Visualizing Climate Change Adaptation

VISUAL methodologies

Kerstin Rosenow-Williams

Institut für Friedenssicherungsrecht und Humanitäres Völkerrecht /Institute for International Law of Peace and Armed Conflict (IFHV).Ruhr University Bochum. Germany

Kerstin.Rosenow@rub.de

Abstract

This article analyses how humanitarian and development organizations aim to make environmental changes visible while trying to meet local needs and demands for sustainable livelihoods. Based on an in-depth organizational case study in Southern Thailand, the research analyses the use of visualization tools to foster environmental knowledge and literacy while supporting both policymaking as well as citizen engagement. Drawing on insights from sociology of organizations, the study discusses the organizational reasons for the use of visualization tools, outlining the underlying coercive, mimetic and normative pressures that facilitate their proliferation in the context of environmental communication. Moreover, the analysis explores the emancipatory motive behind the use of visualization tools, examining to what extent organizations employ visualization tools in an interactive or self-mobilizing participatory manner. In the context of climate change, non-governmental organizations have increasingly become intermediaries between climate scientists and affected populations. In this role, they can facilitate visual environmental communication and at best contribute to citizen engagement, participation and policy action. The results show that the use of visualization tools has already become an institutionalized standard in the context of humanitarian and development aid. Donors, the public, government actors and civil society organizations expect organizations to visualize their activities, not only vis-à-vis the participants, but also publicly. The extent of citizen participation during this visualization process however differs.

Keywords: Visualization Tools, Climate Change Adaptation, Humanitarian Organizations, Development Organizations, Thailand

Introduction

"Over the last 20 years, disasters caused by natural hazards have claimed 1.35 million lives and affected on average 218 million people per year, mostly in developing countries" (World Humanitarian Summit, 2016a, p. 2). The increased intensity and frequency of extreme weather events is only one outcome of climate change in addition to increased droughts, sea-level rise, freshwater sources degradation and the related impacts on crop yields, human health and social vulnerability. Climate Change has become a pressing challenge that threatens the livelihoods of vulnerable populations across the globe, requiring local climate change adaptation. According to the Intergovernmental Panel on Climate Change (IPCC), climate change has been "unequivocal since the 1950s" and will continue to influence humanity strongly in the future (IPCC, 2013, p. 4). Rejecting a solely technocratic or natural scientific approach, the IPCC clearly highlights the social dimension of climate change (2014, p. 6), which has by now become a key concern for humanitarian and development actors (World Humanitarian Summit, 2016b, n. p.).

Due to these global challenges, many non-governmental organizations (NGOs) from the humanitarian and development sector are developing new approaches, or re-modeling existing ones, to incorporate the challenges caused by a changing climate. Consequently, climate change is no longer only a concern for environmental scientists and environmental organizations; the issue has also reached the top of the agenda of political, humanitarian and development actors (Helmer & Hilhorst, 2006; O'Brien et al., 2006). Congruently with the growing attention directed at global political climate change negotiations, most notably since the 2009 Copenhagen Climate Change Conference, concrete measures and tools to adapt projects to climatic changes have been implemented by humanitarian and development organizations (Red Cross/Red Crescent Climate Centre 2007; Rojas Blanco, 2006; Rosenow-Williams 2015a, b). These tools include participatory climate vulnerability and capacity analyses, as well as more detailed disaster preparedness tools that use new information and communication technologies to visualize and anticipate natural hazards and related uncertainties (Kunz, Grêt-Regamey & Hurni, 2011; Meier, 2011; Ruth, 2012).

The humanitarian community is increasingly using visualization tools to communicate important information before, during and after crises based on the premise that "the bandwidth for the communication of information is much higher for the visual channel than for any of our other senses" (Brodbeck & Mazza & Lalanne 2009, p. 30). A growing number of studies have discussed the capabilities of social media tools to visualize and communicate risks effectively (International Federation of Red Cross and Red Crescent Societies (IFRC), 2013; Veil, Buehner & Palenchar, 2011; Wendling, Radisch & Jacobzone, 2014). These studies highlight the key role of technological advances in enabling rapid participatory data collection during natural catastrophes. This data then allows humanitarian organizations "to provide structured and geo-referenced data in multiple formats, such as text, image, video and voice" to support disaster affected communities as "the real first responders" (IFRC 2013, p. 73).

However, the viewpoints of the organizations involved and the (audio)-visual messages they send to their members and the public remain understudied. For example, scholars have not yet adequately analysed the factors that motivate organizations to address their audience through visualization tools. The benefits of visualization tools in non-emergency contexts also deserve further attention.

This article addresses these research gaps with a focus on the visualization strategies employed by humanitarian and/or development NGOs. It analyses how and why these organizations use visualization tools to foster on the one hand, environmental literacy, and on the other, support policy making and citizen engagement. Based on an in-depth case study in Southern Thailand and drawing on a neoinstitutional research framework based on organizational sociology, the following analysis outlines the underlying coercive, mimetic and normative pressures that facilitate the proliferation of visualization tools in the context of environmental communication. Moreover, the analysis sheds light on the emancipatory motive behind the use of these tools. Thereby, this study contributes to the wider literature on participation by assessing to what extent organizations employ visualization tools in an interactive or self-mobilizing participatory manner (Pretty, 1995; Penderis, 2012). Furthermore, the study's theoretical framework and empirical findings on the organizational perspective can contribute to the growing literature on visual environmental communication (Hansen & Machin 2015).

The empirical analysis is part of a larger research project that studies the recent engagement of humanitarian and development organizations in the area of climate change adaptation (Rosenow-Williams, 2015a). It contrasts case studies of the International Red Cross/Red Crescent Movement with CARE International, a global humanitarian and development confederation with 14 member organizations working in over 95 countries around the world. While Rosenow-Williams' earlier work highlighted the benefits of "risk visualization" in humanitarian projects on climate change adaptation and disaster risk management (Rosenow-Williams, 2015b), the analysis presented in this article focuses on the organizational logic behind the use of visualization tools.

Theoretical Research Framework

"Physical, chemical or biological facts […] create no social resonance as long as they are not subject of communication. Fish or humans may die because swimming in the seas and rivers has become unhealthy. The oil-

pumps may run dry and the average climatic temperatures may rise or fall. As long as this is not the subject of communication, it has no social effect. Society is an environmentally sensitive (open) but operatively closed system. Its sole mode of observation is communication. [...] Thus it can only expose itself to danger" (Luhmann, 1989, p. 28f.).

Based on the assumption that communication in human society is a social operation, Luhmann emphasizes that the environment cannot speak. "[I]t can make itself noticed only by communicative irritations or disturbances", which in turn can lead to communication about the environment (ibid, p. 29). This raises the key question of "how society structures its capacity for processing environmental information" (ibid, p. 32). Formal organizations constitute the mid-level of social systems, which increasingly move between interaction systems on the one hand and societal systems on the other hand (Luhmann, 1991, p. 12-13). The focus of this research lies on non-profit organizations in the humanitarian and development sector, which support the livelihood adaptation of local communities in times of climate change.

The analysis of the organizational perspective in visual environmental communication is situated in a neo-institutionalist research framework (DiMaggio & Powell, 1991; Scott, 2014). According to neoinstitutionalism, the primary objective of an organization is to achieve and secure legitimacy—from its members, donors, the public, or the political level (DiMaggio & Powell, 1983; Meyer & Rowan 1991). Legitimacy can be achieved through the process of adaptation towards expectations and pressures. Expectations can be raised both from within the organization and from the organization's environment, including beneficiaries, donors, the government and the public both in the project sites and in the donor countries. DiMaggio and Powell (1983) distinguish between three dimensions of pressures that promote processes of adaptation and isomorphism, meaning an increasing similarity between individual organizations. These include:

"(1) Coercive isomorphism that stems from political influence and the problem of legitimacy;

(2) mimetic isomorphism resulting from standard responses to uncertainty; and

(3) normative isomorphism, associated with professionalization"

(DiMaggio & Powell, 1983, p. 150).

Coercive pressures are the result of laws, government mandates or any other dependence on donors, hierarchies, or support. "The greater the dependence of an organization on another organization, the more similar it will become to that organization in structure, climate and behavioral focus" (ibid., p. 155).

Coercive isomorphism can be based on both regulative elements such as laws or on normative expectations that are expressed through hierarchies or other structures. Mimetic pressures are pressures that cause organizations to mimic the structure of an organization, which they perceive as successful. They can also rely on established legitimate procedures to increase their legitimacy and "survival characteristics" (ibid., p. 151, 154). DiMaggio and Powell stress that organizational models can diffuse unintentionally, which highlights the cognitive dimension of orthodoxy with regard to mimetic isomorphism. Finally, normative pressures are the result of professionalization and socialization processes, which promote isomorphism in organizational behavior (DiMaggio & Powell, 1983, p. 152f.). In this context, professionalization emerges through a similar formal education and through the extension of professional networks that span across organizations.

The analysis section evaluates in how far these coercive, mimetic and normative pressures can motivate the use of visualization tools in the area of climate change adaptation. Has the professionalization of humanitarian and development organizations led to normative pressures to employ visualization tools? Do organizations mimic the lead of successful organizations, or is the regulative pressure of donor agencies responsible for the proliferation of visualization tools? The study assumes that organizations have to meet donor regulations (coercive) and professional standards (normative), while competing with other organizations that use visual tools successfully (mimetic).

In addition to these three pressures that foster the use of visualization tools, the study further explores the linkages of visualization tools to the aim of local transformation through participation. This presents a normative emancipatory motive that has been present in the development literature and practice since the 1970s. Today, participation is still the dominant approach despite criticisms that it acts as "a coercive and manipulative tool used by governments and institutions for their own purposes to increase productivity" (Penderis 2012: 4). In contrast, Penderis highlights that, "participation is ideally a transformation process and proactive 'learning by doing' exercise, with people at the center of the development process" (ibid.). Pretty (1995) differentiates participation into two types. At one end of the spectrum is participation where participants have either no power over decision making and mainly participate to fulfil externally predetermined objectives. Penderins (2012, p. 18f.) labels these types of participation as 'participation as a means'. At the other end of the spectrum, participation can be differentiated into interactive and self-mobilizing participation (Pretty 1995, p. 1252). In interactive participation, people are involved in the analysis of the problem, the development of action plans and the distribution of available resources, while in the case of self-mobilization people take initiative independently of external institutions.

With regard to the research question of whether visualization tools can foster policy making and citizen engagement, the distinction between the use of visualization tools in a non-participatory or participatory manner becomes an important criteria of analysis. The study therefore analyses to what extent an active engagement of all stakeholders can be fostered through joint processes of visualizing environmental change. Ideally, the results of these visualization processes can be communicated vis-à-vis decision makers at the community, NGO or government level to facilitate structural transformation. Thus, participatory policymaking could be enhanced if the community itself actively uses visual tools and their results as a resource in democratic policy negotiations. This process of community empowerment is more likely if the community is actively involved in process of visualization that contributes to the assessment of risks and needs.

Research Methods

In this study, organizations constitute the main unit of analyses including their members and their public (in this case local inhabitants of the villages involved in the project). Following Weber's interpretative paradigm that assumes that social realities are not "hard facts" but consist of rules and meanings that are constructed and interpreted by members of a society (Weber, 1978 [1922], p. 9), the research is based on the generation of primary data and the analysis of secondary data. Research methods include qualitative interviews (semi-structured interviews, focus group discussions and narrative interviews), as well as analyses of organizational documents and policies.

The research data was collected between 2012 and 2016 (interviews with representative of CARE in Germany and Denmark) and during a two-week case study in Southern Thailand in 2014 with Raks Thai Foundation, an associated member organization of CARE International that has been conducting local climate change adaptation projects. Primary data in Thailand was collected based on personal interviews in the national headquarters of Raks Thai Foundation in Bangkok and at the local headquarters in Krabi, as well as focus group discussions and interviews in five local communities in Southern Thailand in the provinces of Krabi and Trang.

The author conducted all interviews with the help of a local interpreter who summarized the answers. A second bilingual researcher accompanied the author at all times and protocolled the interviews. She ensured that the interpreter conveyed the key messages in a shortened form following Williamson et al. (2011) approach of an "interpreter-facilitated interview". The author then transcribed and analyzed the English parts of the interviews. Limitations of this research method can be linked to the lack of familiarity with the language and related limitations in the interpretation accuracy.

In particular, the research analyses the visualization tools used in the project Building Coastal Resilience to Reduce Climate Change Impact in Thailand and Indonesia (BCR-CC). CARE Germany-Luxemburg, Raks Thai Foundation and CARE International Indonesia implemented the project between 2011 and 2014 with the financial support of the European Union (EU) (CARE International, no date a). The BCR-CC project aims to strengthen the capacity of coastal authorities and civil society organizations in order to enhance resilience against the negative aspects of climate change in the target areas (CARE International, no date b). Two major components of the project are to build community understanding of the local impact of climate change and to help affected communities to implement strategies for adapting to a changing environment (CARE Deutschland-Luxemburg & Raks Thai Foundation, 2013).

Climate change is predicted to lead to sea level rise of 1 cm annually over the next 25 years in the Andaman coast in Krabi province. This can cause shoreline shifts of 10-35 meters and increase the chance of storm surges or cyclones (Naruchaikusol, 2016, p. 3f.). Severe coastal erosion can be observed already in the project area. The mangrove forests that help to prevent coastal erosion may also be damaged by the predicted sea level rise. In addition, increasing temperature and higher rainfall variability have negative impacts upon agricultural products that are dependent on specific climate conditions (ibid.; CARE Germany-Luxemburg, Raks Thai Foundation 2013, p. 45).

Results

The results of this article are presented in a three-fold manner. The first part presents some of the visual and audio-visual tools Raks Thai designed to communicate their project. The second part introduces the expectations and perceptions of the local populations in Southern Thailand, as well as the point of views of the local Raks Thai staff.

Employed (audio)-visualization tools

The following summary of employed (audio)-visualization tools in the BCR-CC project first presents the tools that are produced by the organization itself in a non-participatory manner either in Thailand or abroad, followed by the tools that are created in a participatory manner actively involving the local population.

Non-participatory visualization tools

To inform the general population about the local consequences of climate change and possible means of adaptation, various information campaigns were designed surrounding the BCR-CC project intervention. Among them were exhibitions on climate change adaptation at public events and radio segments of two to three minutes or radio shows, which local commercial radio stations hosted free of charge. In Indonesia, the radio segments advertised existing sources of information on how to adapt local livelihoods to a changing climate and raised awareness for the project activities (Interview CARE Germany staff, 19 May 2016). In Thailand, eight local radio stations disseminated findings from the local vulnerability and capacity assessments, while also actively encouraging listeners to express their personal opinions on environmental issues (Raks Thai Foundation, 2013, p. 6f.).

Other frequently produced visualization tools are posters. Raks Thai displays them at local and national meetings to communicate project progress and results to the local community, other NGOs and policy makers. A local communication and media officer designs the posters with the support of a professional photographer (Interview CARE Germany staff, 19 May 2016).

Another important outcome of the project was the production of a cartoon video based on the project results. In the video, a shrimp called Mi washes upon the shore of the project sites (see figure 1). Various volunteers guide her through the different goals of the project answering her questions about climate change and possible ways to adapt to it. The volunteers in the video outline, for example, the advantages of creating safe fish habitats, bamboo walls that help restore coastal mangrove populations (see figure 2) and crab banks in old shrimp ponds that help increase the local crab population. According to CARE,

> The movie aims to motivate students, community members and politicians to work together and to start activities in their communities to protect and maintain their environment (CARE International, no date a).

The video is available in Indonesian, Thai, English and German. Raks Thai still uses the video to educate communities on the topic of climate change. The video can also be found on the websites of CARE International and CARE Germany-Luxemburg. The cartoon video received broad publicity in Germany, especially among schoolteachers, who used it to discuss the topic of climate change with their students. For this purpose, CARE Germany produced an educational booklet, which can be ordered along with the DVD.

Figure 1. Screenshot from the educational video.
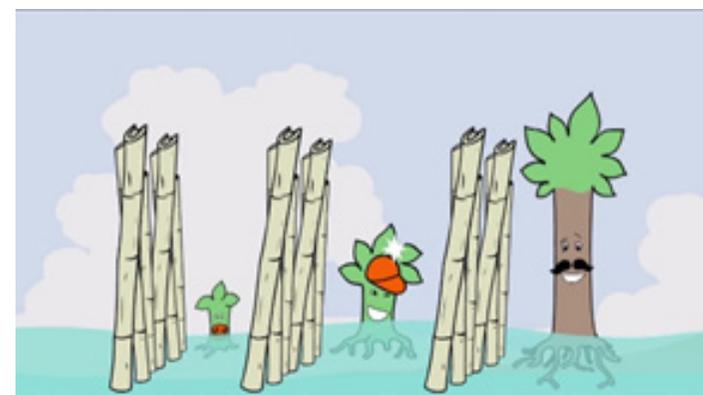
Figures 2. Screenshot from the educational video. *Source Fig. 1 and 2: CARE Deutschland-Luxemburg e.V. and Millus Animation (2014).*

Participatory visualization tools

While the video "Mi's Coastal Adventures" was produced professionally by a German video and cartoon artist in collaboration with CARE project staff in Germany and Thailand, the local population in Thailand also produced videos on the topic of climate change adaptation. This includes a participatory video project by local youth groups from ten schools in four provinces who were trained to produce short films in their summer school break. Raks Thai then used a competition to select the best film on the impacts of climate change in their communities. These ten short films are presented online both on Raks Thai's Facebook page and on YouTube. The film shown below (See Fig. 3 and

4), for example, is narrated by two girls who learn about the topic of mangrove reforestation and is entitled "Destroyer to become the creator". It was the winning movie and has therefore been translated into English.

Another important set of participatory visualization tools is linked to the climate vulnerability and capacities analysis that is conducted in every project village (CARE Deutschland-Luxemburg e.V. and Raks Thai Foundation, 2013).

Fighre 3. Screenshot from the winning movie of a participatory video project.

Figures 4. Screenshot from the winning movie of a participatory video project.
Source Fig. 3 and 4: YouTube (2014) https://www.youtube.com/watch?v=DMx7as-aeVM.

The analysis investigates current and traditional community methods, of dealing with climate risks and climatic changes including the local perception of changes. The participatory visualization tools include hazard mapping, seasonal calendar, historical timeline, vulnerability matrix (to determine the hazards with the most severe impact and which livelihoods resources are most vulnerable), and a Venn diagram (to understand which institutions are most important to the community including their access to services and safety nets). The vulnerability and capacity analysis aims to involve local communities during the initial phase of joint determination of project activities and local needs through participatory tools (CARE International, 2009). All of the tools for visualising local risk perceptions involve interactive participatory processes intending to foster community engagement.

The participatory exercises and associated discussions provide opportunities to link community knowledge to available scientific information on climate change. Raks Thai's field staff uses the opportunity during the participatory exercises and associated discussions not only to understand the communities better in terms of their views on disasters, climate change and vulnerability of their communities, but also to build the relationship with community members as the foundation for the work of the project (Raks Thai Foundation, 2012, p.1).

Finally, Raks Thai frequently produces both audiovisual and visual public relation materials that are published on the organizational websites and in online social networks. These include YouTube videos and short articles, containing (audio)-visual images from the project sites often portraying local staff and volunteers from the villages (see figures 5 and 6). Both clips and articles inform about project results and progress. All materials include the organizational logo, and project related materials also include the EU logo as the project sponsor. Organizational staff, often in cooperation with local volunteers, produces the information. Both the staff and the volunteers, who have internet access, frequently comment and share Facebook posts, with links to the videos and articles, about the local projects[1].

Figure 5. Screenshot from Raks Thai information material (video and article).
Source: YouTube (2015); Raks Thai Foundation (no date).

The use of computer-mediated communication, such as YouTube videos, websites and Facebook groups, has spread rapidly with increased access to the Internet even in rural and remote places. While access to online information is often limited to individuals with the necessary resources, these people are often involved in the local volunteer committees, thus assuming a role of multipliers of new knowledge spreading the information to their neighbors. Videos and articles are further distributed to local community members via the community learning centers, which were established as part of the project.

Coastal erosion forced Kanit Sookdang to move houses five times.

Figure 6. Screenshot from Raks Thai information material (video and article).
Source: YouTube (2015); Raks Thai Foundation (no date).

The local communities' point of view

In 2004, the Indian Ocean tsunami devastated Thailand's Southwestern coast. In the aftermath, a big influx of NGO activities contributed to the recovery process along the coast including the installation of disaster risk management and early warning teams and mechanisms. There was a growth in discourse and knowledge about climate change and climate change adaptation at the community level following the tsunami and the arrival of several NGOs including Raks Thai. The tsunami raised community awareness about localized environmental changes, such as erosion, which continued post-tsunami:

> *So after the tsunami, the people have been thinking 'what about here'? Even a small wave and the soil gets eroded every day and they started to observe the nature and the surrounding environment and then Raks Thai came (Villager during focus group discussion in Ban Klong Prasong, Krabi Province, Thailand, 01 July 2014, line 63-67).*

The community members interviewed listed substantial local changes in their environments and general concern about their future livelihoods. However, they stressed that it was only following the arrival of NGOs, especially Raks Thai's work on climate change, that they became aware of the concept and meaning of climate change as one of the causes of the local environmental changes they were witnessing. Prior to the NGOs arrival, they were predominantly only conscious of the adverse affects on their communities and the exacerbation of existing vulnerabilities by the changing environmental conditions without understanding the cause. Most changes noted were slow onset changes, including changing rainfall and weather patterns with flow on effects for crops, salinization of rainwater, rising sea levels and higher tides creating pressures on housing and causing temporary displacement, and changes in sea life with negative flow on effects for fishing.

The interviewed villagers explained that education tools, such as the climate vulnerability and capacity analysis, helped widen community understanding and discourse surrounding climate change adaptation:

> *During the climate vulnerability and capacity analysis process, they [the participants] also learned more about their own community. For example, where is the vulnerable area where is the risk. So during this training other people also got to learn more about their own area, about our own resources (Villager during focus group discussion in Yong Star Village, Trang Province, Thailand, 03 July 2014, line 177f.).*

The local focus groups in Thailand revealed a high level of support for the climate vulnerability and capacity analysis method. Community members expressed a

feeling of empowerment following the process, flowing from the possibility of conducting the first sound analysis of their local situation. This resulted in a data set that could subsequently be used to raise demands on external donors such as the government for desired changes and projects.

> *You have to know about yourself, you have to collect data about yourself, your community, your environment. So that is a good database, a good foundation to do any further for community development (Villager during focus group discussion in Ban Klong Prasong, Krabi Province, Thailand, 01 July 2014, line 301f.).*

In this context, the local community perceives local participation during the risk assessment as important. As envisioned by the concept of a joint bottom-up climate and vulnerability analysis, community participation can lead to stronger local interest in data assessments, which provides the basis for structured community development.

> *The sketch map [hazard map] is the most important […] Because everything can be shown for the people, not only in the narrative language but it can show as a graphic. People can figure things out and can picture where is what, what is where. […T]he visual can also help to make the ideas clear. The community sketch mapping is simple for the people, who can participate, who can draw, who can easily understand. Compared to Google Earth map you know it looks like from technology from the outside, but this is from their own drawing. They can also come to point to the drawing. It can also call for more participation. People are willing to join activities. (Villager during focus group discussion in Ban Klong Prasong, Krabi Province, Thailand, 01 July 2014, lines 462-476).*

For the Raks Thai volunteers, who now work regularly with the organization on climate change adaptation projects, many became aware of climate change as a concept only after Raks Thai came. They volunteer because they can see the effects of climate change upon their environment. Several were distressed because other community members thought they were paid for the work, rather than volunteering. The volunteers support each other especially against community backlash, which also exists because those who gain resources through illegal fishing activities contest the idea of conservationism, which is one of the main aims in many adaptation projects. One group reported it as being their mission for the future to convince other community members on the need for climate change adaptation. Overall, the Raks Thai volunteers are proud of their work on climate change adaptation and in strengthening their community resilience despite local challenges.

Most volunteers do not have special skills or training. One woman reported she had a high school education, and as she was older, she had more time for volunteering.

During the projects, villagers already had or developed relevant local knowledge, such as building bamboo walls to protect their shores against wave energy, mangrove forestation or building safe fish habitats. Different actively engaged volunteer working groups exist that focus, for example, on the fisher folk, youth, or on emergency response. As these volunteer project committees are dependent on local support they also see the climate vulnerability and capacity assessment process as an opportunity to raise further awareness and participation.

> *The tools of the climate vulnerability and capacity assessment can help to access a wider, broader group of people. For example, some information we need to ask the old people you need to get them to participate. Because normally when we conduct activities about conservation of mangroves only for the big activities, for example, planting mangroves you can get many people to come. But normally the working group is also among these people so these tools bring new faces to come to the group (Villager during focus group discussion in Yong Star Village, Trang Province, Thailand, 03 July 2014, line 510).*

Interviewed community members reflected that a local "knowledge center" would assist educating their communities about climate change adaptation. Some community leaders also stated that they used the knowledge gained through working with Raks Thai to present themselves and their villages as suitable candidates for government funding for climate change adaptation. Overall, their discussions display the growing community awareness, including tensions and strategies used to spread knowledge of climate change and climate change adaptation.

The organization's point of view

CARE International aims to mainstream climate change into existing programs by defining it as an issue of social justice. Accordingly, "responding to climate change cuts to the core of CARE's mission" (CARE International 2013, p. 10). At the local CARE level, the implementation of this organization-wide strategy required organizational staff with Raks Thai to acquire new skills and receive training, as most employees and volunteers did not have an environmental background and had previously worked on different topics. Similarly, the increasing importance of audio-visual communication literacy due to the spread of online communication and advanced participatory and non-participatory visualization techniques required a new skill set that had to be met by the local organizational staff either through existing skills, trainings or though new personal.

In 2014, the interviewed staff in Thailand appeared to be pushing climate change adaptation at the organizational level because of personal convictions about the effects of climate change on humanitarian action and on local populations. Raks Thai workers feel that community understanding of climate change and of climate

change adaptation is essential. Thus, they not only invest considerable energy in community education about climate change as a risk multiplier, but also in working with communities and building local skill sets in implementing adaptation projects.

In this context, it is seen as essential to emphasize that planning needs to be sensitive to community needs and experiences. These local experiences are evaluated through frequent visits of staff in the villages and through the climate and vulnerability analyses. Based on the findings of the climate and vulnerability analysis, adaptation projects are designed together with the communities and local government following feasibility studies to ensure that the proposed interventions are sustainable and equitable (Raks Thai Foundation, 2014b, n.p.)

The digital revolution and its rapid proliferation throughout non-urban Thailand has enabled Raks Thai to actively involve the local populations in their work, for example, through photo documentation projects about local environmental changes that are frequently published online.

> *An important project part was to see whether people can do photo documentation and I think one often underestimated which means are available. Even in the most remote village, people have cell phones and also smart phones. This means everything becomes easier through this digital technique. Before one needed a camera and a store to develop the film, now one just takes pictures with the cell phone uploads it to the internet and the information is available. And it is important that the projects have a Facebook presence, which interests young people (Interview with a former German Raks Thai consultant, 23 January 2014, line 50, translated by the author).*

In addition to the photo documentation, videos are also used to engage the local community. Raks Thai staff trained local youth groups to produce short films in their summer school break to tell their perspective of environmental changes (see Fig. 3 and 4 above). According to the local staff, the process of involving the youth in video projects is important to communicate the message of environmental change efficiently.

> *This example [of the youth videos] shows also the linkage between the issues, the [ongoing] phenomena happening in the community linked to climate change. And this is easier for the locals to understand instead of hiring the big companies, who make the big film, the big story and then transfer it to them on the media (Focus group Raks Thai staff in Krabi, 30 June 2014).*

Another factor is the awareness of local, national and international staff of funding opportunities for programs on climate change adaptation. Raks Thai therefore tries to tie existing humanitarian projects to funding on climate change adaptation coming from abroad. However, the general lack of long-term funding for NGOs and the related threat of closing local offices due to funding shortages makes climate change adaptation projects with local communities very difficult. Lack of English language skills also limits the NGOs potential for self-promotion for international donors that require, for example, English project reports. At the same time, the fact that some of the Raks Thai staff can speak the local dialect is very important for building the initial trust between local volunteers and the organization and to translate such an abstract concept as climate change into the local language.

Analysis

The engagement of humanitarian and development organizations in the area of climate change adaptation has increased considerably over the last few years turning these organizations into key actors in interpreting and translating environmental information for local populations. In this context, information is communicated both top-down and bottom-up with the help of diverse visualization tools as described above.

The following analysis outlines why the organization Raks Thai has decided to use visualization tools in their climate change adaptation project in Southern Thailand. It demonstrates the underlying coercive, mimetic and normative pressures that facilitate the spread of visualization tools in the context of environmental communication. Moreover, the study analyses in how far an emancipatory motive can be detected to justify the use of visualization tools.

Coercive pressures as the result of rules and regulations, as well as dependence on donors, hierarchies and support, are one reason for the use of visualization tools in projects on climate change adaptation. Local projects are nearly always third party funded and similar to any other type of humanitarian or development project they have to follow the rules and regulations of the donor agency, in this case the EU. The EU Directorate General for Humanitarian Aid and Civil Protection (DG ECHO) for example requires the project partners to explain the specific visibility plan that it would like to implement and seek official agreement from the donor (EU, 2013, p. 27). Hierarchal requirements of donor agencies that also aim at promoting their own visibility abroad through visualization measures have therefore institutionalized the process of rendering project results visible. Recently, the EU even established a website that details the use of different (audio-)visualization tools (EU, no date) and extra funding for visualization is available.

The video cartoon production on the project, which was executed in Germany

through a professional artist in collaboration with CARE staff both in Germany and in Thailand, is an example how this expectation is met, while providing both the international donor communities and the local population a visual insight into the project. While the video itself and its storyboard was the idea of the project leader from CARE Germany, the Indonesian government, as another important stakeholder in the project, also suggested creating an entertaining film to reach a wider audience (Interview CARE Germany staff, 19 May 2016).

Mimetic pressures cause organizations to mimic the structure of an organization, which they perceive as successful, or to follow established legitimate procedures to increase their legitimacy (DiMaggio & Powell, 1991, p. 70, 75). Today, many NGOs try to increase the publicity of their project work through computer-mediated communication following the lead of other successful NGOs. Even the production of flyers, posters and posts that are disseminated in the communities at meetings, events and in the learning centers to visualize the project results and related information require the project staff to possess computer skills leading to a restructuration of local organizational resources. The outlined coercive donor rules and regulations and the proliferation of digital media among both users and producers of information facilitated this recent trend in humanitarian and development NGOs towards computer-mediated visualization tools. At the same time, the experiences of climate vulnerability and capacity analyses show that at the grassroots level, the creation of images of environmental change through participatory activities does not necessarily require computer-mediated communication but rather large sheets of paper to draw upon collectively.

Normative pressures linked to processes of professionalization can also explain the use of a broad variety of visualization tools in projects on climate change adaptation. Since the CARE International confederation has developed the climate vulnerability and capacity analysis during its reorientation towards climate change adaptation (CARE International, 2009), associated member organizations such as Raks Thai are expected to implement it following institutionalized and codified guidelines (ibid.). Related participatory visualization tools, such as the seasonal calendar or the hazard map have thus become standard procedures across different types of projects and regional settings. This is characteristic for forms of coercive and normative isomorphism that are linked to both internal rules and normative expectations based on processes of professionalization. The CARE International Climate Change Communications Officer, for example, promotes the use of participatory digital storytelling and educational videos for awareness raising and advocacy (Raks Thai Foundation, 2014a, p. 19f.), thus, further pushing the need for professionalization of organizational staff and local volunteers in this area of computer-mediated communication.

Finally, the results also show that an emancipatory motive that aims at transformative empowerment of local populations can be detected both in the project work and in the employment of some of the visualization tools. In particular, the climate vulnerability and capacity analysis, which is conducted by trained locals volunteers and government staff, provides incentives and resources for local community leaders to partake in local negotiations with government bodies to acquire additional resources for their communities. In addition to the awareness raising function and its contribution to environmental literacy, interactive or self-mobilizing participatory tools (Perry 1995) such as the hazard map or the seasonal calendar, which require regular updating, ideally foster the sustainability of projects beyond the limited initial funding period.

Conclusion

This article addresses one of the central questions in this special issue that asks to what extent audiovisual tools and sources can foster, on the one hand, environmental knowledge and literacy and, on the other, support policy making as well as citizen engagement, participation and policy action. Based on an empirical case study of a local project on climate change adaptation in Thailand, the organizational motives behind the use of participatory and non-participatory (audio)-visualization tools and the local perceptions of these tools were analysed.

The analysis shows that the production of visual materials such as the (online) presentation of digital photos or videos is inspired by the expectations from institutional and private donors. In line with the neoinstitutional research framework, three types of institutional pressures can be identified that foster the proliferation of visualization tools in environmental communication. Humanitarian and development organizations have to fulfill donor regulations (coercive) and meet professional standards that both increasingly require the use of computer-mediated visualization tools (normative), while competing with other organizations that use visual tools successfully also in the context of environmental communication (mimetic).

The study showed that the manner in which visual images (maps, photos, posters, videos) are produced and later on used differs. Visualization can be employed in a non-participatory manner as a means to increase organizational efficiency and legitimacy or in an interactive manner to support the fundamental right of communities to voice their opinions. The use of visualization tools therefore mirrors the ongoing debate in participation studies that is divided between the positions of participation as a mean or an end in itself (Perry 1995, p. 1251). Both motives, however, exist parallel to each other. Thereby, they both contribute to the continuing processes of organizational isomorphism that increasingly renders computer-mediated communication and the visualization of climate change a standard procedure in humanitarian and development projects.

In line with the motive of participation as an end, the study also identified an

emancipatory motive for the use of visualization tools. Raks Thai's participatory visualization tools such as videos or photo documentations, and interactive risk mapping exercises are facilitated as part of the community-based approach promoted by CARE International. This approach aims at involving local populations in the decision making process to enable citizen engagement and bottom-up policy making.

To understand not only the initiating motives and perceptions as studied in this analysis but also the local long-term implications that visualization tools can have remains a research desideratum that this article could not cover. To what extent observed interactive participatory visualization tools eventually turn into self-mobilized visual story telling to solicit public attention for citizen needs remains an empirical question for further longitudinal and participatory local studies. Reflections upon this issue among organizations involved would be welcome, too. A contrasting study on visualization methods versus other methods of communicating climate change could further clarify the impact side. The emergence of participatory gaming methods presents an interesting avenue of risk communication in this context.

In the context of livelihood related projects linked to climate change adaptation, the results underline that questions of trust and ownership of ideas play an important role. When changes in the environment influence the conditions for survival, possible roads to adaptation have to be identified and communicated successfully among those concerned. This includes both an analysis of climatic changes and of the resources available to foster local resilience and adaptation. In this context, not only does the style and content of communication, but also the relationship between the parties who communicate, the available internal and external resources and the environmental developments have an impact upon the success or failure of addressing options in climate change adaptation.

In order to bridge the gap between climate scientists and affected populations and thus to facilitate environmental communication that can lead to successful livelihood adaptation, the role of the translator or intermediary organization becomes important. Ideally, this organization is well established and trusted in the community and therefore, long-term relationships and programs are preferable. Moreover, the complexities of environmental change and the successful translation into local sustainable adaptation projects often requires new skills and motivations that at first, have to be established both within the organizations involved and even more importantly within the local population.

With regard to the question, whether visual methodologies are democratic and horizontal or reproducing power relations and dominant imaginaries, the answer has to be 'it depends'. Participatory use of visualization tools, as in the climate vulnerability and capacity analysis process, can have positive effects for community empowerment and produce feelings of ownership of information and resources that can facilitate political participation and citizen engagement not only in climate change adaption contexts. Top-down presentation of results through posters, power point presentations or non-participatory computer-mediated communication as in social media platforms on the other hand, might increase the reach of audiences but not necessarily the identification and ownership of ideas of those concerned.

Acknowledgements

References

Brodbeck, D., Mazza, R., & Lalanne, D. (2009). Interactive Visualization-A Survey. In D Lalanne J Kohlas (Eds), Human machine interaction. Research Results of the MMI Programm. Berlin Heidelberg: Springer, 27-46.

CARE Deutschland-Luxemburg e.V. and Raks Thai Foundation (2013). Climate Vulnerability and Capacity Analysis Report. South of Thailand. Building Coastal Resilience to Reduce Climate Change Impact in Thailand and Indonesia (BCR CC). URL: http://careclimatechange.org/publications/cvca-thailand/ (accessed on 2 April 2016).

CARE International (no date a). URL: http://careclimatechange.org/our-work/bcr-cc/ (accessed 19.03.2016).

Care International (no date b). URL: http://careclimatechange.org/publications/cvca-thailand/ (accessed 19 March 2016).

CARE International (2009). Climate vulnerability and capacity analysis Handbook. URL: http://careclimatechange.org/tool-kits/cvca/ (accessed on 2 April 2016).

CARE Deutschland-Luxemburg e.V. and Millus Animation (2014). MI's Coastal Adventures. Video. URL: https://youtu.be/r2_FgNGH16Q (accessed on 2 April 2016).

CARE International (2013). Climate Change Strategy 2013-2105. URL: http://careclimatechange.org/wp-content/uploads/2015/09/CAREClimateChangeStrategy2013_2015.pdf (accessed 2 April 2016).

DiMaggio, P. J., & Powell, W. W. (1991). The New Institutionalism in Organizational Analysis. Chicago, Ill.: The University of Chicago Press.

DiMaggio, P. J., & Powell, W. W. (1983). The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review* 48(2): 147-160.

European Union (EU) (no date) URL: http://www.echo-visibility.eu (accessed 2 April 2016).

European Union (EU) (2013). Single Form Guidelines. Draft Document. (no longer available).

Hansen, A. & Machin, D. (2015). Visual Environmental Communication. London: Routledge.

Helmer, M. & Hilhorst, D. (2006). Natural disasters and climate change. *Disasters* 30(1), 1–4.

Intergovernmental Panel on Climate Change (IPCC) (2013). Climate Change 2013. The Physical Science Basis. Summary for Policymakers. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Intergovernmental Panel on Climate Change (IPCC) (2014). Climate Change 2014: Impacts, Adaptation, and Vulnerability, Summary for Policymakers. Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

International Federation of Red Cross and Red Crescent Societies (IFRC) (2013). World Disasters Report: Focus on Technology and the Future of Humanitarian Action, Geneva.

International Federation of Red Cross and Red Crescent Societies (IFRC) (2007). How to Do a VCA: A Practical Step-by-Step Guide for Red Cross Red Crescent Staff and Volunteers, Geneva.

Kunz, M., Grêt-Regamey, A. & Hurni, L. (2011). Customised Visualisation of Natural Hazards Assessment Results and Associated Uncertainties through Interactive Functionality. *Cartography and Geographic Information Science* 38, 232–242.

Luhmann, N. (1989). Ecological Communication. Chicago: University of Chicago Press.

Luhmann, N. (1991) [1975]. 'Interaktion, Organisation, Gesellschaft. Anwendungen

der Systemtheorie'. In N. Luhmann, Soziologische Aufklärung, vol. 2. Wiesbaden: VS Verlag für Sozialwissenschaften, 9–20.

Meier, P. (2011). New Information Technologies and Their Impact on the Humanitarian Sector. International Review of the Red Cross 93, 1239–1263.

Meyer, J. W. & Rowan, B. (1991). 'Institutionalized Organizations: Formal Structure as Myth and Ceremony'. In W. W. Powell, & P. J. DiMaggio (eds): The New Institutionalism in Organizational Analysis. Chicago, Ill.: The University of Chicago Press, 41–62.

Naruchaikusol, S. (2016). Climate Change and its impact in Thailand. A short overview on actual and potential impacts of the changing climate in Southeast Asia. TransRe Fact Sheet No. 2, Department of Geography, University of Bonn: Bonn.

Nupairoj, N. (2013). Social Media and Media Literacy in Thailand. The Asian Conference on Media and Mass Communication, Osaka, Japan. Official Conference Proceedings, no. 94. URL: http://iafor.org/archives/offprints/mediasia2013-offprints/MediAsia2013_0094.pdf (accessed 27 October 2016).

O'Brien, G., O'Keefe, P., Rose, J. & Wisner, B. (2006). Climate change and disaster management. *Disaster,* 30(1), 64–80.

Penderis, S. (2012).Theorizing participation: from tyranny to emancipation. *Journal of African & Asian Local Government Studies* 1.3, 1-28.

Pretty, J. N. (1995). Participatory learning for sustainable agriculture. *World Development* 23(8), 1247-1263.

Raks Thai Foundation (no date). URL: http://www.raksthai.org/new/news-events-detail.php?tr_id=181 (accessed 19 March 2016).

Raks Thai Foundation (2014a). BCR-CC Communication and Visibility Activities (grey document).

Raks Thai Foundation (2014b). Protecting coastal livelihoods in Thailand. URL: https://www.weadapt.org/placemarks/maps/view/1212 (accessed 15 May 2016).

Raks Thai Foundation (2013). BCR-CC Annual Report. Annex VI. Interim Narrative Report (grey document).

Raks Thai Foundation (2012). CVCA participatory tools: linking community knowledge to climate science. URL: http://www.careclimatechange.org/files/adaptation/BRCCC_CVCA_Participatory_Tools_April2012.pdf (accessed 21 May

2016).

Red Cross/Red Crescent Climate Centre (2007). Climate Guide. The Hague: RCCC.

Rojas Blanco, A. V. (2006). Local initiatives and adaptation to climate change. *Disasters*, 30, 140–147.

Rosenow-Williams, K. (2015a). Climate Change and the International Red Cross/Red Crescent Movement. Moving the Social- *Journal of Social History and the History of Social Movements* 54, 59-84.

Rosenow-Williams, K. (2015b). Communicating Climate Risks. A case study of the International Red Cross/Red Crescent Movement. *Journal of International Law of Peace and Armed Conflict* 28(2), 130-138.

Ruth, F. (2012). Visualising Risk: The Use of Graphical Elements in Risk Analysis and Communications. Focal Report 9: Risk Analysis, Zurich.

Scott, R. W. (2014). Institutions and Organizations. Ideas, Interests, and Identities. Los Angeles: SAGE Publications.

Veil, S. R., Buehner, T. & Palenchar, M. J. (2011). A Work-In-Process Literature Review: Incorporating Social Media in Risk and Crisis Communication. *Journal of Contingencies and Crisis Management* 19, 110–122.

YouTube (2013) URL: https://youtu.be/pqLhSCqqPR4 (accessed 20 May 2016).

YouTube (2015) URL: https://youtu.be/V1ZSlEoGyyg (accessed 2 April 2016).

Wang, L., Wang, G., & Alexander C. A. (2015). Big Data and Visualization: Methods, Challenges and Technology Progress. *Digital Technologies* 1(1), 33-38.

Weber, M. (1978) [1922]. Wirtschaft und Gesellschaft: Grundriss der verstehenden Soziologie. Studienausgabe. Tübingen: J.C.B. Mohr (Paul Siebeck).

Wendling, C., Radisch, J. & Jacobzone, S. (2014). The Use of Social Media in Risk and Crisis Communication, OECD Working Papers on Public Governance, No. 25, OECD Publishing.

Williamson, D. L., Choi, J., Charchuk, M., Rempel, G.R., Pitre, N., Breitkreuz, R., & Kushner, K.E. (2011). Interpreter-facilitated cross-language interviews: A research note. *Qualitative Research* 11(4), 381-394.

World Humanitarian Summit (2016a). Natural disasters and climate change: managing risks and crises differently. High-level leaders' roundtable. Core Responsibility Four of the Agenda for Humanity. URL: https://www.

worldhumanitariansummit.org/file/522836/view/571411 (accessed on 2 April 2016).

World Humanitarian Summit (2016b) URL: www.worldhumanitariansummit.org (accessed on 2 April 2016).

(endnote)

[1] Among the 66 million residents of Thailand there are 25 million Internet users. Among these, 18 million are social network users and 85 % of them are Facebook users (Nupairoj 2013: 3).