Comics' and graphic novels' effect on the perception of climate change and natural disasters

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Abstract
There is a paucity of research in the field of communicating disasters and climate change through comics and the effect sequential art has on the perception of these two subjects. Increasingly, communication through comics is becoming very trendy, and a few studies demonstrate evidence that comics have effects on the people's perception of complex matters. In order to extend our understanding of what effect comics about natural hazards and climate change have, I combine two methods: in-depth interviews with comics' authors and focus groups discussions with students about comics. This multimethod provides an opportunity to compare different perspectives and identify common ground between a creator and a reader. First, using the results from interviews, two main themes were found: call for action and empathy. Second, I addressed these two themes during two focus group sessions including fifteen participants in total. The results indicate that the perception of climate change and natural disasters is diverse and comics create a platform for discussions on different topics, such as emotions, risk awareness, policymaking, leadership or disaster response. This paper discusses challenges that affect the perception of subjects when communicated through comics, intentions of authors, and potential of comics for science communication and communication for change. The findings of this study contribute to the possible development of this type of communication in environmental and sustainability sciences and disaster risk management.

ACKNOWLEDGEMENT

ACRONYMS

CC	Climate Change
CCP (from 1 to 8)	Focus Group Participant of the group Climate Change
DRR	Disaster Risk Reduction
DP (from 1 to 7)	Focus Group Participant of the groups Disasters
GT graphic novel	The graphic novel '*The Great Transformation. Climate – Can We Beat the Heat?*'
IQ	Investigative Question
LGBTQ	Lesbian, Gay, Bisexual, Trans and Queer
RO	Research Objective
RQ	Research Question
SDGs	Sustainable Development Goals
UN	the United Nations
UN comics	the UNICEF comics '*Chakra - Climate Change*'
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNISDR	United Nations Office for Disaster Risk Reduction
WBGU	the German Advisory Council on Global Change (der Wissenschaftliche Beirat der Bundesregierung Globale Umweltveränderungen)

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1. INTRODUCTION

1.1. Background and Context

Comics have been studied for the last several decades, however, according to Berninger et.al. (2010), they have been marginalized or even ignored by critics and academia. One explanation is the stereotype that comics struggle to communicate 'serious' matters, like human rights, or sensitive issues, as gender equality. At the same time, the public regards comics as a medium that is meant primarily for children (Versaci, 2007).

Meanwhile, national and international non-profit organizations refer to sequential art as a medium of communication for different local or global issues. Among these issues are Sustainable Development Goals (SDGs), including climate change, diseases or community integration. F. Marin (personal communication, June 15, 2016), a Research and Communications Consultant at United Nation Development Programme (UNDP) in Europe and Central Asia, observes that, graphic novels are the best method to depict existing problems in the society and make people talk about sensitive issues, like early marriage or gender-based violence. Besides, independent artists have been launching social media projects and campaigns aimed at drawing the attention of people living in one country to sufferings of others in other parts of the world. By triggering the emotions of lay people by presenting to them, for example, the consequences of different disasters depicted in an artistic manner, authors aim to induce more empathetic feelings towards migrants or victims of natural hazards. In addition, this allows the reader to learn more about other cultures, have an opportunity to 'observe' an event from a different angle and to 'hear' voices that usually are not conveyed in the media. Moreover, by applying non-traditional methods of communicating climate change and disaster risk reduction (DRR), like graphic novels or comics, these national and international institutions and comics' creators hope to reach different audiences.

Although there are some doubts among lay people if comics can communicate complex subjects (Goddin, 2007), a few studies demonstrate evidence that comics can have a certain effect on the perception of 'serious' issues. Some studies contain information about the healing effect of graphic novels on people who were psychologically traumatized during a natural disaster (Corby, 2012), others argue that knowledge perceived through graphic novels helps better understand the subject, for instance, climate change (Leinfelder, 2015). Intergovernmental organizations, like United Nations Children's Fund (UNICEF) (2015) or United Nations Office for Disaster Risk Reduction (UNISDR) (2015), have observed that comics have been positively perceived by local people within comprehensive programs focused on communication for development or change. Comics help better and easier communicate how one should take care of the environment or stay safe in case of emergency, e.g. earthquake or landslides.

Nevertheless, as surveys show, comics are currently underutilized in science (Shurkin, 2015), although they are a powerful idea as Boyer noted (2012). Stereotypes existing within society limit the potential of graphic novels (Boyer, 2012) and as a result, the research on the effect of comics on perceptions of climate change and disasters is insufficient. Thus, by understanding what effects and how they are achieved, there is potential to harness the mechanisms at play to best utilize the medium of comics to communicate climate change issues and disasters risk awareness.

1.2.   Motivation for the project

Comics, as a type of media, spread knowledge in a society and might construct an environment in which lay people think and act. Stories in the sequential format are produced to serve groups that are distinct in terms of age or educational background. However, belonging to a particular genre of literature and media, comics are not accepted and understood by everyone. Furthermore, comics analyzed in the thesis introduce and explore the threat of climate change and natural disasters as one probable consequence of global warming. The threats addressed are supposed to be everybody's concern.

The thesis does not argue sequential art is better than other media. It also does not evaluate if one sample of comics is superior to another. However, the thesis provides some evidence that comic strips might be an interesting and helpful tool for communicating global issues – problems and solutions, like climate change and natural disasters.

1.3.   Research question

The main research question (RQ) of the thesis is the following:

RQ: *What effects do comics have on the perception of climate change and disasters by lay people?*

It is important to investigate if comics about climate change and disasters have any effect on the lay people and how previous knowledge and if comics, as a form of art, influence people's perception of climate change and natural disasters.

To address the main research question, the following investigative questions (IQ) were used:

IQ1: *What are the challenges in perceiving messages communicated through comics and graphic novels?*

IQ2: *What were the intentions of the authors and creators of the comics and graphic novels and how they correlate with the information perceived by the reader?*

The authors of comics construct the specific environment that either represents the general notion of an author, compliments readers' perception of the problem communicated in a book or neither of the two. Therefore, an assumption made here is that the message perceived by the audience differs from that intended by the authors. Thus, the approach of using comic books as a

medium for communicating DRR and disaster awareness should be improved or reassessed in order to better reach targets defined by the creators of comics. However, this thesis does not aim to provide recommendations on this matter.

1.4.   Scope of the project

In order to investigate the effect of messages delivered and perceived via comics and graphic novels, the paper studies only books and comic strips that contain plot or narrative story and images in the form of sequential juxtaposed panels that represent individual scenes. Additionally, these samples addressed the problem of climate change and natural disasters that occurred from 2004-2015, such as the 2004 Indian Ocean tsunami, Hurricane Katrina in the USA in 2005, the 2010 earthquake in Haiti, and the earthquake in the Pacific Ocean and resulting tsunami that affected Japan in 2011.

1.5.   Thesis outline

The paper is divided into five main chapters. Chapter 1 (Introduction) provides the setting of the study, presenting the background, research question and aim, as well as objectives of the thesis and motivation for the project in the broader context of disaster risk awareness and climate change communication. Chapter 2 (Literature Review) provides the conceptual and theoretical background for the paper beginning by discussing the fields of study that inform this study – effects and functions of comics and challenges in understanding comics. Chapter 3 (Methodology) includes the structure and process of the focus groups and interviews, nature of samples, i.e. comics, and obstacles and limitations to the study. Following this, the findings analysis and discussions (Results and Discussions) are a descriptive summary of the feelings and observations that were expressed during focus group discussions, along with comics' authors' opinions that emerged from the interviews and the concepts mentioned in the literature review. Finally, the thesis concludes (Conclusions) with the key observations from the researcher's perspective and contributions of this paper to existing knowledge. The appendix section contains the list of comics and graphic novels that were found in the research process, as well as the list of samples of comics used for focus groups discussions and an interview guideline.

2.   LITERATURE REVIEW

This chapter discusses the key framing concepts of the thesis. It begins with the definition, discussion of comics as a medium of communication and challenges related to the plurality of definitions around comics. The key focal points for the thesis are the functions of comic books as a medium and the effects that comics have on a reader. The chapter sheds light on effects related to readers' different emotions and feelings, as well as perceiving information and comics authors' encouragements to act or to change. It is also essential for the project to study the challenges people face when reading and understanding comics. Finally, a review of the existing analysis of the effect of comics and graphic novels on the perception of climate change and natural disasters concludes the chapter.

2.1.   Defining 'comics'

There is a difference between the terms 'comics,' 'comic book,' and 'graphic novel'. This difference is formulated in matters of target audience, form and volume of a story, cultural roots or even marketing.

First, Wertham (1954) argued the difference in the definition of 'comic books' and 'comic strips' and differences in terms of target audience, although he admitted there is an existing overlap. 'Comic books,' he stated, are separate entities with colored pictures and read by children, whereas 'comic strips' are read by adults and appear mostly in newspapers.

Next, McCloud (2001) discussed the issue of an existing object and defined 'comics' as a medium itself, while 'comic book' or 'comic strip' refer to a specific object. The medium represents 'juxtaposed pictorial and other images in deliberate sequence, intended to convey information and/or to produce an aesthetic response in the viewer' (McCloud, 2001, p.9). Eisner (1994) also noted the form of a story as a defining factor and called the number of pages as a key factor for a book to be called 'graphic novel'. Therefore, as Eisner showed, 'graphic novels' are complete narratives told in the comics' format, published as a book with generally between 50 and 200 pages. He also stressed the issue of seriousness that coined the term 'graphic novel' and differentiated them from other forms of sequential art.

Additionally, there is a discussion around cultural roots of the terms. For instance, Stein and Thon (2013) claim that the term 'comics' is culturally defined with Anglo-American origins, whereas the term 'graphic narrative' is much more inclusive and can encompass different forms and formats from around the world and across cultures.

Finally, some scholars believe that the term 'graphic novel' is employed by comics scholars, creators, and publishers for its marketing potential, and serves as a synonym for serious comics that promote serious themes (Wüllner, 2010).

Thus, taking into account the plurality of opinions, I, applying the approach of Versaci (2007), use terms 'comics,' 'comic book,' and 'graphic novel' interchangeably throughout the thesis. Moreover, the effect the usage of any of these terms might have on readers was not a critical focus of the paper.

2.2. Comics as a genre

Research that has been done about sequential art includes discussions about how comics function (McLuhan, 1964; Eisner, 1993; McCloud, 2001; Versaci, 2007), what kind of effect they might have on the reader (McCloud, 2001; Versaci, 2007), main functions of sequential art (Eisner, 1993), or what critical issues are related to identifying target audience by creators of the comic strips (Versaci, 2007; Schwartz, 2010). Another aspect widely covered in the literature is reflection upon the cultural (Berninger et.al., 2010; Stein & Thon, 2013; Logan, 2016), social (McLuhan, 1964; McAllister, Sewell & Gordon, 2001; Adams, 2008; Cañero & Claudio, 2015; Logan, 2016), historical (Schwartz, 2010; Chute, 2016), psychological (Kukkonen, 2013), and ideological dimensions of comics (Versaci, 2007; Adams, 2008; Peterson, 2010). The preliminary analysis of the scientific literature showed that there is a substantial number of articles and books devoted to comic art as a genre of literature and media communication and graphic journalism. The thesis is focused on comics as a genre of communication, and does not aim to compare comics or graphic novels with other genres of literature.

McLuhan (1964) defined comics as a medium and framed the theory that the comic strip belongs to the world of games and, like illustrations, are extensions of social man (1964). This hypothesis became one of the fundamental concepts in understanding the effects of comics as a medium of communication and was explained in detail by McCloud (2001) and Logan (2016). While many studies have been done on comics about superheroes, human relations, and ordinary life, research has also been conducted on how comics communicate issues such as science, terrorism, disasters, social norms and behavior. Although, comics and graphic novels have been studied for several last decades, still, according to Werthmann (2010), they have suffered marginalization in academia. Another reason is that there is a stereotype that comics are not appropriate to communicate 'serious' matters (Boyer, 2012).

McCloud (2001) and Goldman (2010) argued that comics being a product of mass consumption could be worth taking seriously. There is still prejudice in the society that comics communicate 'laughing matters' and could hardly articulate important political themes and motifs. For instance, Özçinar (2010) calls comics *¨dubious form of literature¨* (p. 165). Nevertheless, most of the research materials studied in the frame of the project point out that comics can deal with so-called 'serious' issues and topics. As Hardy-Valee (2010) noted, some subjects could be

replaced by others – *¨history instead of fantasy; intimacy instead of adventure; real war instead of intergalactic super-conflicts between the imperial armies of trans-dimensional eternal beings¨* (p.85).

2.3.   Functions of comics

In order to discuss how comics could be utilized as a medium of communication, I referred to Eisner's approach (1993). He divides the functions of sequential art into two applications – i) instruction and ii) entertainment. Readers, as Eisner observes, are more familiar with periodical comics or graphic novels, which usually serves to entertain a reader, while manuals and storyboards instruct us how to deal with a particular issue (Eisner, 1993).

Images in entertainment comics can convey a certain amount of emotion and depth. However, the interpretation of these images may differ due to the different imaginative natures of the readers. These comics stitch together readers' experiences and authors' perception of the real world. Thus, while reading, the reader has to 'translate' the narrative and create their own visual image in their minds eye. Comics about superheroes, who might be among us and save the real world from a disaster or a 'bad guy', are usually perceived as entertaining ones.

Instruction comics utilize images to attract readers' *¨to convey relevance and set up visual analogies and recognizable situations¨* (Eisner, 1993, p. 140). According to Eisner (1993), there are two types of instruction comics – technical and attitudinal. Technical instruction comics provide instructions in process and procedures in order to familiarize a reader with a situation that might occur or with a device that is to be used, for example, how to evacuate from a room in case of fire. Whereas attitudinal instruction comics function as a medium to condition an attitude toward a task, for instance, give a sense of responsibility for minimizing risks while riding a bike.

However, there might be an overlap of above-mentioned functions. An entertaining comic book can have a potential to communicate practical advice, whereas humor in instruction comics brings some entertainment into a technical work (Eisner, 1993). Both international and national bodies raise risk awareness and importance of preparedness to crisis situations by means of comics. Such comics provide not only some element of entertainment, but also step-by-step instructions on how communities, for example, exposed to the risks of volcanic eruptions, could better protect themselves (UNICEF, 2015).

2.4.   Effect of comics

Different studies identify different effects that comics might have on a reader. The literature analyzed for the thesis highlights the big spectrum of purposes that appeal to comics. People read them to have fun (McCloud, 2001), escape from the real world (Versaci, 2007) or to follow documented history (Chute, 2016). Comics can also trigger political debates or help teachers in a study process. Being a type of media, comics can also create hidden environments

and have hidden effects, and, as Logan (2016) stated, the effects of a medium impose a set of sensibilities upon its users. For the purpose of the thesis and based on the literature, I place the different effects that comics could have on a reader into three categories: i) trigger feelings and emotions, ii) understand science better, and iii) motivate for change and development.

2.4.1. Feelings and emotions

Eisner (1993, p.13) highlights that 'the success or the failure of this method of communicating depends upon the ease with which the reader recognizes the meaning and emotional impact of the image'. This ease derives from cognitive and perceptive elements of dialogue that emerge between an author and a reader. Usually, readers ascribe basic comics content as funny and entertaining (McAllister, Sewell & Gordon, 2001; McCloud, 2001; Versaci, 2007; Maynard, 2012). Nevertheless, not only comics about supermen or aliens can be entertaining and 'light'. For example, the report of UNISDR– Regional Office for the Americas (2015) exemplifies that one of the readers found comics presented by the organization funny and interesting, however, the story was about a cartoon character who lacks knowledge about the risks to which he is exposed living in the climate vulnerable country of Nicaragua.

Another interesting effect is the ability of readers to sympathize and empathize with comic book characters which was discussed by Eisner (1993) and Versaci (2007). The latter identified the ability of comics, unlike other forms of literature, to 'put a human face' on a given subject and readers, in addition to text, 'see' the characters through the illustrations.' Chute (2016), echoing McCloud (2001), emphasis also the ability of readers to 'see yourself' while entering the world of the cartoon.

Comics that depict death, disaster, terrorism or war could also have an emotional effect on a reader. Chute (2016) studied in detail this theme in regard to graphic novels about war conflicts in the twentieth century. Coby (2015) focused on the traumatic experience of people during and in the aftermath of the Hurricane Katrina, depicted in the graphic novel '*A.D.: New Orleans After the Deluge*' by J. Neufeld (2007).

2.4.2. Knowledge and science communication

Although comics are often dismissed as the insignificant 'funnies' (McAllister, Sewell & Gordon, 2001), many fiction comics communicate serious matters and contain, for instance, references to accurate scientific ideas and facts (Tatalovic, 2009). The research on the effect of comics in education is vast, and the scope of this project does not allow for a detailed review of this. One of the main effects drawn by scholars are: i) communicate complex matters (Leinfelder, 2015; Sousanis, 2017), ii) educate illiterate persons (Horstkotte, 2013), and iii) motivate, for

example, students for further reading and to bridge the gap separating reading out of school and in school (Hammond, 2010).

Illustrative drawings catch the eye of a broader audience and popularize the science subject. Science-themed comics, as Tatolovic (2009) states, may help to promote and explain science not only to students but also to the general public. This, as he explains, happens thanks to the usage of many fictional elements and techniques that explain real-life scientific phenomena. These fiction elements enhance the enjoyment of reading and more effectively deliver scientific content. However, Berninger (2010), for instance, noted that comics in the mid twentieth century, especially in America, were accused of reducing literacy by replacing 'proper reading'. Thus, he suggests that comics ¨*should be used in conjunction with the other media to be most effective*" (Berninger, 2010, p.245).

The comics-style approach in communicating knowledge about climate change or disasters is understudied, however, a few studies are available and will be detailed later in the paper.

2.4.3. Communication for change and development

One of the less studied effects of comics by scholars is their ability to communicate complex matters and encourage people if not to change their habits or views on certain issues, but to at least consider change. The change can be made in regard to a particular social, environmental, or political situation. In that sense, communication through comics is becoming very trendy. Increasingly, comics or animations about Sustainable Development Goals (SDGs), diseases (IOM, 2017), community integration (OSF, 2013), early marriage (UNDP, 2016), gender-based violence (Care International UK, 2017), or weapon contamination (ICRC, 2016) have been designed and utilized by national and international organizations.

The United Nations (UN) (2017) have their own web-site 'Comics Uniting Nations' that declares 'transformative power of comics to educate people in every corner of the globe about the SDGs and empower them to create positive and lasting change in their own communities and worldwide.' Graphic novels and comics about climate change are among those aimed to create a platform for discussion around SDG #13 'Climate Action', which addresses climate change and its impact.

2.5.   Challenges in understanding comics

Although, as it was exemplified in subsection 2.3., there are two main applications of sequential art – entertainment and instructions, there is no evidence that the meaning a reader will derive from a comic book or graphic novel will coincide with the meaning the author intended to convey (Duncan, 2012). Obstacles to perceiving the content of a comic book can occur from both the communicator's and audience's side. Comics as an art form can make the

reading process easier or harder. Studies have identified challenges for perceiving information transmitted through comics.

First, comics require a high level of participation from a reader. The role of a reader and their involvement in a text was studied by Eisner (1993), McCloud (2001) and Round (2010). The graphic language of comics blends words and images, and both the text and illustrations narrate the message of a communicator. A reader has to follow and pay attention to all elements of comics in order to be able to grasp an idea of a comics' creator. Images in comics compliment the narrative or even tell more than the text, and vice versa. Moreover, it is the readers' 'responsibility' to interconnect images with text and 'define the relationships between different (elements of) images' (Goddin & Hassler-Forest, 2010, p.2). Goddin and Hassler-Forest (2010) add that reader's activity remains central to understanding the comics medium.

A commonality of experience noted by Eisner (1993) could be highlighted as the second challenge for understanding the mediated message in comics. As Duncan (2012) noted, each individual perceives information communicated through words and images through their own perceptual filter that consists of beliefs, attitudes and knowledge. An author and a reader have different life experiences; it is commonality of experience that, as Eisner (1993) states, on the one hand, helps to comprehend an image and a general idea of comics while on the other, lays foundations for different sort of reader's and artist's assumptions regarding the mediated message. Thus, in order to be successful, the artist ¨[…] *must take into consideration both the commonality of human experience and the phenomenon of our perception of it*¨ (p.38).

Third, comics are a complex form of art (Versaci, 2007) and establish barriers for a reader. Being a unique form of narrative, comics stand out from other media of communication in terms of its 'texture', time, and reality. This complex nature of the combination of printed words and pictures provides ground for manipulation of meaning that leads to discussions around comics, the plurality of ideas and multiple interpretations (McAllister, Sewell, & Gordon, 2001).

2.6.   Research on communicating climate change and disasters through comics

While there is a large body of literature dealing with history, trauma, or superheroes in comics, only a few studies relate directly to climate change or DRR. Although a few studies contain content and qualitative analysis of comics, none of the published articles or books present quantitative data regarding comics or graphic novels refereeing to the issue of climate change or DRR.

2.6.1. Studies on the perception of climate change in comics

Comics and graphic novels about global warming exist worldwide, however, only a few studies on the effect of perception of climate change through this medium channel were available.

The unpublished report of Leinfelder (2015) provides interesting results of a field study conducted in 2013 directly after the German graphic novel '*Die große Transformation. Klima – Kriegen wir die Kurve?*' ('*The Great Transformation. Climate – Can We Beat the Heat?*') (hereinafter GT graphic novel) was published. The research team used a web questionnaire and evaluated comments and readership composition of the project's Facebook page. About 38 people answered all the questions of the survey. Half of the respondents were older than 36 years and were either employed or self-employed. The study focused on finding out if it was appropriate to communicate the theme of climate research via comics, if it was easy to understand the content and if the book helped readers better understand the world around, or if the readers felt manipulated. In brief, the Leinfelder's survey received positive feedback and showed that the authors of the book accomplished the main goal. The goal was to communicate climate research and portray scientists, giving a wide array of possible solutions and encouraging individual action. Nevertheless, there was also criticism of using the members of German Advisory Council on Global Change (WBGU) as protagonists as well as denial of the whole concept of global warming, whether communicated through comics or not. Finally, Leinfelder (2015) admitted the importance of performing another study on the book as the first study had been performed shortly after the book had been published.

2.6.2. Studies on the perception of disasters in comics

If the problem of climate change is somewhat discussed in comics devoted to broader, environmental issues, natural hazards is not a popular theme in comic literature in general. I found also a paucity of research in the field of communicating disasters by means of graphic novels or comics. Therefore, again, there is a limitation on the analysis of the perception of disasters in comics in the scientific literature.

Some studies were devoted only to cartoons, for example, studies by Kelley-Romano and Westgate (2007a & 2007b). While the term 'cartoons' refers to a single-frame entity and does not encompass comics (Eisner, 1993) in particular, findings in the works by Kelley-Romano and Westgate are relevant to the thesis. They are relevant because the goals of communicating hazards or climate change in other domains overlap with science communication through other means of sequential arrangements of more than one frame containing images and words. Although this work has been useful in understanding the specific functions of the crises cartoons published in the aftermath of the Hurricane Katrina, Kelley-Romano and Westgate (2007a) offer

possibly the most useful perspective for the thesis. Their study examines all 'of the available means of graphic persuasion" available to the political cartoonist. The authors identify seven functions of cartoons: *¨illustrate/record the event; memorialize and mourn; question leadership; critique larger social issues; reflect on the response to and the behaviors after the crisis; blame and indict guilty parties; and contextualize the crisis within world events¨* (2007a, p. 3).

A few rhetorical critics have also conducted a thematic and content analysis of cartoons published after Hurricane Katrina. These analyses examine the portrayal of President Bush and victims of the hazard (Kelley-Romano & Westgate, 2007). Representation of trauma on such a large scale and suffering of others were thoroughly described in studies of Hoefer (2014), who paid special attention to the representation of social issues through strongly contested discourses such as race and region.

Sharpe and Izadkhah (2014) studied how comic strips can be used to enhance knowledge and education of pre-school children in Iran, including in relation to disaster preparedness and safety, and children's engagement with the issue. The research revealed the snowball effect experienced when children shared what they had learnt about earthquakes- through comic strips- to their peers, classmates and their families.

Through the literature review, only two scientific papers (Shemak, 2014 & Coby, 2015) referred to comic books devoted to the natural disasters that occurred from 2004-2015. The books narrate the situation in Haiti after the earthquake in 2010 and in New Orleans after the Hurricane Katrina in 2005. Shemak (2014), analyzing a 2012 work of comics journalism titled *'Tents beyond Tents'* (2012) examines how the comics function as a cartographic project, or cartoon mapping, through depictions of the spaces of the refugee camps in and around Port-au Prince. Shemak (2014) claims that comics and cartography have more in common than what we might think. Coby (2015) explores in his article Josh Neufeld's '*A.D.: New Orleans After the Deluge*' (2007) aftermaths of the hurricane as traumatic incidents, trauma of people who were trapped in New Orleans. Coby (2015) draws attention to how a graphic novel became a forum for survivors to vocalize their experiences.

3. RESEARCH METHODOLOGY

3.1.　Rationale for the method

Opinions of people who read comics about climate change and natural disasters are analyzed in the research with regards to the aim and objectives of authors of comics. Therefore, focus groups and interviews are considered as the main method for the research. They allow comparing different perspectives on DRR and climate change related issues. In addition, these methods shed light on common ground between a producer and a reader (Eisner, 1993).

The symbolic environment constructed by the authors of comics' either represents the general notion of an author, compliments readers' own understanding of the problem mediated in a book or neither of the two. Thus, my hypothesis is that the message perceived by the audience differs from the one sent out by the authors and publishers. If so, using comic books as a medium for communicating climate change, DRR and disaster awareness should be improved or reassessed. In order to reach better targets defined by the initiators of literary projects or even to broaden the key audience. Consequently, a key question that this paper seeks to address is: how is the intended message communicated by graphic novels received by lay people?

3.2.　Methodology and material

To address the research question, methods for research included a content analysis of comics depicting different disasters or climate change issues, qualitative semi-structured interviews with authors of comics about disasters or global warming subject, and, finally, focus groups discussions.

3.2.1.　Comics

In order to investigate the effect of comics and graphic novels on the perception of climate change and disasters, 17 graphic novels and comic books were identified (see Appendix 1). The criteria for the data selection were the following: first, a story should contain plot or narrative story and images in the form of sequential juxtaposed panels that represent individual scenes (McCloud, 2001). Second, stories should be devoted to the problem of climate change, natural hazards around the globe and the humanitarian crisis that occurred in Europe because of the on-going conflict in Syria (2011 to date). Third, stories should depict catastrophes that occurred from 2004-2015 in different parts of the world. I selected this period because I wanted to focus on recent disasters that caused devastation in different regions of the world and affected the global humanitarian response and disaster management agenda. Among those natural disasters

are the Indian Ocean tsunami of 2004, Hurricane Katrina in the USA in 2005, the Earthquake in Haiti 2010, the earthquake in Pacific Ocean and tsunami that affected Japan in 2011.

The analysis of each was focused on framing a problem as well as the relation between messages depicted and perceived through comics. Initially, the research was conducted with a focus on comics about migration forced by either climate change or conflicts. However, migration stories were later excluded for two major reasons. First, there was a sufficient number of comic strips and graphic novels devoted to various natural disasters; secondly, personal interviews were conducted with most of the authors of the comics chosen for the focus group discussions. As a result, only the comics that addressed natural disasters and climate change, with relevance to natural catastrophes, were included for analysis. Also excluded were comics in languages other than English or German, containing illustrations drawn by children, and contextualizing a disaster with larger social issues, like LGBTQ issues.

Unfortunately, I did not find any available online platform that would provide information about all existing comics that refer to different aspects of natural disasters or climate change. I collected the stories using online search aggregators, like Google.com and Yandex.ru, Cartoonmovement.com or United Nations resources, as well as social networks.

3.2.2. Interviews

In order to frame the purpose of comics and the expectations of authors, I conducted face-to-face interviews with creators and authors of some comics presented in Appendix 1 (see Appendix 2). Semi-structured interviews were conducted to supplement literature and to compare the opinions of comics' creators with responses of focus groups participants. The main criteria for choosing an interviewee were the following. First, a person should be either an author or an artist of comics that describes at least one of the world's disasters from 2004-2015, like Hurricane Katrina, or the 2004 Indian Ocean tsunami, or disasters in Japan in 2011. Secondly, I assumed, it would be beneficial to talk to a person who depicted a smaller, local disaster, like the flooding in the Balkans in 2014. Thus, I aimed to cover disasters that affected different continents – Asia, Europe, and North America. The comparison of authors' approaches in the depiction of disasters of different levels would help the research project, as I assumed, to reveal new information in terms of perception of disasters. Thirdly, it was important for me as a researcher to interview the creators of the GT graphic novel as there is an unpublished report on the effect of this graphic novel was available online for the public.

Conversational-style interviews as a research method provide information about an individual experience (Flowerdew & Martin, 2005), and in this case the authors' approach to depict disasters and climate change. The emphasis of the interviews was on considering the aim and objectives of creators of the comics the former indented to transfer to the audience. Thus, a

generic interview guideline was prepared (see Appendix 3), although some of the questions were tailored to characteristics and content of the comics. Furthermore, respondents were free to talk about issues that were relevant to the topic that I as an interviewer could not have anticipated.

Eight semi-structured interviews were conducted either in person, or over Skype or in a written form via email. One was conducted with a representative of UNDP, which initiated comics on social issues, two with creators of stories about climate change, and five with creators of comic strips about natural hazards. One of the interviews was conducted with the assistance of an English-Croatian interpreter. Each face-to-face or Skype interview lasted approximately from half an hour to an hour and was recorded and transcribed for later analysis. Interviews were designed around several main questions: What was the message of the story? What kind of reaction did you expect from a reader? How will the readers feel about it? Examination of these interviews revealed that the issues raised fell into two major categories: call to action and call to empathy towards people affected by natural hazards.

According to Flowerdew and Martin (2005, p. 112), in-depth interviews as a method 'do not have to be used in isolation but that they can be employed as part of a multimethod approach to a research question'. Therefore, focus groups as an additional research technique were designed and led.

3.2.3.   Focus groups

Quan et.al. (2001) state that focus groups provide exchanges between participants, or as Flowerdew and Martin (2005, p. 129) call it 'the spectrum of views that individuals hold regarding a particular issue.' Andrews et al (2005, p. 5) claim that focus groups help 'to obtain detailed qualitative attitudinal data.' This statement corresponds to Flowerdew and Martin's concept (2005) when a researcher can observe the nature of group members' interaction and dialogue over a set problem or discussion issue. Discussions within a group trigger various matters and perspectives. Thus, focus groups as a method provide an opportunity to collect opinions about climate change and disasters issues in comics and compare them with data collected during in-depth interviews.

Two focus groups were conducted – one focused on the perception of climate change in comics, named 'Climate Change' (group CC), and another one aimed to study the perception of disasters described in the same form of art, named 'Disasters' (group D). Following the recommendations of Flowerdew and Martin (2005), the maximum allowed number of discussants was 10 in each, whereas the minimum was 4. As a result, two focus groups were conducted amounting to 15 unique participants in total – 8 and 7 participants in groups CC and D correspondingly. The participants were selected on the basis of purposeful sampling; in order to maximize the diversity of opinions, and were recruited mainly through advertisements on

Facebook. The groups' demographics varied in terms of age, country of origin, and academic background of the groups' members. The groups' characteristics varied also in terms of gender; however, the gender balance was almost maintained in both groups. Additionally, participants of the survey had to be enrolled in Bachelor or Master program at Lund University, Sweden.

To minimize biases, the percentage of students that were enrolled in the Master's program in Disaster Risk Management and Climate Change Adaptation was limited – up to 25% in the group CC and up to 15% in the group D. The percentage of potential participants in the latter group is lower as students of the program dealt with different aspects of disasters and thus were more likely to express thoughts from the perspective of a professional rather than a layperson.

Discussions were triggered by samples of short comics in English (see Appendix 4), so the spontaneous reading would not take more than 10 minutes. Based on data collected during the interviews with authors and literature analysis, comics selected for the focus groups discussions were those whose primary purpose, as I framed it, appeared to be a call to action or empathy – with regard to stories about climate change and disasters. Comics about climate change were represented by one national and intergovernmental organization – WBGU and the UN. Moreover, taking into account the Leinfelder's (2015) statement that although there are a few external studies on the GT graphic novel and it would be worthwhile performing another study on the book (as the first study was performed soon after publication), I included one of the book's chapters in the list of comics for focus groups discussions. Comics presented to the group D depicted different natural disasters that shed light on various events from a geographical perspective and impact scale – the Haiti earthquake in 2010, the Japan earthquake and tsunami in 2011, and the flood in Bosnia and Herzegovina in 2014.

Participants were asked, initially: 'How do you feel about that story?' The aim was to allow participants to express their own thoughts and feelings in their own words and in no particular order. In addition to the key question, a list of structured and semi-structured prompts (see Appendix 5) was used to ensure that the following domains were covered at some stage of the focus group: 'What emotions did the comics trigger? What specific problem (if any) does the comics address? Does the author or the message of the story motivate or encourage you to do anything about climate change? Do you feel like changing your behavior or habits having read it? Do you feel like reading more about the topic?' Additionally, participants were asked their age, field of studies (minor and major), country of origin and whether they had direct experience of disasters, specifically earthquakes or floods.

Each focus group lasted approximately 80 minutes, including time spent on reading. Discussions were recorded and transcribed for later analysis. For the reason of clarification, the transcribed speech of some of the participants was edited. All answers and opinions were coded and are presented in the thesis on an anonymous basis.

3.3.   Research limitations and obstacles

The main limitations related to literature analysis are the lack of studies on effect of comics on perception of climate change and disasters and the application of approaches introduced in works of Eisner (1993) and McCloud (2001). Although both of these works contributed to the dialog about the comics form, they have been criticized for the lack of theoretical sophistication and stands out of the scholarly traditions (Groensteen, 2007).

One of the major obstacles to data collection was non-response from some of the authors. To account for the lack of interviews with, for example, authors of the comics "*Haiti: Tents Beyond Tents*", a radio issue with the creator – Matt Bros – about the project was used. It provided some insights into the aims of the literary project and was used as a complimentary data source.

Secondly, some of the comic books from the list were not in English. Translation of the texts in English would require time and good command of knowledge of French, Croatian, German or Arabic. I managed to find a volunteer who helped me to translate the interview with a creator of the comics about the floods in the Balkans in 2014 from Croatian. In this case, I anticipate some risk in losing the author's message in translation that might have affected the general analysis of the material.

Thirdly, three of the five comics presented during the focus groups were parts or chapters of books. Therefore, there is a risk that because the comics were extracted the readers were not exposed to the books in their entirety. As such, this may have influenced the way in which the comics samples were perceived.

Next, taking into account that the topics of disasters, death, sufferings and discrimination may be very sensitive for people who will be chosen for focus groups, a lack of qualitative data gained from interviews or focus groups is anticipated. This could have happened because of stigmatized feedback of participants due to some social or culture bound aspects or respondents' unwillingness to demonstrate sensitivity.

Another factor that might have limited the research is business ethics. The creators of the comics about climate change could be bound by conditions of labor agreements and could have not expressed their own opinion, but the aim of the organization they represent.

Finally, the process of establishing contact with authors was time-consuming especially in relation to the time difference due to various geographical areas. Additionally, copyright law protects comic books; therefore, the permission of authors to use the materials in any further publications and presentations was required.

4.   RESULTS AND DISCUSSIONS

This Chapter presents the results of the study and relates them to the concepts mentioned in the literature review and thoughts and opinions of the comics' authors and creators expressed in the interviews.

The chapter provides different examples of focus groups participants' reaction on comics and information communicated through them. The chapter studies in more detail perception of climate change subject and disasters and the effects that the comics had on the respondents. This section of the thesis also studies the challenges in comprehension of the information presented in the comics samples and identifies differences and similarities in data interpretation by the receiver and the communicator.

4.1.   Perception

Focus group discussions showed that their participants read the comics entirely, and the comics had effect on perception of climate change or disasters. The samples provided for the reading created a forum for discussion on different topics – risk awareness, politics, leadership, disaster response and other – what obviously demonstrates the plurality of people's opinions about the same subject depicted in the same for everyone form of art.

4.1.1.   Climate change in comics

The participants of the group CC agreed that the two comics provided for the reading were about climate change. However, the perception of climate change generally differed from one person to another.

'I feel I am not the public who are supposed to read this because I do not have the previous knowledge of the problem. I have more general...climate is changing, global warming.' (CCP-2)

'The climate is changing. It is really tough to do the test but it is credible because it has been years of research.' (CCP-4)

'Pardon my French but we are fucking it up.' (CCP-8)

'Sea level. We do not know how but we think it will be affected. If the point of that is general awareness raising then the form of comics is simplifying the idea.' (CCP-7)

'I understand it was within SDGs.' (CCP-7)

The perception of the subject by the respondents was diverse. The content of comics created a platform for further group discussions around such issues as framing target audiences of comics, credibility of information communicated through comics, risk awareness, consequences of the global warming or policymaking.

4.1.2. Disasters in comics

As far as the comics about disasters were concerned, respondents of the group D discussed some general ideas about the situations depicted in the comics, namely the aftermath of the Haiti Earthquake 2010 and the flooding in the Balkans 2014, as well as the sequence of disasters in Japan in 2011.

It emerged that, two out of the seven participants had never heard about the 2010 Haiti earthquake. The situation described in the comics about the Haiti Earthquake 2010 after the disaster was perceived by participants as complex. Readers followed the story of the everyday life of people living in the camp and their struggles. They also frequently mentioned a lot about the role of the government and the future of the affected people.

'The impression I get from what happened is that government seems completely unable to handle the situation. It also makes an impression that there is no will to really solve the problem. It is understandable that for some time international aid institutions injected all kinds of help but it is not going last forever because at some point the government should take over.' (DP-1)

'I look at the situation and I am trying the whole time to figure out how, what are solutions. You realize the complexity of the situation with so many people and so little resources.' (DP-5)

'I think if like pick up this topic of helplessness I can totally see it. Helplessness of those people because they are targeted from all of the sides. Some private owners want them away, out of those areas; government cannot help from its side. And they have no resources of their own to get out of the situation.' (DP-4)

'What these people are facing – there is a lack of information, they do not know what is going on. That is affecting their lives, they do not know what they are supposed to do, what they can do or if it can help.' (DP-2)

'Why does the government cannot deliver what it is owe to deliver? People try to recover from this disaster.' (DP-7)

'It does not very deliver the complexity of the issues. Why does the government cannot deliver what it is owe to deliver? People try to recover from this disaster.' (DP-7)

'They were trying to show everyday life of people in the camp. They cannot make life for themselves in these camps and they are not going to leave, probably, they are going be there. […] That makes it more relatable to read, not just statistics. […] We can actually see these people having their everyday life just like everybody else.' (DP-6)

The second in the row of comics samples presented in the group D was the comics about disasters that affected Japan in 2011. Interestingly, two out of seven group members perceived the story as a somewhat general, universal description of a disaster, rather than a description of a specific situation in Japan, although, three disasters were mentioned in the story – the earthquake, tsunami and the situation around nuclear plant in Fukushima. Besides, the story triggered different reactions related to the disasters, namely economy, individual behavior during a disaster, national approach towards disaster risk mitigation and consequences of disasters.

'I found it interesting this discourse of the value of life vs. investment in economy. This topic was brought up and I found it interesting.' (DP-4)

'There are so many things going on in the comic. But then I thought that maybe that's the purpose – it is an inner monologue after something has happened. If you are feeling confused, most likely in such a situation. You are thinking of different things - your own safety, what has happened to others, what is the societal impact of this disaster and comparing it to knowledge you have […]' (DP-2)

'I feel like they are kind of promoting how Japan actually deals with, how they react to disasters. Before into what happened in 1993, and what happened now, and then lesser deaths. I think it is kind of praising this to, in a sense. And then, talking about media, how like Japanese people seem so calm about it. But then everybody else in the world - 'Oh my God! This is happening to Japan!' (DP-3)

'I feel concerned I think. [...] Still kind of concerned, especially with the scanning these babies for radiation. This left concerned of what is going happen in the future. I think we still probably know the downstream effects from Fukushima, a lot of crazy things are happening in the Pacific with biodiversity in the ocean.' (DP-5)

The short comic strip about the aftermath of the flooding in Bosnia and Herzegovina in 2014 was discussed in the end of the focus group session. Two out of seven group members admitted that it was the first time they had learnt about a flooding in the Balkans in 2014. The discussion around the comics was mostly about corruption in the region and lack of ownership in disaster prevention.

'It is somewhere in Balkans. […] Because these corrupted people talking. […] They are showing the internal struggles of these people who […] are responsible for [...] something.' (DP-1)

'Why corrupt politicians instead of ... they had the power to implement policies and things in the past to avoid future flooding. They said they had one in 1915 and 1965, and instead of putting money into kind of adaptation and mitigation, they… Obviously, the money gone somewhere else, into their pockets.' (DP-5)

'It is interesting it is not important what kind of situation this is. We do not need to know what this, where this took place, what the message to come across...This describes universal situations.' (DP-6)

Discussing the last comics, the respondents of the group D raised a question if the information, or the general idea, presented in one comics could be applicable to another one. Six out of seven participants agreed that it is not as important what kind of situation is depicted in the comics and where the story takes place; the comics describes universal situations and no more contextual information is needed.

4.2.   Effects

The analysis of comics' effects on perception of climate change and disasters identified were framed around two main functions of sequential art described in subsection 2.3. – instruction and entertainment. In addition, this research project contains the analysis of what kind of feelings and themes the comics might trigger. This means that I studied how particular comics (see Appendix 3) may affect readers on emotional and cognitive levels. In order to study this, the questions, such as 'How do you feel about that?' or 'Do you feel like doing anything now?' were asked. The answers include a number of subcategories in which different arguments are expanded. These subcategories are i) emotions and feelings, ii) trust, iii) science communication, and iv) instruction and communication for change. The subcategories were generated by combining different subject areas addressed during the discussions in both focus groups. The arguments expressed both by the authors of the comics and the participants of the focus groups were compared and exemplified.

4.2.1.   Emotions and feelings

In order to learn what exactly the participants felt by reading the comics about climate change and disasters, a general question about feelings was asked at the beginning of each session. However, during the focus groups, the participants continued reflecting on their feelings and emotions. The findings were structured in such subcategories as i) entertainment and ii) empathy and sympathy.

The first subcategory of emotions and feelings is related to entertainment. One of the main assumptions related to comics and discussed earlier in the project was that comics should be fun and easy to read. The discussions confirmed that this stereotype exists. The participants' undelivered expectations to read 'funny' comics were more visible during the discussions within the group D than the group CC.

> *"I am used to reading like comics, Chinese or Japanese comics. This to me was like 'Okay, this is like fun'. You see the internal struggle he has, what is going on… To me, it was kind of fun journey. Until when he got to the bad part, about the real issue and I was 'Okay, it's obviously more serious". (DP-3)*

> *"Usually when you think about comics you think it has to be in some way entertaining and it is not. It is more like informative, and this is something surprising." (DP-4)*

Participants felt frustrated, emotionally drained, shocked, concerned, depressed or confused by the end of the readings. These feelings were mostly connected to the development of the stories' plot, people's lives, and complexity of issues related to the disasters depicted. Only the comics about flooding in the Balkans caused some laughing. Later, two participants expressed sarcasm, as humor in the story was black and white. Additionally, as CCP-1 stressed, the content of the comics might be perceived as funny or entertaining if a scientific audience is 'geeky enough'.

The second subcategory of emotions and feelings addresses empathy and sympathy. Authors and creators of the comics about disasters expressed in interviews hope that readers will understand other human beings and their experience of disasters and suffering (F. Marin, personal communication, June 15, 2016; J. Neufeld, personal communication, February 16, 2017; A. Pasion, personal communication, March 3, 2017; S. Wilson, personal communication, February 13, 2017). Although it was clear from the group discussions that most of the participants had not experienced the natural disasters depicted in the comics, most of them stated that they felt sympathy and could share the feelings of protagonists.

> *'[…] when I read, I felt sympathetic to those people, and not entertained by the story [...]' (DP-4)*

> *'I feel bad for them. Like it reminds me that you own do not take things for granted. It is like self-reflection.' (DP-3)*

> *'It was easy for me to follow because like the main protagonist who tells the story, I am throwing into this - the situation is completely unfamiliar for me, I like follow it his pace - he is confused, he does not know what is happening, and then he learns, and then I learn with him.' (DP-1)*

"And you cannot really sympathize with them in the end when they are sitting in the boat like that. […] You wondering where one else is. You see them sitting in the boat there and - 'Wow, you can cause this, and I can't feel sorry for you'. You feel sorry for the rest of population." (DP-5)

At the same time, none of the participants of the group D said openly that they felt empathy. As DP-5 mentioned during the discussion about the Haitian earthquake, '*the situation is so extreme that I hardly can put myself in their shoes.*'

In addition, one participant in each focus group noted the importance of telling stories about people who were directly affected by floods, not only about politicians or climate scientists. Later on, concerns of the participant in the group CC were eliminated when this kind of information was presented in other comics.

'I think it is really good we get the persons' stories of what is happening in the countries affected by climate change…I like this page [p.2 of the comics 'Chakra - Climate Change'] especially. I think that is the page that mostly combines the information – what is happening with the images. People might recognize themselves of seeing it somewhere.' (CCP-3)

'It is a view into other person's world you do not know about – Maldives, or India, or Indonesia.' (CCP-5)

Interestingly, the issue of understanding other people's concerns because of global warming or the impact of the latter on their every-day life was not mentioned in any of the interviews with the comics' creators. In that sense, the respondents shared the unexpected perception of the subject communicated through comics.

4.2.2. Trustworthiness

When discussing the comics, the participants of both focus groups expressed a great deal of concern regarding the reliability of the information presented in a comic format. The participants felt sympathy to people in the comics, but the question, if the stories about disasters were based on real cases, was still debated.

'[…] I am not sure these are the actual people the voice I heard, and I am not sure who are the audiences is. […] There is a disaster, and people are suffering and that must cause sympathy.' (DP-7)

The issue of trust opened the floor for discussion around sources of information, channels of communication and framing the problem of climate change in general. There was a person in each of the focus groups who verbalized doubt if the information communicated through comics could be perceived seriously. One called stories in comics '*a made up story*' or '*a fairy-tale*' that

simplifies the general idea of climate change awareness and makes it '*cheaper*', less reliable (CCP-7). Another speaker claimed that references for the information provided in the comics are needed to make one believe in what was said.

'[…] In my mind, comics are like fictional, so is not the real thing that is happening. […]' (DP-3)

'I do not really believe anything on comics. For me, it is like a story unless […] I looked at the source. […]' (DP-3)

As some respondents suggested, the reliability of information transmitted in the comics might be increased, by providing sources of data and names.

"The question I had while reading this was like 'Are these real people? Are these animations of real people, real respondents?' That would add extra value to this creative format of delivering the news. But even if they are not real, you know, I believe that it is based on actual reports." (DP-1)

There were also comments in favor of comics' effect to make the stories realistic. The everyday situations and struggles of people were portrayed vividly and so participants could imagine the reality or ask for details about the vulnerable people. In that sense, the participants got the message that was transmitted by the authors – to show the reality for living in Haiti (Werman, 2012) or author's own experience of disasters in Japan (S. Wilson, personal communication, February 13, 2017).

'[…] it is engaging you into reality.' (DP-2)

'I was wondering if the names were real because pictures might be like depicting people, of course, but they might not correspond to the reality. […] I was wondering in the names of the victims.' (DP-4)

Finally, the theme of trust was also discussed through the lens of readers' ability to understand the comics. According to one of the speakers (CCP-7), children will trust the comics produced by the UN – '*Chakra - Climate Change*' (thereinafter the UN comics*)* – more than the German one because they will be able to fully understand the content of the UN comics.

4.2.3.   Science communication

The participants of the group CC also perceived information presented in the sequential form of art as authors' intention to popularize climate change subject. Some respondents admitted that science and art go well together and their combination can help readers visualize consequences of climate change or natural disasters.

'It is a very good piece of both science and art compiled together... It gave me information that I knew but it illustrated it to me, especially about Lima and the glaciers disappearing. Then there was a forest fire. It is good to have some illustration because we do not imagine things the same way when I say a flood or a forest fire. I might not imagine the same image as someone else.' (CCP-8)

'It combines art and science what is really interesting.' (CCP-5)

Whereas, others were very dissatisfied with the approach.

'I do not like how it is done... For me, it seems like sense twice to hop on the bandwagon of another art form and try to spell message, which cannot be expressed like that in a comic.' (CCP-3)

4.2.4. Instruction and communication for change

This section sheds light on how the participants of the focus group discussions perceived the comics as a medium that serves to instruct and change behavior patterns and to communicate climate change science.

Information about climate change or a disaster in comics was perceived as an instruction or a manual for action. As S. Wilson (personal communication, February 13, 2017) said in the interview, *'everyone could be affected by a disaster'* and his story described in *'Reaction to Disaster'* (2011) is for everyone and can help to emotionally prepare for what one would do during the disaster. Following this, when Wilson's comics (2011) was displayed during the focus group, one respondent (DP-1) stated that it was informative and practical. Together with another member of the focus group, the participant elaborates further on their understanding of the content of the story.

'It is sort of a manual about how to behave, about safety because it has element of what to do when you are not trained and when you do not know how to act during.' (DP-1)

The comics focused on climate change led participants to reflecting upon the author's intention to make readers think about global warming, change behavior and actions that mitigate climate change. Their opinions echoed A. Hamann's (personal communication, January 20, 2017) intention expressed during the interview that authors of the GT graphic novel wanted to *'get people involved, motivate them to start thinking about their own behavior and possible changes they could do in their own life'*.

'It gives some specific things you could do in your house you might fight climate change.' (CCP-5)

"We get somebody telling us and then we 'Oh yeah, now I know. I'm going to do something."' (CCP-3)

'It is more like straightforward. It would request for certain actions.' (CCP-7)

4.3. Challenges in perceiving the communicated information

As it was discussed in the literature review, there are some challenges a reader faces while perceiving information communicated through comics, and these challenges affect the overall effect of comic books and graphic novels on perception of climate change and disasters. In addition, these challenges play a certain role in perceiving and understanding the information and intentions of the authors. This section studies how the focus groups participants experienced the challenges discussed by different scholars, like Eisner (1993), McCloud (2001), Groenteen (2007), Versaci (2007), Round (2010), Duncan (2012), etc.

4.3.1. Involvement

To begin with, comics discussed during the focus groups required some level of participation from the readers, as exemplified in Chapter 2.5. The level of participation in the comics' narrative affects the perception of the message communicated in the comics, and several factors might create obstacles in the perception for a reader. First, information in comics is communicated in different dimensions, from different perspectives. McCloud (2001), Versaci (2007) and Mikkonen (2010) noted the influence of sense of time upon both the dynamics in graphic narratives and the relation between images. As such, it is possible that the reader may feel lost.

'It is like a patchwork of many different things. Could be good, but could be a mess as well. It is difficult to say what it is about.' (DP-7)

'I was a little bit confused about what the point was with this. Is it, like someone said, to promote how Japan dealt with this, or is it to show how you are going act if there is an earthquake - you should stand under the door- or is it a general information about how many died, what happened.' (DP-6)

Second, readers had not only to follow the narrative but also to pay attention to the images because, as was noted earlier, comics are based on the combination of both text and images. In some cases, participants could feel the joint effect of images and texts.

'The images relate to the story, there is something happening in the comic. Not just general information.' (CCP-2)

Occasionally participants in the focus groups struggled to follow both the images and texts.

'I have previous experience of reading comic strip and read all really fast. If I skip something I still know by looking at the pictures what it is talking about... with this one, I had to pay attention and it was stressful. I would rather prioritize text.' (CCP-4)

However, there were also those who did not see a benefit of comics as genre and questioned an opportunity to convert the comic to a report by removing all images from the comics about the earthquake in Haiti and changing the font of the text in the comics (DP-7).

Other difficulties participants expressed they faced while reading included the language of texts, the characteristics of images and the design of the comics. First, the language of the extract from the GT graphic novel, as respondents mentioned, was too scientific and too technical, containing too many technical terms some of which, like 'WATTS/m2' or 'permafrost', the general public might not understand. Whereas, the text in the UN comics was reader-friendly, written in modern, standard language. The participants who either did not study sustainability sciences, had no previous knowledge of the problem or did not consider themselves as scientists expressed the major concerns about terminology. Second, there was a difficulty in understanding images. For example, one participant could not identify what a particular truck in the picture was doing, and, as I view it, the role of this image in the whole story. Finally, there were some comments regarding the design of comics, for example, the font of texts that made the reading process either easier or difficult.

In summary, if a person while reading comics follows the text in favor of images or vice versa, some information transmitted by the author might not be interpreted correctly. This may result in an effect contrary to the authors' intentions.

4.3.2. Commonality of experience

Different life experiences lay the foundation for different effects in perceiving the information (Eisner, 1993; McCloud, 2001). Differences in educational background and life events were revealed during the focus group discussions. It was interesting to observe how a participant's way of thinking 'matches' the author's, or the contrast in which climate change can be perceived by those who studied social and natural sciences. Moreover, as at least one participant in each of the groups stressed that different backgrounds make people biased when reading comics.

'I think having different backgrounds makes us a bit biased when we read this because I see we are anchored to what we have read before as scientific journals or what we read before as comics. Now it is hard for us to put that together.' (CCP-8)

'I have started analyzing from the disaster perspective.' (DP-2)

'I am more analyzing and thinking...very academically.' (DP-7)

Additionally, one of the focus group participants was in Japan during the disasters of March 2011 and expressed shock while discussing how well informed the author of the comics was and how naturally he depicted the situation.

"I think it is 'Wow'. He has a point. What kind of awareness of problems he has! I am shocked." (DP-7)

"I think it is how many people thought actually – 'It was ok, just hundred people died' - and then they found out that hundred times more. I think it is very well done, how we felt. I was in Tokyo, so maybe it was a bit different. But, I think if people are more West than Tokyo, I guess, they feel this way." (DP-7)

This participant (DP-7) noted that due to their own personal experience of the disasters, their perception of the comic did not fully correspond to their experience of the disasters. Whereas one respondent of the group D commented on the calmness of Japanese society during and after the disasters, another member of the group D, DP-7, having this particular disaster experience, perceived the information as incorrect. According to DP-7, there was a discussion about the population's trauma because of non-stop media broadcasting in the country.

In summary, different life experiences led to different feelings and alternative understandings of a text, and, as Groenteen noted (2007), each of the panels in comics is descriptible by the reader, and it is up to the reader to construct the meaning of the panel.

4.3.3. Trustworthiness

Although sources of information could be provided in the comics, it does not mean that the content of the graphic novel will be worth trustworthy. For example, the GT graphic novel was designed as a 'graphic translation' of the report of the WBGU '*World in transition – A Social Contract for Sustainability*' that was published in 2011 (Leinfelder, 2015; A. Hamann, personal communication, January 20, 2017). Every scientist in the comics, as A. Hamann mentioned in the interview (personal communication, January 20, 2017), speaks about their special contribution to the report in relation to their professional subject. Still, one participant pointed to limitations in 'reading' references.

'They do give sources but it is this characteristic of people in the science who actually know what does it mean to see a source if it is reliable or not. I am not particular aware if those who are reading would be much keen on.' (CCP-4)

A couple of participants expressed concern if it is possible to trust those who create these comics and graphic novels. In the participants' opinion, the comics display bias. The notion that only the communities of the Global South feel the impact of global warming and, therefore, have to do adapt, exemplifies the participant's statement.

'It is funny there are no white people in the comic. It is a global issue, right? Maybe their focuses on the people who are going to be more affected, so they are depicted from the Global South countries.' (CCP-4)

'When we talk about solutions, there are also only those countries in the story of doing something. Even the solutions themselves like switching to renewable energy, of course, our global thing can be converted to countries in the West Europe and North America, but there is nobody representing those countries.' (CCP-3)

These statements exemplify one of the underlying assumptions in studying the ideological content of the texts, and especially of the comic books, formulated by Rifas (2012). According to Rifas, "ideology can support domination of one group over another" (2012, p. 226). Although his explanation was about the ideology of 'racism' in the nineteenth century and the domination of the white Europeans over the world's non-white people, we, living in the twenty-first century still discuss the issue of 'white and non-white people". Moreover, as he remarked in his private correspondence to Adams in 2008 "…comic book stories themselves have no 'political impact,' except through the people who take inspiration or encouragement from them, and then do things differently, especially through activist organizations" (Adams, 2008, p.71). At the same time, Rifas (2012) had another assumption that comic books do not present a simple, consistent "ideological position"; they present an arena in which heroes work through issues and conflicts in the form of stories (p.226). Therefore, I have concerns regarding what other feelings or questions the participants had but did not express during the focus group discussion.

Finally, the comics raised a question of gender representation. The feelings were expressed after the focus group and therefore were not transcribed. The main concern was that if there are two main characters in the UN comics – superheroes Chakra The Invincible and Mighty Girl,- why was there more emphasis on the boy (Chakra) in the comic's images compared to Mighty Girl.

4.3.4. Defining the target audience

The effect of the discussed graphic novels or comics on the perception of disasters or climate change could be explained by the fact that the participants do not define themselves as a target audience of the comics.

Although it was not a goal of the research to identify the target groups for the comics, nevertheless the topic was actively discussed. Participants of group CC did not attribute themselves to target audiences of the comics. Main reasons for this was the irrelevance of an age group, of academic background, and of the form of art. However, for example, A. Hamann (personal communication, January 20, 2017) defines the target group of the GT graphic novel as 'basically anybody' and adds that research done by Leinfelder (2015) showed the book might be interesting for people who are already aware of the issue and have read about it. However, as it was discussed above in Chapter 2.6.1., the result of their report was based on the answers of people aged over 35.

At the same time, the UN comics were defined as a story for a younger crowd, for children. However, as one of the participants mentioned, there might be an overlap of target audiences.

'Although it is clearly aimed at children, I do not think as an adult we are averse to reading this… I think adults would still be happy with getting information like this.' (CCP-6-UN)

Moreover, one participant mentioned the possibility that adults could be indirectly affected by comics that their children read. For example, a child may read the comics and tell the parents that the family should not use the air-conditioner anymore (CCP-7). Therefore, the effect of communicating climate change in comics could differ depending on the approach of the creators.

4.4. Intentions of the communicated messages

Being a complex form of art, comics provide opportunity for manipulation of meanings or plurality of interpretations (McAllister, Sewell, & Gordon, 2001). Reactions of the focus groups' participants to the comics were observed and compared with the aims of the interviewees. At least four authors' and creators' intentions to communicate information through comics were identified: i) absence of intention, ii) documentation of events, iii) motivation, and iv) science communication.

4.4.1. No intentions

Duncan (2012) described that images on the page of comics are a result of author intention; thus, it can be assumed that 'each image is a strategic choice of the author made to communicate a particular idea or effect' (p.44). However, this is just one of the underlying

assumptions of images functions presented by Duncan, and occasionally some images in comics become a result of many years of an author's work and do not function as a part of a big plan of a story's creator. For instance, S. Wilson (personal communication, February 13, 2017) stated in the interview that as a creator, one does not know what they are doing, one just does it unconsciously. S. Wilson adds that if one tries to analyze his own influences, then it might be a question of his education (psychology and sociology) when we see various perspectives of an issue. Therefore, as S. Wilson concludes, in the creative process he was influenced by education without realizing that, and there was not an intentional plan to communicate and draw things related to building codes, ethics, evacuation plans as depicted in the comics.

4.4.2. Documentation of events

Focus group discussions brought up the issue of reality or presentation of facts in comics about disasters. The perception of the situations depicted in the comics was influenced by the participants' feelings as a result of them 'seeing' the life of people and 'hearing' the voices of victims of the disasters.

'My overall impression is that it tells the story well, in detail, of people. Actually vulnerable people. Their voices heard.' (DP-1)

'We can actually see these people having their everyday life just like everybody else.' (DP-6)

This echoes Woo (2010, p.166) who described comics journalism as a reporting on the experiences of the victims of conflict and war 'with a rare depth, sensitivity, and sense of context.' Additionally, the stories were perceived by the members of the groups D and CC consciously, meaning on the basis of the analysis of references and sources of information given in the text. In that sense, some of the participants were able to 'observe' real life and real people as it was said by creators of the comics read during the focus groups (Werman, 2012; Ž. Gašić, personal communication, February 22, 2017; S. Wilson, personal communication, February 13, 2017) or admitted by the creators of the comics about Hurricane Katrina and the 2004 Indian Ocean tsunami (J.Neufeld, personal communication, February 16, 2017; E. Fassnidge, personal communication, February 1, 2017).

4.4.3. Motivation

Another interpretation of authors' intentions was a call to action or change. Addressing communication for change through comics, the participants questioned approaches of the comics' creators – i) individual approach and ii) usage of common language.

The first approach is to address the issue either on a personal or collective level. As some participants claimed, many visuals were used the UN comics in order to inspire a reader. In addition, the respondents admitted that the effect of the comics would be more positive if the creators address the message of the comics to an individual, rather than to the general public.

'[…] think about how much I consume as an individual in terms of fossil fuel and stuff. Even though maybe as an individual, I cannot change but that is how we all think. If we all change then it is going to create a bigger impact.' (CCP-8)

Whereas, during the discussion on the GT graphic novel some respondents were somewhat unsatisfied, feeling as though they had not been addressed by the authors at an individual level.

'I think they are more encouraging global changes, but not on the personal level. If we all think about changing our consumption then something changes. It is again about public, they are not addressing individual - me as an individual. They do not tell me what I might do for changing the world.' (CCP-2)

'If I do not get it, if I do not know what to do I will do nothing. I will not react to it at all. I will ignore it because I think that is something for other people who know all the numbers and all the stuff.' (CCP-3)

Another approach is the creation of a platform for discussions on climate change by using common language and speaking with friends about every-day activities, as it was in the UN comics. Dialogues and standard language help to better react to the problem and contribute to solutions.

"The children's version is about people having conversation in order to get the information across, and the one directed towards an older audience is about just 'Here is you the information' and I think even as an adult I prefer the one where it is about conversation, encourages me 'Oh, what's going on'. Where I am come from these problems. What is happening? Do you see these things?' Even as an adult, I am reacting to it better. It is more a dialogue." (CCP-5)

"If you talk to somebody about the problems of climate change in your own life …you do not talk with somebody installing graphs 'I've just measured these two in my garden. It is this and this'. It is not the language we use. I feel more engaged with using every day language to talk with my peers about how I perceive the problem; how I might think, I can contribute to the solution." (CCP-3)

4.4.4. Science communication

The approach of communicating the subject of climate change through comics was also actively discussed during the focus groups. The participants' arguments related to the intention of authors to popularize science and climate and whether it is appropriate to communicate issues relating to climate change through comics. Participants had their pros and cons and created a forum for discussion if the comics can reach new audiences and popularize science.

'It appeals to people that may not even know anything about climate, climate change or global warming…It is an opportunity to reach wholly different demographic, like younger people or people that are more interested in comics.' (CCP-5)

'It is trying to make people more interested, find this intersection of people that do not care and people that care a lot. And kind of find people that are in the middle and get them more excited or educated them through entertainment. But I don't know how realistic that is.' (CCP-1)

In that sense, the intentions of the creators of the GT graphic novel matched the effects the participants shared after reading it. As A. Hamann (personal communication, January 20, 2017) stressed in the interview, the comic was created to popularize the report of WBGU and bring the subject of climate change to a broader audience. In addition, A. Hamann adds that comics are a medium used alongside mainstream communication channels; they might therefore be more helpful in providing encouragement by offering possible solutions and suggesting actions. M.Bueker (personal communication, January 23, 2017), a representative of The Helmholtz Association, also admitted in the interview, that comics are an innovative way of communicating information and that it is '*the way of opening the scientific community for the general public*'. Moreover, M. Bueker (personal communication, January 23, 2017) raised a point regarding the visibility of research or scientific organizations in the public sphere. He emphasizes that most people choose not to be involved with scientific outreach, a sentiment that was also brought up by one of the respondents of the group CC who also mentioned that there are people who are not concerned. Nevertheless, science communication through comics presents information in an alternative way, to that of research papers. Importantly, even those who are not interested in science still have the opportunity to learn about the life of scientists and their activities.

5. CONCLUSIONS

There are stereotypes in society regarding the sequential form of art, and comics as a form of communication and literature has been marginalized and not taken seriously both by academia and the general public. The criticism is based on the idea that comics are associated mainly with fun and children or juvenile themes, therefore, they cannot communicate 'serious' matters, like sustainability or human rights. However, a few studies demonstrate evidence that comics can have a certain effect on the perception of 'serious' issues.

At the same time, while studies on comics as a medium of communication and the effect of comics on the reader do exist, there is still a paucity of research in the field of communicating disasters and climate change by means of graphic novels or comics. The existing studies illustrate the efficacy of comics for achieving various outcomes in readers, like excitement, empathy and relief or demonstration of willingness to read more about a subject. However, there is a lack of studies on these effects in relation to the fields of climate change or natural hazards.

The research question of the thesis was as follows: What effects do comics have on the perception of climate change and disasters by lay people? The preliminary analysis of the literature showed that comics as a genre of literature and form of art affect the reader, for example on emotional and cognitive levels, and findings presented in the thesis provide the evidence that comics have effects on perceptions of climate change and natural hazards on the readers.

First, people experience different emotions while reading comics, like sympathy and empathy. The analysis of the focus group discussions confirmed this, as almost all the participants expressed sympathy. However, some participants felt that they could not empathize with the protagonists of the comics since the situations depicted in the comics were too extreme. Secondly, people can perceive information communicated through comics. The audience learnt of some research related to climate change or natural disasters, as well as consequences and victims. In addition, the samples of comics provided prompted discussions on various topics, something that is interpreted as a further – and perhaps unintended – effect on the audience. Respondents discussed such themes as risk awareness, politics, corruption, leadership, ownership, disaster response, reasons for the problems and solutions to overcome them, and many other. This obviously demonstrates the plurality of people's opinions about the same subject – climate change or disasters – and different interpretation, i.e. perception, of the same comic strips. Thirdly, the participants of both focus groups expressed a great deal of concern regarding the reliability of the information presented in a comic format. The issue of trust opened the floor for discussion around sources of information, channels of communication and framing the problem

of climate change in general. Some respondents admitted that science and art go well together and their combination can help readers visualize consequences of climate change or natural disasters. Finally, information about climate change or a disaster in comics was perceived as an instruction or a manual for action, for instance, how to act in case of an earthquake or what one could do in their house to mitigate climate change.

Two investigative questions helped to address the main research question: (1) *What are the challenges in perceiving messages communicated through comics?* and *(2) What were the intentions of the authors and creators of the comics and graphic novels and how they correlate with the information perceived by the reader?*

The findings show that readers do experience challenges in perceiving messages communicated through comics and graphic novels. The first challenge is a commonality of experience. Readers and authors have different experiences and knowledge, and therefore perceive and communicate messages in different ways. Secondly, people can comprehend information presented in a form of a comic in a different way – someone reads only texts, someone enjoys pictures, others do both. Another point discussed by the participants is if it is possible to trust those who create these comics and graphic novels. In the participants' opinion, the comics might display bias. Finally, the effect of the discussed comics on the perception of disasters or climate change could be explained by the fact that the participants do not define themselves as a target audience of the comics.

Another important aspect of the discussions was devoted to the reflection of participants upon how they understood the intentions of authors, if there were any, and what were the obstacles to correctly perceive the information communicated by the authors. Readers' reactions were correlated with the opinions of some of the comics' authors and creators. Four creators' intentions to communicate information through comics were identified: i) absence of intention, ii) documentation of events, iii) motivation, and iv) science communication. However, as findings show, the reader perceives and interprets the information even if the author did not intend to communicate a particular idea. There was also no consensus about whether or not comics are a good mean of communication for complex matters, like global warming or people's sufferings in the aftermath of disasters. Nevertheless, there was a general consensus that comics are able to reach a wide or a new audience.

Moreover, the findings of the thesis demonstrated an overlap of comics functions – entertainment and instruction – when the reader not only experiences certain emotions and puts themselves in the position of the comics' characters, but also learns, for example, how to behave in case of disaster. Thus, the focus group discussions proved scholars' theories that an entertaining comic book has the potential to communicate practical advice.

Above all, the thesis presents findings that had not been an aim of the thesis. For instance, the focus groups participants indicated the sociological dimensions of comics, namely the

sociological portrait of the reader of these type of comics. Moreover, theme of antagonism between Global South and Global North, as well as the issue of ownership and leadership appeared in the discussions. Additionally, the respondents initiated discussion around the issue of trustworthiness, specifically, if one can trust the information communicated in a form of comics. Besides, the thesis did not aim to identify the traits that make comics reader-friendly. When some of the comics contain texts written in too way scientific or too technical manner, other communicate a message in accessible way. As the participants admitted, there should be balance between images and texts, so they would complement each other. Commonality of life and professional experience, both among the participants and between the authors and the participants, was also defined as one of the challenges in perceiving information.

Noted in the findings, this paper does not provide recommendations on how comic books as a medium for communicating climate change and disaster awareness could be improved or reassessed in order to have a particular effect on the lay people. Additionally, the thesis was focused on comics as a genre of communication, and did not aim to compare comics or graphic novels with other genres of literature or forms of art utilized to communicate climate change subject or natural disasters. Nevertheless, the research provides the evidence to the possible development of this type of communication in environmental and sustainability sciences and disaster risk management. Besides, the paper sets a tentative guideline and points out the aspects that could be taken into account by those who would like to communicate 'serious' matters through comics and graphic novels.

The focus groups and interviews conducted in this project are the first step towards developing a framework for best practice in comics in communications and more precisely comics in climate change and disaster risk management. This future framework could be used to analyze the content of comics about natural disasters and global warming as well as what effects comics create. Further experiments, like focus groups, are needed to validate the components of the framework, as well as to test those presented in the thesis. This applies especially to those aspects around which there was no consensus among focus group participants or to themes that the thesis did not aim to study but arose during the focus group sessions. Finally, future experiments with other samples of comics probably could identify new pitfalls or opportunities in communication of information through sequential forms of art.

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APPENDICES

Appendix 1. List of graphic novels and comic books

#	Graphic Novel	Publisher/ Initiator	Version	Language	Overview	Reference
1	Sarah's Journey	An independent author Sweden	E-book Hard copy (dummy)	English Arabic	A story about a refugee girl that draws attention to the problems of children's right, migration and integration.	http://www.kidnovation.se/
2	Daria. A Roma Woman's Journey	UNDP (Istanbul Regional Hub)	Online	English	The novel highlights some of the issues that Roma women face every day: women's right, violence in the family, discrimination, etc.	http://positivenegatives.org/comics/daria-a-roma-womans-journey/comic/
3	Dana's Story	Care International UK	Online	English German	A first person illustrated testimony about the difficulties that a refugee mother faced on her journey to Serbia, fleeing ISIS controlled Syria.	http://positivenegatives.org/comics/danas-story-2/danas-story/
4	A.D.: New Orleans After the Deluge by Josh Neufeld	Random House, NY USA	Online Hard copy	English	The book is a portrait of the New Orleans city under siege. The author depicts seven true stories of survival in the days leading up to and following Hurricane Katrina in 2005.	http://www.smithmag.net/afterthedeluge/
5	Balkan waters	Non-profit organization Croatia	E-book Hard copy	Croatian English	Children's comics against flood devoted to ecological and environmental awareness as well as natural hazards preparedness. Reflection of floods happened in the Balkans in summer 2014.	https://www.indiegogo.com/projects/balkan-waters-natural-comics#/

6	5.12 Earthquake by Coco Wang	An independent author China	Online	English	An online comic strips based on news stories about the earthquake in Sichuan, China, in 2008.	http://earthquakestrips.blogspot.se/search?updated-max=2008-06-13T06:32:00-07:00&max-results=7
7	Tents Beyond Tents: Understanding Haiti Through Comics	Le Nouvelliste, newspaper Haiti	Online	Creole English	The project focuses on the struggles Haiti faces in the aftermath of the devastating earthquake that rocked Port-au-Prince in January 2010.	http://www.cartoonmovement.com/project/1
8	Aftershock: Artists Respond to Disaster in Japan by Adam Pasion	Independent project of artists Japan	E-book	English	A response of over 35 contributors from over 5 continents to the combined disasters of the tsunami, earthquake and nuclear meltdown that occurred in Japan in March 2011.	https://www.kickstarter.com/projects/324352192/aftershock-artists-respond-to-disaster-in-japan
9	At the heart of Fukushima by Kazuto Tatsuta	Kana editions France	Online Hard copy	French	The book is a reflection on the nuclear accident in Fukushima, Japan, followed after the tsunami and damage of this disaster in March 2011.	http://archyworldys.com/five-years-after-the-fukushima-disaster-a-manga-tells-the-daily-life-of-the-workers-of-the-plant/
10	Rinse, Spin, Repeat. A graphic memoir of loss and survival by Edith Fassnidge	An independent artist UK	Hard copy	English	A graphic novel drawn by a woman who witnessed the Tsunami occurred on the Boxing Day in Thailand in December 2004.	https://unbound.com/books/rinse-spin-repeat
11	Mr Konntou and Timalin	The Association pour le Developpment Durable (ADD),	Online	English	The booklet is devoted to the impact of tsunamis on the Mauritian way of life,	http://iotic.ioc-unesco.org/resources/awareness-and-education-materials/96/comics/detail/27/mr-konntou-and-

		the Mauritius Meteorological Services the University of Technology (UTM) Mauritius			infrastructure and economy and ways to avoid possible related to natural disasters destructions.	timalin
12	Klar Soweit? No.23 – In Paris we trust	The Helmholtz Association Germany	Online	German	Social Media project devoted to science. Major scientific issues are presented in a graphic manner. The issue No23 is devoted to climate change.	https://blogs.helmholtz.de/augenspiegel/2015/12/klar-soweit-no-23-in-paris-we-trust/
13	The Great Transformation. Climate – Can We Beat the Heat?	German Advisory Council on global Change (WBGU) Germany	E-book Hard copy	German English	The book illustrates the central ideas around the progressing climate change in the form of a comic. The books encourage scientists, politicians and citizens to act jointly.	http://www.die-grosse-transformation.de/p/blog-page_19.html
14	Syria's Climate Conflict	An independent publisher Syria (?)	Online	English Arabic	The novel argues the influence of droughts occurred in Syria in 2011 on political situation and prerequisites of the war conflict.	http://yearsoflivingdangerously.tumblr.com/post/86898140738/this-comic-was-produced-in-partnership-by-years-of
15	That's us by Carlo Carino (included in Ponoy Komiks, Filipino Comic Anthology)	Biguglyrobot Japan	E-book	English	A story devoted to the supportive reaction of Filipinos living abroad to the Typhoon Haiyan, which devastated portions of Southeast Asia, particularly the Philippines, on November 8, 2013.	Electronic version of the story was edited and provided by Adam Pasion, the editor of the Aftershock (No. 8 in the list).
16	Climate Change by Darryl Cunningham	An independent artist/ Myriad Editions	Online Hard copy	English	An approach to explain climate change in a format of a graphic novel.	http://darryl-cunningham.blogspot.se/2010/12/climate-change.html

		UK	(title 'Science Tales')			
17	The Cartoon Introduction to Climate Change by Dr.Y.Bauman and G.Klein	Island Press/NGO USA	E-book	English	The authors of the book claim that Climate change is no laughing matter-but maybe it should be. The book entertains and educates by delivering a unique and enjoyable presentation of issues interconnected with the global warming.	https://islandpress.org/book/the-cartoon-introduction-to-climate-change

Appendix 2. List of interviewees

Name	Type of interview	Date of interview	Comics or graphic novel discussed
Michael Bueker Social Media-Manager, The Helmholtz Assosiation	Face-to-face interview	2017, January 23	Klar Soweit? No.23 – In Paris we trust
Edith Fassnidge Author	Skype interview	2017, February 1	Rinse, Spin, Repeat. A graphic memoir of loss and survival
Željko Gašić Editor, Stripos	Email interview	2017, February 22	Balkan waters
Alexandra Hamann Co-editor	Face-to-face interview	2017, January 20	The Great Transformation. Climate – Can We Beat the Heat?
Florin Marin Research and Communications Consultant, UNDP in Europe and Central Asia	Face-to-face interview	2016, June 15	Daria. A Roma Woman's Journey
Josh Neufeld Cartoonist	Skype interview	2017, February 16	A.D.: New Orleans After the Deluge
Adam Pasion Editor, cartoonist	Skype interview	2017, March 3	Aftershock: Artists Respond to Disaster in Japan
Sean Wilson Comic book writer	Skype interview	2017, February 13	Reaction to Disaster. In: Pasion, A. (ed.). *Aftershock: Artists Respond to Disaster in Japan*

General questions

1.   Responsible for the initiation of the project (person, organization, organization's partner, etc.)?

2.   Aim of the project within the objectives of the organization

3.   Stakeholders involved (private sector, NGOs, state institution, academia, etc.)

4.   Budget for the project

5.   Development of the project/ future topics related to climate change and disasters in the format of a comic book

Communication issues

1.   Key communication message (importance, urgency, relevance or magnitude of issue)

2.   Key communication channel (dissemination of information)

3.   Element of innovation, if any, and where is innovation situated

4.   Target audience

5.   Achievement of the project

6.   Achievement of the communication measures

Questions about some features of comic books/graphic novels

1.   Geographical focus (local, national, regional)

2.   Format (online/ hard copy)

3.   Circulation/ coverage (online, offline)

4.   Language of the project (existing, future translation)

5.   Publisher (copyright, year)

6.   Reviews (positive, negative)

7.   Scientific research done on the book

#	Graphic Novel	Publisher/ Initiator	Volume (A4 pages)	Language	Overview	Reference
Focus Group #1: Climate Change in Comic strips						
1	Chapter 4: Hot Stuff// from The Great Transformation. Climate – Can We Beat the Heat?	WBGU Germany	11	English	The chapter illustrates the main reasons and central ideas around the progressing climate change.	http://www.die-grosse-transformation.de/p/blog-page_19.html
2	Chakra - Climate Change	Comics Uniting Nations UNICEF	6	English	It is the third installment in a series from the UNICEF-backed Comics Uniting Nations. It is aimed at kids and young people, and presents a diverse global perspective on the causes and results of climate change.	http://www.comicsunitingnations.org/comics/
Focus Group #2: Disasters in Comic Strips						
1	Tents Beyond Tents: Understanding Haiti Through Comics	Le Nouvelliste, newspaper Haiti	15	English	The project focuses on the struggles Haiti faces in the aftermath of the devastating earthquake that rocked Port-au-Prince in January 2010.	http://www.cartoonmovement.com/project/1
2	Reaction to Disaster by Sean Michael Wilson// from Aftershock	Independent project of artists Japan	6	English	An experience of a comic artist during and after the tsunami, earthquake and nuclear meltdown that occurred in Japan in March 2011.	https://www.kickstarter.com/projects/324352192/aftershock-artists-respond-to-disaster-in-japan
3	No title// from Balkan waters	NGO Croatia	1	English	Reflection of floods happened in the Balkans in summer 2014.	https://www.indiegogo.com/projects/balkan-waters-natural-comics#/

Focus groups	Questions to discuss

Group Climate change	1. Engagement questions
	   - How do you feel about that story?
	
	2. Exploration questions
	   - When you think about the message of the story, what is the first thing that comes to mind?
	   - Are there things in the comic that engage you to do something?
	   - What actions there might be?
	   - Who or what influences your decision either to act or not?
	
	3. Exit questions
	   - Is there anything else we have not talked about that anyone would like to comment on?

Group Disasters	1. Engagement questions
	   - How do you feel about that story?
	
	2. Exploration questions
	   - When you think about the message of the story, what is the first thing that comes to mind?
	   - What kind of emotions did the story your read trigged?
	   - What do you feel about the characters/protagonists?
	   - What do you think about the situation the characters faced?
	3. Exit questions
	   - Is there anything else we have not talked about that anyone would like to comment on?