, in order to start a successful collaboration process and gain the trust and willingness from stakeholders to participate. In conclusion, considering the intensifying environmental challenges, it seems timely and necessary with more conceptual research and practical testing on the impact of design thinking and PD methodology on the CBDRR process.

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