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Invoking ‘Empathy for the Planet’ through Participatory Ecological Storytelling: From Human-Centered to Planet-Centered Design

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Abstract: In sustainable design and innovation, appreciation of the Planet as an equal stakeholder with humans and businesses continues to rise. Yet a consistent challenge arises in that people have difficulties relating to the nonhuman and interpreting the world in terms of human values and experiences. We need more practical tools to stimulate a connection, especially in its affective dimension, to the Planet and to include nonhuman stakeholders in sustainability developments. To anchor Planetary understanding and considerations, we investigate the role of participatory storytelling to stimulate a reappraisal of the needs of nonhuman stakeholders through empathy building. To posit this, we defined empathy for the Planet as a holistic relationship with human and nonhuman stakeholders. We facilitated workshops where design students, design professionals, and business stakeholders could co-create environmental stories using human and nonhuman character personas. We analyzed the personas, stories, and participants’ feedback on the process experience and impact and observed that story creators experienced empathy for the Planet through projecting and blending their own emotions and intents onto the characters. We discuss, therefore, how ecological story co-creation can be a tool for self-reflection, collective sense-making, and the inclusion of the voice of Planetary stakeholders relevant for sustainable design and to drive sustainability engagement in general. This research confirms the role of stories and imagination in creating a bridge to the natural world through new, human and nonhuman, perspectives.

Keywords: storytelling; co-creation; empathy; nonhuman characters; nonhuman persona; more-than-human; post-anthropocentric; system thinking; sustainable design



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1. Introduction

Design relies on empathy for people, but what about empathy for the Planet? In sustainable design, innovation, and business, the Planet is increasingly seen as a stakeholder as important as humans and businesses (see the People-Planet-Profit Triple Bottom Line Framework) [1–3]. An example is the company Patagonia, which declares on their website that “Earth is now our only shareholder” and gives their profits to environmental NGOs. However, a general challenge in sustainability is that people have difficulty relating to the nonhuman world (animals, plants, natural ecosystems, etc.) [4,5]. This reinforces an anthropocentric way of approaching sustainability, i.e., where we interpret the world in terms of human values and experiences. Focusing solely on human needs reinforces unsustainable solution development, while considering human and nonhuman needs is necessary to shape solutions that benefit all stakeholders in the Planetary ecosystem [6–8].

Design, as a discipline (encompassing product design, service design, design research, strategic design, communication design, etc.) where the starting point is an empathy-driven understanding of stakeholders’ needs and perspectives [9,10], could be the bridge to interpreting the nonhuman world and including Planetary viewpoints in sustainable

developments. Could designers—in the same way empathy is utilized for human stakeholders in people-centered design—use empathy for Planetary stakeholders (the whole ecosystem of human and nonhuman entities on Earth) in sustainable design, and how?

While design is a driving force of sustainability and is rapidly developing in the material and business aspects (e.g., eco-design, circular design, design of KPIs, goals, and requirements) and the human aspects (e.g., communication design, design for behavior change for a circular economy) [11–14], the focus is on the human and the man-made, and the relationship with the Planet, especially the affective aspects, is only slowly getting considered. Emerging nature-inclusive design approaches driven by posthumanism and systemic thinking—e.g., bio-inclusive design, life-centered design, planet-centered design—call for an involvement of a larger set of stakeholders, human and nonhuman [8,15–20] and drive the development of new design frameworks including the nonhuman, or ‘more-than-human’ [7,8,15,21,22]. These frameworks express new relationships between humans, nonhumans, technology, and spaces. They call for a better understanding of the nonhuman and a recognition of its specificity and capacity beyond an anthropocentric view. However, the impact of the empathic, emotional, or compassionate aspect towards the nonhuman is little explored. This gap fits with a more general need to investigate the affective dimension of climate change engagement [23–25] and to develop ‘soft approaches’ to trigger environmental action that is becoming apparent in the field of conservation [26–28], environmental communication [14,29,30] and education [31,32]. To accelerate sustainable transformation, we need the more profound motivation that an empathic connection with the Planet could bring. Empathy for the Planet might involve different mechanisms and implications than empathy for people; hence, we need to understand ways to stimulate it, its mechanisms, its meaning, and its impact on sustainability.

Many traditional design tools that stimulate empathy are difficult to apply to nonhuman stakeholders because they often use language-based communication to connect to stakeholders and understand their experiences [2,33]. Storytelling, though, can be used as a design tool to stimulate empathy for nonhuman stakeholders because it relies on imagination to step into their shoes [3,34–36]. Stories based on end-user personas are widely used by designers to investigate and illustrate human users’ needs, emotions, and behaviors and to promote empathic engagement [37–43]. In this research we take a similar approach where personas and stories express the perspective of the Planet and we explore how it can create an empathic connection. The creation of nonhuman stakeholders’ personas is already being explored as a tool for designers [44,45], and is the first step of story creation. Building stories with these personas will help imagine their stance, emotions, intents and reactions along a journey, which is key in recognizing their agency and moral kinship and putting the nonhuman to equal footing with the human [3,46].

In this research, we want to answer the following questions: Can storytelling be a design tool to elicit empathy for the Planet? What are the meaning and implications for sustainable design of empathy for the Planet generated through this method?

To explore the emergence, experience, and impact of empathy for the Planet, we designed a method where participants co-create stories based on Planetary (human and nonhuman) personas. The stories are environmentally themed, but the type of character (human, animal, vegetal, inanimate, metaphorical, etc.), the type of story arc, as well as the strategy to create empathy of the Planet are completely open. We use storytelling as a participatory process instead of the more classical teller/receiver approach because, while well-crafted stories can have a profound impact on an audience, e.g., to trigger pro-environmental behavior change [47,48], a specific story only resonates with a specific audience. Rather, we involve participants to create in a non-prescriptive way characters and narratives that have meaning to them as individuals and as a group. As a participatory tool, story making is known to stimulate multidisciplinary collaboration, idea and emotions sharing, new perspective taking, out-of-the-box thinking, and collective sense making [41,43,49–51]. We applied this method in four workshops with design students,

professional designers, and business stakeholders. By looking at the created stories and feedback from the participants, we investigate how the method is used by designers and business stakeholders, their experience of the process, and the impact it has on their emotions, perspectives, and behavioral intentions. Based on these results, we can assess the method and attempt a definition of empathy for the Planet. The learnings on participatory ecological storytelling could be converted into a design tool to be used in different contexts (i.e., in design/business environments or with general audiences).

This article starts with a review of relevant literature on nonhuman stakeholders and empathy for the Planet in design, literature, and communication, and on participatory story-based processes that support the rationale for building our participatory ecological storytelling method. In the Section 2, we describe the workshop process and the protocol for data collection and analysis. In the Section 3, we show the analysis of the stories in terms of characters, story themes, and endings, and the summarized participants feedback about the way they created empathy, their emotions, their experience of the process, and how it impacted them. Finally, we discuss the findings to infer the empathy-creation mechanisms of participatory ecological storytelling, the positioning of empathy for the Planet and the potential implications of the method for design practice, concluding with the limitations of the study and its outlook.

1.1. Framing of Empathy for the Planet

Empathy in its broad sense refers to taking the perspective of another and is viewed as a multidimensional, i.e., cognitive and emotional, phenomenon [9,52]. It is a vastly studied concept in aesthetics, sociology, and psychology, with its ambiguities and controversies [46,53].

Empathy is connotated as a relationship with the individual and the human, thus associated with human-centrism rather than post-anthropocentrism (i.e., considering humans as equally important as other entities in the universe) [54]. However, it is good to remember that the term empathy initially related to an emotional connection to a non-human entity: the word, a translation of the Greek *empathia* meaning “passion, state of emotion”, was coined in 1858 by the German philosopher Rudolf Lotze to describe an aesthetic appreciation and projection of human feelings onto the natural world and inanimate objects [53]. In this research, we want to avoid creating an a priori dichotomy between the empathic experience for the human and the nonhuman. Nonhuman may refer to nonhuman animals, other living entities such as plants or fungi, and “things” ranging from rocks, landforms, water bodies, natural ecosystems, to man-made objects [7,8,55]. The human-nonhuman dualism reinforces the anthropocentric bias where the nonhuman is not considered as moral kin, which creates a psychological distance to the animal and natural world and contributes to an attitude of instrumentalization of this world [3,56]. Instead, it is important to develop the ability to think flexibly across the human-nonhuman divide to recognize the ethical needs of both communities [35]. In posthumanist studies, the boundaries between human and non-human are blurred [6,7,57]; one needs to value the “sphere of otherness” while avoiding a sharp demarcation [56]. Quoting the ecological storyteller Anthony Nanson, there is a way to consider “nature as a whole”, to “reunite the individual and the collective, with a complexity composed of the intricacy of senses, behaviors, and relationships of the individual entities in the Planetary ecosystem” [58]. This links to the notion of interrelatedness, a sense of relationship with the self, others and the nature. As the writer Alida Gersie reflects: “In order to be ‘ecologically sensible’ we need to think and feel relationally” [50]. This idea of developing and valuing relations between entities is also fundamental to systems thinking: designers must acknowledge that behaviors, emotions, experiences of actors and their environment in a system are influencing each other, and that agency is both individual and collective. Hence, we frame empathy for the Planet as a holistic notion including empathy for human and nonhuman, individually and as a collective ecosystem. We believe that this framing is necessary to enable horizontal relationships and a respectful dialogue where human and nonhuman are considered equal. The notion of empathy for the Planet can be found in the field of

compassionate conservation, with Batavia describing it as “an emotional experience of interdependence and shared vulnerability” [27]. It also emerges in education [59–62], where Dolby et al. use the term “new empathy” encompassing empathy for humans, animals, and the planet.

With this definition in mind, we will summarize in the next section the current positioning of empathy for the planet in design practice and the tools to stimulate it.

1.2. Empathy for the Planet in the Design Practice

Empathy is a key element in the practice of design since the rise of Human-Centered Design in the 1990s and is seen as an enabler of meaningful product and solution innovation and development [9,10,52,63]. In this context, empathy is both an explicit step of the design process and an ability and emotional state of the designer [9,10]. Empathy helps designers to comprehend or imagine the feelings, stance, and perspective of the subjects they design for (cognitive empathy), to emotionally connect and identify with them (affective empathy), and it motivates to solve their problem, relieve their suffering, or enhance their wellbeing (empathic concern, also called compassion or motivational empathy) [17,64–66]. Designers use empathy to inspire and drive their design decisions, build experiences that are relevant for users [9,52,67] and to keep an active, respectful, and open attitude towards them [10]. For these reasons, we see empathy as a natural entry route for the integration of nonhuman stakeholders through consideration of their needs and perspectives.

The role of empathy in design is subject to discussion. Empathy is too often generalized as an emotional connection for the other and confused with sympathy (which can be summarized as feeling concern for the other) [63]; an overemphasis on connecting emotionally to users may be detrimental to the design process if it leads to overwhelming emotions and affects rational thinking [52]. Furthermore, because empathy for other human beings is facilitated by similarities of thinking and feeling and by one’s judgement on their situation [63], there is a risk that designers understand users through their own perspectives, memories, and experiences and project their thoughts and emotions onto the user, hence biasing the design research output. On the other hand, this process of self-reflection, i.e., recalling explicitly one’s own memories and experiences, can also be beneficial for connecting and empathizing with users [52]. The exact extent and nature of affect sharing in empathy is a subject for debate, but there is consensus that it requires emotional literacy (i.e., the ability to understand and express one’s own or another’s emotions) [50]. Finally, empathy building in the design process is influenced by the quality of the process, where incomplete observation, personal bias, or ignorance can lead to the omission of relevant information [63]. Designers must make conscious decisions reflecting their design ethics and desired social impact on their strategy to gain empathy with stakeholders and the extent to which their own values are embodied in the process [63].

Classically, in the people-centered design process, empathy is built while gathering knowledge about and connecting with users through design research methods such as observation, interviews, context mapping, journey mapping, and while simulating and imagining experiences through, e.g., prototypes, design probes, empathy simulators, storytelling, role-playing, and bodystorming [9,33,52,63,68–70]. Designers also use storytelling techniques, including personas, scenarios, and storyboards, to empathically communicate users’ experiences to other actors involved in product or solution design and development [10].

These tools and methods apply primarily to human stakeholders; involving nonhumans through traditional design research methods is practically limited, which results in an unequal role in the process [8,63]. Leveraging animal studies and the emerging field of plant psychology, designers are exploring methods and the associated ethics to include nonhuman animals [44,71–74], plants, and other nonanimal stakeholders in the design process [8,45,75]. The impossibility to communicate and understand through language and to directly compare experiences with the nonhuman world limits the development of cognitive empathy during design research. This can to a certain extent be compensated by

knowledge of the nonhuman's natural history and emotional literacy [2], but design tools to develop empathy for the nonhuman are still lacking.

Design research tools based on imagination, such as storytelling, may remain effective in generating affective empathy with the nonhuman. Stories have the capacity to facilitate taking different perspectives through the story characters and engaging with alternative, unknown environments and experiences [3,34,70,76]. Stories “make familiar the unfamiliar” [36]. For example, new approaches for design research with the more-than-human explore fictional dialogues with objects and artificial intelligence to understand their perspectives and initiate a co-design process [76–78]. These narratives bring to the surface possible opinions and intentions of daily objects about their use and misuse—a critical eye on the design that opens new possibilities for designers. Taking nonhuman perspectives in stories is not common practice in design but is frequent in literature. This type of story has the potential to expose designers to different environmental understandings, serve as a point of comparison between the human and nonhuman worlds, and stimulate new ways of thinking, empathic connections, and behaviors [79]. To extend the known story-based design toolset to Planetary stakeholders, the method presented in this study leverages learnings from literature and environmental communication studies related to the notion of empathy for the Planet, which are summarized in the next sections.

1.3. Empathy for the Planet in Stories: The Role of Imagination, Anthropomorphism, Human Bridges, and Identification

Storytelling is a powerful tool to stimulate empathy and its co-drivers: interrelatedness and emotional literacy [50]. In environmental studies, stories are a known tool to rearticulate complex relationships between humans, nature, and technology, to connect the personal and the social, the local and the global, and to link causes and effects [58,79–82]. Environmental narratives can stimulate pro-environmental engagement by communicating and making easy to remember facts, but also by shaping beliefs and co-constructing meaning in new relationships with each other and with the world [58,83–87]. To engage, these narratives must translate the inherent uncertainty and complexity of the topic into a positive outlook while making the audience curious about the challenges and empowered on the ways to act [29,30,83,88,89]. Storytelling, with a focus on playfulness and empathetic connection, is widely used by brands to communicate about the environmental impact of products, to change people's preconceptions about second-hand or eco-products, and to promote eco-friendly consumption and behavior [90–92]. Climate change documentaries using empathy creation and imagery have become a popular tool to engage audiences and stimulate action on climate change [31].

Empathy in environmental narratives is closely linked to imagination: imagination favors projecting oneself in another situation [10]. Because humans cannot fully apprehend the nonhuman, imagination has an explicit role to play in building our perception of the environment [34]. Furthermore, imagination in climate fiction helps people make sense of the environmental challenges spanning large timescales and geographical locations and envision radically different social, political, and economic futures [87,93–96].

The main line of thinking in post-anthropocentric narratives is to move away from the traditional story canon where humans are the central narrator and open to nonhuman characters treated as sentient beings capable of agency [3,46,93,96]. Interestingly, a framework developed in animal studies—that can be applied to all Planetary stakeholders—describes four characteristics influencing the creation of empathy: agency (ability to move, eat, play, groom, etc., and present social and moral behaviors); affectivity (ability to show emotions); coherence (being easily understood as animal-like with arms, legs, body, and face—eyes being particularly impactful); and continuity (spending time with another increases understanding and empathy towards the other) [2,97]. The assignment of these characteristics to nonhuman story characters will facilitate the creation of ‘narrative empathy’, a concept in

cognitive literary studies describing the “imaginative process whereby readers temporarily adopt the perceptual, emotional, or axiological perspective of a fictional character” [70].

A mechanism to promote empathy for the nonhuman world is anthropomorphism, i.e., the assignment of human characteristics and purposes to nonhuman entities, and it has been shown to motivate conservation action [70,98,99]. Anthropomorphism is widely used in traditional stories, fables, and children’s stories, and in marketing. It helps to perceive nonhumans not as passive objects but as active individuals with particular perspectives, values, and motivations worthy of moral consideration, especially when similarities are found between nonhuman and human moral behavior [100,101]. It can bridge a psychological barrier towards entities that score low on the agency, affectivity, coherence, and continuity scales. For some, anthropomorphism is a condition for building empathy for nonhuman characters or narrators in a story [102]. For others, there is a risk of reinforcing anthropocentric bias [103] and triggering ‘false empathy’ (the incorrect projection of personal experiences and the incorrect belief that one feels the suffering of another without cognitively understanding the other) [33,58,70]. While these risks are to be kept in mind, there is a line of arguments supporting the idea that the mere attempt of imagining and representing nonhuman perspectives is beneficial to revisiting the respective positions of the human and nonhuman worlds and to initiating new relationships based on consideration and respect, even if the nonhuman perspective is not accurately recreated [3,34].

Another route to building empathy for nonhumans is the use of human bridge characters, or “human proxy”, that are role models in expressing emotional responses and altruistic behavior for nonhuman subjects [47,102]. Human bridges can be narrators, existing human protagonists (such as cameramen in ecological documentaries), or fictional characters. The story receivers partially experience the emotional and cognitive states of the human bridges, which breaks down “the invisible wall between viewers and animals” and emotionally engages the audience “with a world they have become distant from” [102]. It is interesting to think that designers, who often take the role of a ‘bridge’ between end-users and other stakeholders by carrying end-users’ stories, could be a ‘human bridge’ to the Planet in sustainable product or solution development.

Identification (the cognitive and emotional process of putting oneself in a character’s shoes) with story protagonists is linked to empathetic engagement and confronts story receivers with the consequences of climate change and pollution that the protagonists might face, makes different environmental realities and perspectives closer and more personal, and facilitates imagining alternative futures and personal transformations [80]. Identification is favored by imagination, narrative exposure, and similarities in demography, past experiences, viewpoints, and goals [104]. Therefore, a variety of characters and narratives that illustrate different belief systems and views on climate change will facilitate identification. A participatory story making process where participants can choose the type and features of the story characters will favor the creation of a variety of characters; the choice of the character and the expression of their nature through the story making process may reveal the beliefs, values, and emotions of the story creators.

1.4. Ecological Self-Narratives

Today, environmental communication can often appear too factual, not attention-grabbing and not emotionally engaging enough [29,30,105]. It faces the challenge of a “narrative deficit” preventing people from framing themselves in terms of climate action [83]. Frames are unconscious mental models that people use to interpret the world around them and evaluate new facts presented. If the facts do not match one’s frame, they will be perceived as senseless and ignored; if the facts fit into existing mental frames, people are more likely to recognize, accept, and engage with them [106]. Narratives can connect facts to one’s frame by appealing to values, emotions, concerns, pre-existing cultural narratives, and metanarratives about the world [83]. Cognitive psychologist Bruner talks about the “narrative mode of thought”, which enables the organization of everyday interpretations of experiences, events, places, people, etc. in story form [107]. However,

the perception of environmental challenges and climate change is highly personal; it is influenced by personal experience, beliefs, and perceptions; ideological polarization; psychological distance; gender; age; nationality; social identity; internal dimensions such as ethics and altruistic or egoistic traits [23,24,29]. Environmental communication must match their message and strategy to a given audience, which is challenging because of the practical cost of identifying and researching the audience [14,108,109].

To answer the difficulties in creating targeted narratives, there is a growing interest in shifting environmental communication from a traditional top-down, story teller-receiver approach to a participatory process where audiences dialogue, discuss multiple interpretations of a story, and develop narratives [50,51,58,83], and to develop platforms stimulating such interactions [14]. Participatory storytelling allows for the direct engagement of the audience, and the audience creates meaning through a narrative in line with their frame while creating a safe space for exchange that opens to other values, experiences, and perceptions [83,94]. Self-narratives (the way individuals translate relationships and events from their lives into stories that can be retold to themselves and others) and personal values are expressed and clarified through the auto-investigative potential of story creation; stories are used in socio-ecological research to help us reflect on and rework our knowledge and experiences, our interactions with the environment and with each other, to formulate our beliefs, our identities, and our values, to “reveal things to us that we know but didn’t know we knew” [58,110,111]. For example, students were asked to write their personal life stories in relation to climate change, and constructing their personal biography impacted their self-perception and the type of goals they set for themselves [81]. Storytelling and story making also stimulates emotional literacy, potentially enhancing the auto-investigative impact and the ability to empathically connect to others [50].

1.5. Ecological Collective Narratives

Through connectedness, comparison, and overlaps in perceptions, values, and motivations, stories stimulate the emergence of social narratives and shared values [112]. Stories have been shown to be carriers for collective imagination of different futures [79,113], for the development of collective efficacy (the thought that one has the ability to impact) [89] and “ecological identities” (a way to relate to the world and to others grounded in memories and feelings about the environment) [81,82].

Participatory dialogues such as story making enable the expression of diverse individual voices but at the same time connect personal and group actions to the bigger picture of environmental challenges, which stimulates both an individual and a collective, entangled response [30,83,114]. Participatory storytelling connects self-narratives to social narratives; it expresses self-focused values to make communal values emerge [3]. Reason et al. elaborate on the idea that collaborative storytelling and retelling enable the participants to add their own layers of experience or values to the story, similar to the traditional retelling of stories, and contribute to a communal and appropriated knowledge, which they call ‘storyknowing’ [115]. This links to quantum social theory, which promotes a participatory approach to change supported by subjective meaning and metaphors to empower individuals and groups through a transformed sense of collaborative agency [114]. Story creation has transformation potential on an individual level by being a “symbolic act” opening a path to transformation [58] and collectively by taking the role of a “boundary object” [49,116], a “shared intellectual space” [117], or a “translation tool” [51] between story co-creators from multiple disciplines.

There are multiple examples of dialogue and co-creation around environmental narratives targeted at engaging and stimulating audiences. Shaw et al. designed a Narrative Workshop methodology where citizens develop new stories based on their values and identities to engage in discussions about climate change and its policies to shift the climate change story “from a scientific to a social reality” [30,118]. The Stories of Change project engages individuals and groups in energy transitions through play and reflection upon stories exploring the relationship of humanity with energy [117].

Collaborative filmmaking on environmental topics has been shown to trigger personality development, change agency, and a sense of responsibility [119]. Rotmann reports on using a fairy tale-based ‘story spine’ in behavior-change practitioner workshops to elicit stories from diverse stakeholders and help develop better interventions that change citizens’ energy-use behavior. These works contribute to the theoretical understanding of the processes that connect individual engagement to the societal change needed to address environmental challenges and to the development of practical methods to trigger the social dimension of public engagement [84].

In the above work on individual and group story making, the “voice of nature” is not represented, and the nonhuman realm is not included as an agent of change. Nevertheless, the openness, connectedness, and sense of collective efficacy initiated by these participatory processes are a major step towards including new, nonhuman, stakeholders. The references in terms of participatory, nature-inclusive storytelling are the extensive books by Nanson and Gersie et al. that describe how storytelling can create strong and intimate bonds between story tellers, listeners, and the natural world [50,58]. They use inspiration from traditional folktales and often use animals, plants, trees, or metaphorical or mythological characters that represent the Planet. They advocate for oral storytelling and give much attention to the space in which the storytelling act takes place—preferably nature—as storytelling favors connectedness with the immediate environment. Toivonen et al. show in their ‘Storytalk’ that dialogue around narrative experiences helps conceptualize human-nonhuman relationships and ascribing agency to the nonhuman [35]. Participatory storytelling, by involving “many tellers and hearers” [96] and including the Planet through characters, can blur the demarcation between ‘spheres of otherness’ [56] along the lines of complex human-nonhuman networks and of the reassessment of individuality in posthumanism [3,56,96].

In the design context, there is a need for such a creative, collaborative, and nature-inclusive process [8]. Participatory ecological storytelling can be such a method, stimulating the construction of collective narratives, where ‘collective’ not only includes the human group but also (part of) the nonhuman world. Such collective narratives may influence the way designers and their (human) stakeholders work together and the way they include the Planet in sustainable developments. This study may help clarify the influence of the participatory aspect (i.e., listening, sharing, and building upon others’ perspectives) in connecting individual voices and including the voice of the Planet.

1.6. Principles Guiding Our Participatory Ecological Storytelling Method

The process presented in this paper was built based on prior hands-on experience with participatory storytelling with end-users as characters [49] and includes learnings from the previously discussed literature in order to extend to nonhuman characters. As a result, we identify and define four principles important to designing the participatory ecological storytelling workshop. These are:

- (1) Planetary character: the character of the story can be human, animal, vegetal, natural, object, spiritual, metaphorical, etc., singular, a group, or an ecosystem. The workshop participants are free to choose the type of character and whether to use anthropomorphism or not. The character’s journey in the story illustrates the story theme—the “main message”—related to environmental challenges or sustainable solutions. The characters are developed through a Planetary persona template.
- (2) Character depth: building granular character personas with motivations, history, a rich inner world, and positive and negative sides is key to creating compelling characters [49]. It enables imagining their reactions and decision rationales along with the events of the story, which is essential to assigning them narrative agency.
- (3) Playfulness: participatory storytelling presents similarities with play in its cooperative, non-hierarchical, instinctive, and improvised dynamics and in overcoming divisions of nature and culture [3]. Such dynamics yield original ideas and the expression of tacit knowledge (i.e., knowledge gained through personal experiences) as story creators

encourage each other to be creative, expansive, humorous, and honest [38,49]. The intrinsic experience of building the story and engaging with others, the character, and their world is more important than the resulting story [7]. Participants are encouraged to build on each other's suggestions, to try, to be imperfect, to use humor, and to share personal experiences.

- (4) Open plot: we do not enforce the use of antagonists or villains or pre-defined story arcs such as the Campbell heroes journey in order not to nudge the stories into a conflictual story canon that may reinforce the human/nonhuman antagonism [3]. The story structure is as open as possible while using well-known narrative components to make it easy to create the story [120]: participants are guided to create story arcs with a beginning, a middle, and an end, with the middle part dynamized by the struggles of the main protagonists.

2. Materials and Methods

2.1. Structure of the Workshops

This paper presents the results of 4 participatory ecological storytelling workshops with different groups:

- Workshop 1 involved a group of 31 students in the first year of their industrial design education at a Dutch university, was conducted online, and took place in January 2022. The students were taking a course aimed at developing their critical thinking, and the workshop was an element of that course.
- Workshop 2, which involved 10 participants, was conducted in real life during an international design conference in July 2022. The participants were professionals or senior students (Master's, PhD) in the field of design and art.
- Workshops 3 and 4 were conducted at a large multinational in February 2023 with 25 people each, with roles in marketing, business, design, and innovation.

In this paper, we will refer to the first group as "design students", the second as "designers", and the third as "business stakeholders". For all workshops, the participants volunteered to join, demonstrating a prior interest in the topic of storytelling and/or sustainability.

The details of the workshops can be found in Table 1. The workshops were facilitated by the authors of this paper. All workshops started with a 30 min–1 h introduction and discussion, followed by 1.5–3 h exercises, including persona and story creation and sharing, and a final discussion. Workshops 1 and 2, which lasted 3 and 4 h, had an extensive story creation exercise. When designing workshops 3 and 4, which lasted only 2 h, we decided to focus on the persona creation exercise and keep the story creation shorter. The reason is that in workshops 3 and 4, we wanted to give the participants, mostly non-designers and therefore generally less familiar with persona creation, more time to immerse themselves in the persona creation exercise. For this reason, we chose to do the persona creation individually and with more extensive questions than in workshops 1 and 2. In the rest of this paper, we will refer to workshops 1 and 2 as "story-focused workshops" and workshops 3 and 4 as "persona-focused workshops". Besides this difference, there were small variations in the workshops, such as total duration, size of groups, warm-up exercises, online/real life format, ways of sharing the stories.

2.2. Data Collection and Analysis

The data used for this study consists of the stories written by the participants and the feedback given by the participants in individual questionnaires after the workshops. In workshops 1, 2, and 3–4, respectively, 10, 3, and 15 stories were created ($n = 28$), and we collected the feedback of 22, 8, and 21 participants ($n = 51$). Four illustrative stories and one persona can be read in Appendix A.

Table 1. Overview of workshops processes.

Step in Workshop Process	Story-Focused Workshops	Persona-Focused Workshops
Introduction	We presented a recap of storytelling theory basics (narrative transportation, role of empathy and mental imagery, basic story arc structure, building blocks for a story character, tips for creative writing) [121,122] and high-level examples of ecological stories (wildlife documentaries, fictional movies, personal stories, traditional tales) [47,50].	
Persona creation exercise	Collectively (in groups of 2–4), participants were asked to discuss and write down: <ul style="list-style-type: none"> - how the persona looks - their qualities and flaws - what they love and dislike 	Individually, participants were asked to think about their character and to write: <ul style="list-style-type: none"> - how the persona looks, moves, transforms - the sounds they make - their qualities and flaws - their past and memories, how it shaped them - what they love and dislike - their social circle, what/who is around and how that makes them feel
		After the exercise, participants in groups of 3 shared their personas (an active listening exercise) and picked one for the story creation.
Story creation exercise	Participants in groups built the story arc for their persona by filling in keywords or short sentences in a story template. The template structures the story into a beginning, a middle and an end: <ul style="list-style-type: none"> - The beginning includes questions about the wanting of the main character (their drive for the story) and the context of the story (encouraging use of local names of animals, plants and land features, description of looks, smells, feelings and sounds). - The middle stimulates imagining the obstacles that the character meets on their journey, their possible struggles, successes, discoveries, and the companions on the journey. - The end of the story asks about the outcome of the journey, the changes experienced by the character or their outlook. 	
Sharing	Stories were written as a short text and in workshop 2 were also verbally shared.	Stories were written as a postcard from the character to humans.
Closure	An open discussion was facilitated where participants shared their experiences and learnings during the story creation and reflected on possible benefits of the method for their line of work.	
Total workshop duration	3–4 h	2 h

The stories were classified along type of heroes (the main protagonists: human, animal, vegetal, mythological, other) and companions (i.e., protagonists who have a positive relationship with the heroes and an active role in helping them on their journey: human, animal, vegetal, mythological, other), themes in the stories, and endings of the stories (positive/negative). The human, animal, vegetal, and mythological character categories came from the classification of the ecological story examples presented in the introduction to the workshops. The stories were analyzed by the first author of this paper using a thematic analysis approach to identify recurring themes. The stories were decomposed into a series of events (3–10 per story), including the climax/ending (the final, emotionally loaded action of the story). Themes emerged from the stories by summarizing each event or group of events as an action or intention of action carried out by a character. Summarized events across stories were clustered by similarities in character and action, and sub-themes emerged. The sub-themes were grouped into main themes. As a result, each story contains 1–5 themes. Endings were classified as positive if the climax/ending moment presented an outlook that was positive, joyful, hopeful, or open for positive developments, and negative if the conclusion expressed helplessness, pessimism, or figured the death or fatal wound of the main characters.

The questionnaires consisted of a series of semi-open questions asking the participants about (1) their approach to communicating empathy in their persona and story, (2) the emotions it evoked, (3) their experience of the process in the workshop, and (4) the possible changes or motivation triggered by the process, in line with our research question. We used these four topics to classify and analyze the results. First, quotes from the answers were collected in relation to these four categories, and each quote was coded to be assigned to a category. Within each category, we used inductive coding to assign to each quote a sub-code describing the type of approach for empathy creation for (1), emotion for (2), co-creation benefit, enabler, or difficulty for (3), and change (awareness, intention of action, or none) for (4). The sub-code structure was refined when reviewing the first 30% of the quotes of workshops 1 and 2, and then those from workshops 3 and 4, to ensure accurate capture of data themes. The rest of the data were deductively coded according to the finalized coding structure. The quotes were grouped by sub-code and summarized with minimal rewording for each category.

3. Results

3.1. Story Characters

The participants chose hero characters that were animals (fishes, turtles, other marine animals, squirrels, monkeys, sloths), vegetal (trees), inanimate natural (oceans, sky, lands, sand, clay), a bacteria family, a man-made object (a wind turbine), and a mythological creature (a yeti); see Figure 1.

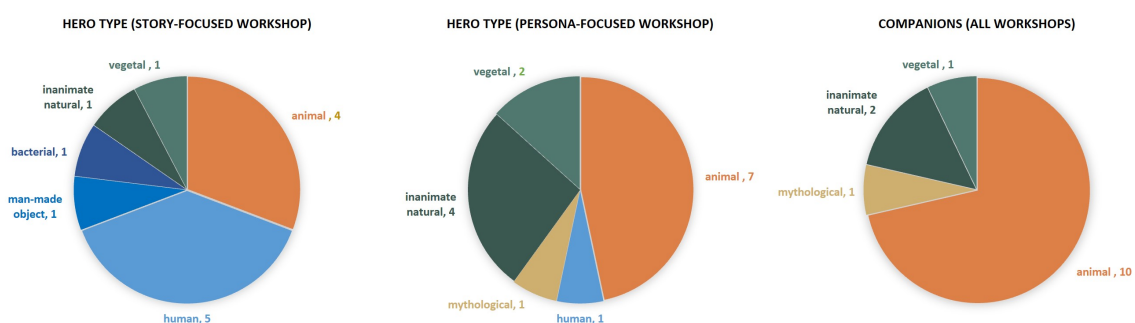


Figure 1. Repartition of the types of heroes for story-based workshops (left), persona-focused workshops (middle), and companions for all workshops (right). The number next to the category indicates the number of stories that display the category.

The animal and tree characters were anthropomorphized and given traits of innocence, friendliness, sweetness, and were family oriented. More specifically, story creators chose animals that were likeable or known from existing stories (like Nemo or Chip ‘n Dale). As one participant said, “By making the animals cute, people might feel more like they want to protect them”. Natural elements such as oceans and sky were assigned traits of grandeur, generosity, sentimentality, and emotionality (see the *Great White Ocean* persona in Appendix A), with heightened emotions manifesting through water movements and weather.

The human heroes were, at the beginning of the story, self-centered, pleasure-seeking, and ignorant. The bacteria, wind turbine, sand, and clay characters were anthropomorphized, and their traits were similar to those of the human characters (arrogance, stubbornness, selfishness, and ignorance); these characters can be considered metaphors for humans. One of the creators of the selfish and fame-seeking bacteria character said, “the analogy with the bacteria community stimulates multiple level-reading”.

Most companions in the stories were animals, and we also saw a tree, water, and a genie; see Figure 1. They all displayed solidarity for the animal heroes or awareness and enlightenment, which they communicated to the human heroes.

In the story-focused workshops, nonhuman, human, and human metaphor heroes were picked about equally. Noticeably, the human metaphor characters were all developed

by participants of the second workshop, i.e., professional designers and senior students at a design research conference and conveyed more conceptual stories. This can be related to the high level of abstract thinking of the participants. In the rest of the paper, we will use the term human character to encompass human and human metaphors.

In the persona-focused workshops, mostly nonhuman characters were picked. This can be attributed to the fact that participants had more time to think about their choice for a Planetary character and explore nonhuman options because the persona exercise was longer, more individual, and more immersive.

3.2. Story Themes and Endings

Most of the stories make the theme of *human/nature antagonism* explicit, expressed through nature destruction or animal killing by humans or man-made objects (“*those giants*”; “*they murdered*”) and through the voice of animals, trees, plants, or natural elements, heroes and secondary characters; see Table 2. As this theme is associated with nonhuman heroes, it is present in all stories from the persona-focused workshops. The stories that stay away from this antagonism all express the theme of *human individualism*, i.e., humans displaying individualistic behavior and ignorance. This theme is most associated with human heroes, which is why we see it more in the story-focused workshops.

Table 2. Overview of themes and sub-themes in stories.

Theme	Number of Stories Mentioning the Theme			Sub-Themes
	in All Workshops	in Story-Focused Workshops	in Persona-Focused Workshops	
Human/nature antagonism	24	69%	100%	<ul style="list-style-type: none"> • Destruction of forest habitat and wildlife killing by humans or man-made object • Plastic pollution and sea-life destruction by humans • Soil, air and water poisoning by humans • Humans dominating animals or nature
Human individualism	11	54%	33%	<ul style="list-style-type: none"> • Humans not listening • Humans not collaborating • Humans being lazy • Humans pursuing individualistic goals (food, money, fame, growth) • Humans turning against each other
Union is strength	10	54%	20%	<ul style="list-style-type: none"> • Animals teaming up with animals or trees • Humans teaming up with humans • Humans teaming up with animals or natural elements
Learning from nature	10	46%	20%	<ul style="list-style-type: none"> • Animal, trees or natural elements communicating with humans to show them the reality of the environment crisis, their responsibility in it, and/or how they can contribute to solving the issue • Humans confronted to the beauty of nature change their perspective and behavior
Humans taking action to solve the issue	6	38%	7%	<ul style="list-style-type: none"> • Humans preach for action (stop pollution, stop destruction, initiate vegan movement ...) • Humans concretely act to solve problem (use eco-friendly material, replant trees ...)

All the stories position these negative themes as struggles to overcome. Positive themes are used to provide solutions, namely, *union is strength*, i.e., characters teaming up for a successful outcome; *learning from nature*, i.e., listening to animals or nature creates knowledge and awareness for humans; and *humans taking action to solve the issue*, i.e., proactive attempts to stop or minimize threats to animals or nature. The theme of *union is strength* is expressed mostly through teaming up of same-type characters (between humans or between nonhumans), and occasionally between humans and nonhumans. Constructive human-nonhuman interaction is rather expressed through the theme of *learning from nature*, where companions, whether animals, vegetal, or spiritual, enlighten humans. The theme of *humans taking action to solve the issue* is carried by human characters. These positive themes are present in similar proportions in the story-focused workshops. In the persona-focused workshops, the positive themes were less present as the stories were less elaborated and often stopped at the tension part of the story arc.

A total of 20 out of 28 stories conclude with a positive or mitigated but hopeful message: animals' final oath to act to save their world, a call to awakening or action, human transformations to more eco-awareness, humans supporting endangered animals or forests.

Out of the 8 stories with a negative ending, half concluded with the death or pessimistic outlook for the main character or its family. One of the writers of *Shelly*, the dramatic tale of a little turtle fighting fishermen, commented: "*During the writing we all noticed we really wanted a happy ending but we realized that that might not leave the right message*". Several of these negative-ended stories leave doubts on possibilities to limit or repair environmental damages through ambiguous final messages. For example, the wind turbine tragedy (see the story of *Daisy* in Appendix A) highlights that sustainable solutions can be double-sided.

3.3. Creation of Empathy for the Planet

Many stories featuring nonhuman protagonists include vivid descriptions of forest, land, or sea-world destruction and create dramatic moments through descriptions of the intense emotions of the characters (read *Finding Plastic* in Appendix A as an example). Many of these stories include the death or wounding of a companion or parent. Participants explained that they try to convey empathy by showing the consequences of destroying nature and killing animals through the eyes of the nonhuman protagonists, by showing their pain and sadness when they lose their home or family, and by showing that humans are responsible. They intentionally positioned them as victims and humans as enemies to elicit shame and doubt:

"In our story we tried to communicate empathy for the sea life by giving fishermen the bad guy role and showing how abruptly they can destroy sea life animals' lives. Leaving the animals in pain."

"We tried to make the character Nemo, which everyone loves, be very pathetic. His house is destroyed, his home is destroyed and all his friends are gone. And with the context that the world and men have done all this, you start to think about Nemo and really realize what we do. You feel guilty for what you did to him, even if it's just a fictional story."

A student criticized this dramatic approach, stating: "*As far as I'm concerned, [the facts] are so horrific that they don't need to be surrounded by a pathetic story to have impact.*"

The stories that used humans or human metaphors as heroes have different mechanisms to create empathy. The participants said they created familiarity and emotional connection by showing the flaws of their characters and describing their worldview. Several designers reported that emotions were intentionally contrasted, "*sort of bittersweet*", to highlight conflicting values. These human-centered stories focus on raising awareness and a positive lens for the possibilities for humans to act and mitigate the environmental crisis. For example, in several stories like *The Cunning Monkey Enlightening the Naïve Girl* (see Appendix A), story creators showed that mindset and attitude change is possible. Participants explained:

“The story should create a feeling of familiarity, and causes people to think as the main character. It will let people ask questions and let them doubt about their own purchasing habits.”

“[The story] generates empathy for the innovative woodworker and his ethics. You feel like that is the way forward and that the cutting of new trees is not always necessary.”

In most of these stories, besides empathy for the human characters, participants communicated empathy for the Planet through secondary animal or natural characters who convey the message that nature should be treated with kindness.

In several stories humor was used to de-dramatize the negative emotions evoked by the suffering of animals, to create an ambiguous relationship with the human characters, or to show with irony the human failure to connect and care for the environment and the absurdity of human ways of living. Humor contributed to making the process more engaging: *“I had a lot of fun, using anthropomorphism and telling a story with humor, despite the tough reality for actual species. It made me want to write short stories and explore other personas to empathize with other species and elements and perhaps get others to empathize.”*

3.4. Emotions Evoked by Stories

The emotions associated with the stories were mostly negative emotions, in particular sadness, fear, worry, anger, disappointment, irritation, regret, see Figure 2. These negative emotions are most found with stories with nonhumans main characters. The participants who created stories with human or human metaphors report fewer and more positive emotions, especially hope and compassion.

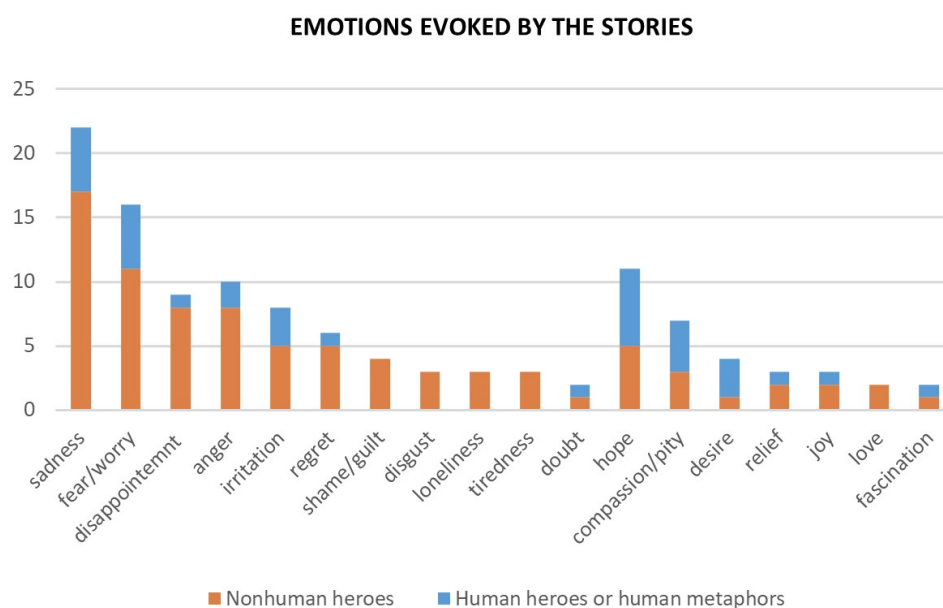


Figure 2. Overview of emotions reported by the participants when writing the stories, for nonhuman heroes and human (or human metaphor) heroes. The y axis indicates the number of respondents mentioning the emotion.

The participants reported their own emotions, but we noticed that they often also reported the emotions of the story characters that they experienced as well. Several participants described as a new experience the process of feeling for a nonhuman character. *“The story made me feel pity for the wind turbine, as if it was a person not knowing much about how the world works getting hit by reality hard. [. . .] We felt really bad for Daisy [the wind turbine]. It is interesting to feel so bad for a fictional character. It was a new experience for me. I get often*

irritated when the word empathy is used—what does it really mean? [. . .] This was empathy beyond the buzzword.”

3.5. Experience of the Story Co-Creation Process

Participants reported that the process, through collaboration, exchange of ideas and perspectives, playfulness and creativity favor new or deeper reflection and is a motor for team discussion about the environment, see Table 3 for detailed feedback. The connection to the characters, taking their perspective and experiencing empathy was also an important aspect of the process and was qualified several times as eye-opening. The collaborative aspects were most reported in the story-focused workshops, which can be explained by the longer time assigned to the participatory exercise. Comments about the creative benefits and the connection with the characters came back more in the persona-focused workshops. For the aspect of connection, this is due to the emphasis on the persona exercise. For the aspect of creativity, we can stipulate that this type of creative workshops is not common practice for non-design stakeholders and is particularly enjoyable—a result found in our previous research where we applied story co-creation with scientists [49].

A participant’s quote summarized all these benefits and enablers: *“Story co-creation was a fun exercise, especially merging the inputs of three people into one story. I felt that the collective input made the story even more rich and something different from what I would have done alone. [. . .] Along with creativity, I think this exercise was also critical to developing empathy with our surroundings and storytelling workshop was a very good tool in achieving that.”*

Participants in general appreciated the templates that facilitated the creative process, yet several had difficulties developing their personas or stories, getting ‘in the creative flow’, or needed more time, especially in the shorter (2 h) workshops.

3.6. Short-Term Change in Perspective and Behavioral Intention after the Workshop

About half (23 over 51) respondents, mostly in the story-focused workshops, indicated the intention to use more storytelling elements in their work after the workshop, see Table 4. The intention to use storytelling in their practice was higher for the designers and students than for the business stakeholders, probably because storytelling is a skill familiar to designers.

Sixteen respondents reported an increased awareness of environmental issues, and seventeen indicated an intention to consume more responsibly or to create more sustainable impact in their work. Eleven participants declared that the workshop did not change or impact them, most of them because they were already active in the field of sustainability. Noticeably no professional designers nor senior students reported environmental awareness or intention of change, which we can attribute to their more mature ecological identity.

We stress that these results reflect the mindset of the participants shortly after the workshop and that we do not have data on their long-term mindset or behavior.

Table 3. Overview of benefits, enablers and difficulties of the process reported by the participants and illustrative quotes.

Experience during Persona and Story Creation	Summary of Experience Element	Number of Respondents Mentioning the Element		Illustrative Quotes
		in Story-Focused Workshops	in Persona-Focused Workshops	
Collaboration and exchange	34 respondents expressed that the story co-creation stimulates collaboration, exchange of ideas and perspectives. The process challenges them to listen to and embrace suggestions, to consider different opinions and perspectives (including those from people who do not share their values), to look at problems differently. As a result, the process helps to go more in depth with ideas and to improve their reflection. Several respondents mentioned that it is a good team building exercise as it connects people and a good medium to facilitate a discussion about the environment and sustainability.	80%	48%	<p><i>"It was a great way to connect our ideas and dive deeper in the problem."</i></p> <p><i>"My team was very diverse and being able to execute a task with people who thought so differently was fascinating, exciting and taught me to compromise on expectations."</i></p> <p><i>"The story is a really strong method to get organizations reflect on their current behavior, and at least start the conversation. Love the way storytelling creates the opportunity to discuss change and innovation in the form of metaphors. This way it may at first not be as confronting and stimulate co-creation from different perspectives."</i></p> <p><i>"I really relate to the story because I've been to Malaysia and expected only beautiful things but saw a lot of shocking things, like pollution, dead coral reefs and big palm tree plantations. I've seen the jungle before and there I saw it getting destroyed right before my eyes. [...] I realized that the people that don't share the same mindset as me (wanting to contribute to a more sustainable world) don't have it because they haven't seen it up close like I did."</i></p>
Connection to characters	23 respondents said that the persona creation exercise made them see the world from the character's perspective and feel closer to them. This was for many a new experience. Being immersed in the creative process during the workshop, relating to personal experiences and memories, and assigning human attributes to nonhuman personas helped them creating this connection. Many in the persona-focused workshops mentioned that the detailed persona templates pushed them to go in depth, inspired them and triggered their imagination.	23%	76%	<p><i>"Personally, it was a bit of an eye opener, we don't frequently think of being empathetic with our Planet (really putting ourselves in its shoes)."</i></p> <p><i>"I like the idea that we were asked to get into the head of the persona and think like we are them. I loved this experience as it was eye-opening."</i></p> <p><i>"To me the creation of the persona was really a super valuable experience and the most interesting part of the workshop. Thinking about what the persona sees and feels really helps to enable an ecosystem mindset, thinking about all the connections the plant, animal or else has in this world and how all actions have impact. Very emotional exercise."</i></p> <p><i>"I liked realizing how it changes the way one thinks about parts of nature, which is in a more personalized way. This increases the felt proximity to the things that surround us. They start playing sort of a role in our life more."</i></p> <p><i>"I used my memories of spending time in the ocean to build a story that could reflect the ocean's feelings."</i></p>
Creativity and playfulness	18 respondents associated the entertaining aspect (the word 'fun' came back in most of these answers) to creativity in the process. They see this combination as a motor for new ideas: they enjoyed listening and building upon others' ideas and being surprised by their creativity.	23%	71%	<p><i>"It was fun, because we came up with a fantasy story which i did not expect. Therefore this exercise helped me thinking outside the box."</i></p> <p><i>"I usually write by myself, I don't have 2 other brains with me. It's incredible to have 2 [extra] creative brain."</i></p> <p><i>"Really enjoyed coming up with ideas and building on the ideas of teammates. It made for coherent pieces that could surprise each other."</i></p>

Table 3. Cont.

Experience during Persona and Story Creation	Summary of Experience Element	Number of Respondents Mentioning the Element		Illustrative Quotes
		in Story-Focused Workshops	in Persona-Focused Workshops	
Difficulties in the process	11 respondents expressed that the creative process (setting the scene, creating the characters and the plot) was difficult sometimes. Several participants in the persona-focused workshops felt that the story creation exercise was rushed.	13%	33%	<i>"I found it challenging to let the creative juices flow at first, but working with my colleagues definitely helped."</i> <i>"Writing the [story] for some reason felt like cutting the story too short and that we lost the emotional momentum which was so powerful."</i>

Table 4. Overview of the reported changes by participants and illustrative quotes.

Expressed Change or Intention of Change after Process	Summary of Change or Intention of Change	Number of Respondents Mentioning the Change		Illustrative Quotes
		in Story-Focused Workshops	in Persona-Focused Workshops	
Intention to use storytelling and personas in work practice	23 respondents expressed the intention to use elements of storytelling and personas in their work, mostly to talk about their projects, to show different perspectives and the bigger picture, and to trigger an emotional response.	60%	24%	<i>"It is a good teaching tool: it is good to learn how to communicate what you do but also to understand why you are building what you are building (like a chair). A better story and a better chair will come out."</i> <i>"A good story takes us a long way in our sustainability efforts. When we're able to engage stakeholder from an empathetic approach to our Environment we'll be able to get their attention and make them feel the urge to act."</i> <i>"After the workshop I have thought increasingly of characterization and personification of the abstract and inanimate as a powerful storytelling tool."</i> <i>"I do think storytelling can have an impact even if you may not be aware of it at first. I liked learning how a story can draw empathy/attention and hearing different opinion. I want to address in my design brief that there isn't one side to environmental change. And talk more about how it can change by communicating with the people and business."</i>
Increased awareness of environmental issues and consequences of actions	16 respondents declared after the process made them more aware of the size of the issue and of the consequences of their actions on wildlife and nature.	20%	48%	<i>"The story did motivate me more to be more aware of what is happening around me and try to understand the consequences of my actions. This is due to the fact that via the story, you can realize that your actions can have severe consequences even if those consequences are for someone [. . .] who cannot talk in real life."</i> <i>"It made me think about on-land problems and sea problems and it made me realize that environmental issues are huge and way bigger than anyone can even imagine, but we still have to act."</i> <i>"You should really think twice before you do something, so you don't hurt anyone else in the process."</i>

Table 4. Cont.

Expressed Change or Intention of Change after Process	Summary of Change or Intention of Change	Number of Respondents Mentioning the Change		Illustrative Quotes
		in Story-Focused Workshops	in Persona-Focused Workshops	
Intention to make changes in work practice to create more sustainable impact	11 respondents want to have more sustainable focus and/or impact, for example by including systemic considerations, initiating dialogue or reflecting on the ethics of innovation in their projects and business transactions.	20%	24%	<i>"I want to see people, profit and planet as equals and involve them all in my product design."</i> <i>"I will prompt the question 'what would the planet think about that?' in future business cases."</i> <i>"Thinking and feeling from the planets perspective as a tool in decision making is a huge AHA moment!"</i>
Intention to consume more responsibly	6 respondents expressed their intention to stop buying unnecessary items, to live with less, to be more informed of the origin of products, to use less plastic or more recycled products.	17%	5%	<i>"The story made me become aware of what I need and what I don't need. So that I can stop buying unnecessary purchases."</i>
No change	11 respondents said they would not change anything after the process, mostly because they were already motivated to work on sustainability before.	20%	19%	<i>"I already had the motivations to do something better for the environment."</i> <i>"Can't say that it changed anything. But I consider myself as someone who is already very aware about my values/behavior/prejudice—because of my work with design for sustainable behavior, so I don't think I am the typical audience for such a workshop."</i>
No answer	8 respondents do not know or did not answer the question.	20%	10%	

4. Discussion

4.1. Mechanisms for Creating and Experiencing Empathy for the Planet through Participatory Ecological Storytelling

The stories created by the participants can be grouped into two categories. In the first group, the protagonists are animals, trees, or natural elements facing human antagonists who destroy their habitat and/or kill their companions. These stories are associated with sadness, fear, disappointment, and anger. Participants create empathy by anthropomorphizing the nonhuman characters, describing their intense emotions, and showing their pain. They intentionally position nature as the victim of human enemies to elicit guilt and shame. The second type of story relates the transformation journeys of human heroes towards more eco-friendliness. These stories are less emotional and more positive. Participants create familiarity and emotional connection by showing the flaws of their characters and describing their worldview.

We can distinguish here two strategies that participants use to create empathy for the Planet: directly by trying to take the perspective of nonhuman characters, or indirectly through human or metaphorical characters who experience or discover empathy for the Planet in the story. The story creators do not experience exactly the feelings or thoughts of the characters—this is especially impossible for nonhuman characters—but they attempt to understand them as individuals, which is the basis for empathy creation [9]. At the same time, story creators project their own values, emotions, and thoughts, onto the characters and identify with them. For both type of stories, participants reported that experiencing empathy by taking the perspective of story characters was a new, deep, and eye-opening experience. Relating to the concept of “narrative empathy”, where an audience uses imagination to adopt a character perspective [70] but that is generally experienced while being the receiver of a story, here participants who are story creators practice “active narrative empathy”.

The choice of the character and the associated empathy creation strategy reflects the motivations and understanding of climate change of the participants. In the first set of stories, the heroes are the “good guys”, in the second they are the “bad guys”, and this positioning reflects, respectively, a sense of powerlessness or responsibility of the story creators with respect to environmental challenges. Nikoleris explains that in fictional ecological narratives, identification with the characters—heroes, victims or villains—helps people create meaning around changes that are difficult to grasp [80]. In fictional story making such as here, where participants do not have to explicitly reveal their personal emotions or experiences, the distancing from reality may create a safe space for expression. In the first group of stories, the expression of negative emotions and possible identification with victimized heroes while highlighting feelings of shame and guilt through the description of destructive human activities may be a way to process these emotions and the anxiety linked to uncertain futures. The second group of stories expresses through human characters a recognition of one’s own flaws such as selfishness, individualism and ignorance, and indicates self-reflection and awareness of how one’s lifestyle contribute to environmental problems and the need for individual change.

The stories are written from the perspective of the sympathetic follower of the protagonist or as critical examiner of the protagonist’s view, following known archetypes in climate fiction [80]. The two types of stories can be related with two of the frames most commonly associated with climate change: the frame of ‘conflict’ (fighting a “war” against climate change) and of ‘morality’ (becoming aware of responsibility and stewardship) [14,123]. It is known that metaphors, a mental projection of a complex or vague concept onto an understandable representation, are activated and communicated by language and help expressing frames [124]: here the stories are the metaphors expressing the frames. A participant mentioned that participatory storytelling is an engaging, non-confrontational way to open dialogues about environmental challenges because it uses metaphors.

If we compare the stories created in the workshops to common story archetypes [125], the first group generally matches the plot of *overcoming the monster* (a story where the hero is attacked by threatening antagonists and must fight—here nonhumans confronted to humans destructing their habitat and killing their companions); the second matches the plot of *rebirth* (the hero undergoes a dramatic event that makes them reconsider their thinking or behavior and change—here humans transforming to reconnect to nature). Because these story archetypes are extensively used in the media industry, and because they reflect the common frame of ‘conflict’ and ‘morality’, it is not surprising to see them dominating the story creation here.

A major role of these stories could be to counteract the effects of doom and discouragement. The climate crisis conveys a large range of negative feelings and overwhelm, which can be paralyzing, an effect reinforced by the framing of climate change as threatening and distant. Eco-anxiety and a gloom and doom vision may lead people to emotionally and cognitively shut down and to denial, rejection, and avoidance of the climate topic [14,126]. Making the topic closer and personal and associating it with positive emotions, especially hope and empathy, is an important path to inspire and motivate engagement [127,128]. Here the stories are personal and express forward-looking endings: the first group of stories almost always end with a call or an oath by nonhuman characters to act on a collective level, which may reflect a desire of the story creators not to stand still and to see transformation on a societal level; the second group reveals a desire for progress through personal transformation or enlightenment.

Furthermore, emotional fluctuations in stories, i.e., experiencing emotional highs and lows from protagonists or liked characters, have been shown to promote greater identification, continued engagement with the narrative world, and higher persuasive potential of a story—in particular, after being exposed to negative content, the positive emotions triggered by positive content are amplified [127,129]. Here, emotions associated with negative themes of human/nonhuman antagonism, human individualism, ignorance, and destructive actions are balanced out by hopeful endings and positive themes of interspecies collaboration and learning from nature.

The main difference in the strategies to create empathy between the three groups of participants (design students, professional designers, and business stakeholders) was related to these emotion fluctuations and the associated themes. In the persona-focused workshops, participants had less time to elaborate on the positive themes, while the story-focused workshops resulted in stories with richer and more contrasted emotion patterns. We observed that the creation of stories with sufficient richness takes time (at least 1.5 h), which should be taken into account when designing future workshops. The persona- or story-focus of the workshops also resulted in a noticeable difference in the experience of the process: extensive and immersive persona creation stimulated to a larger extent creation of nonhuman characters and empathetic connection; long story co-creation exercises were stronger in stirring creative idea sharing, team building, and understanding of the perspective of other participants. An optimal process might hence take the form of a full-day workshop combining extensive Planetary persona and story creation.

4.2. Positioning of the Findings on Participatory Ecological Storytelling in Existing Knowledge

In the introduction, we reviewed existing work on participatory ecological storytelling using essentially human characters, which is a powerful tool for self-investigation and self-expression, collective sense-making, and individual and collective transformation towards pro-environmental engagement. We see a reflection of these findings in the stories of this study that used human heroes, see Figure 3. However, the perspective of the Planet is often missing in these efforts. We also reviewed how non-participatory literature and communication using nonhuman characters can assign agency and moral kinship to the nonhuman and create empathy for the Planet. In this study, we combine the benefits of the participatory process and the use of Planetary characters, building on the work of Donly, Nanson and Gersie et al. [3,50,58] that investigates the connection between individuals,

groups, and nature, via participatory storytelling involving nonhuman characters. We also respond to the need for a creative, collaborative, and nature-inclusive tool applicable in sustainable design processes [8].

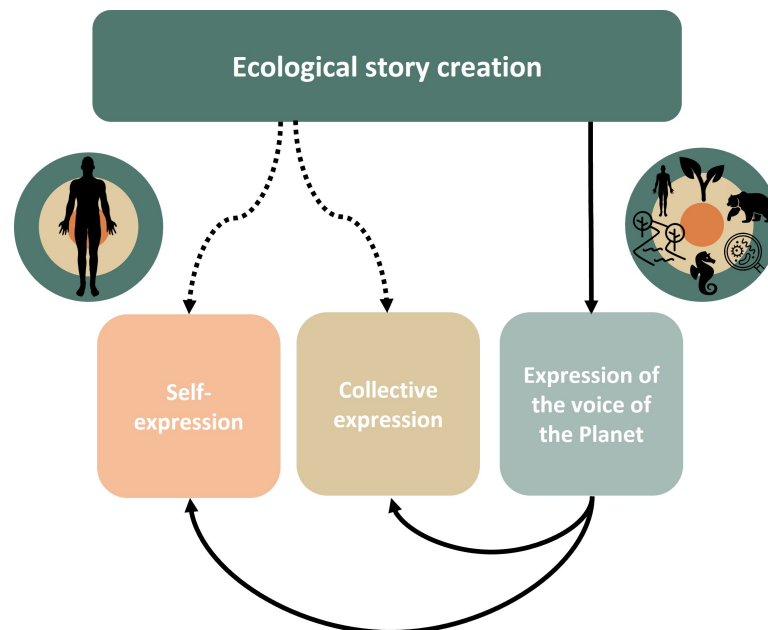


Figure 3. Graphical representation of the mechanism of participatory ecological storytelling. The dotted arrows represent the effect of story making with human characters, and the bold arrows with Planetary characters.

We observe that through the expression of the voice of nonhuman characters, not only empathy for the Planet is built, but also self-expression and collective dynamics are activated; see Figure 3. Stories are the ‘boundary object’ between the expression of the voice of individual story creators, their group and the Planet. Important elements are stimulated by storytelling and relevant for all expression pathways, such as emotional literacy that favors introspection and empathy for other humans and nonhumans, or connectedness that is essential in building social narratives and relating to the nonhuman. This step through Planetary characters is essential to appraise sustainability efforts through a Planetary lens instead of an anthropocentric lens.

The two approaches can be complementary, for example, when Planetary characters are used for mindset shift and human characters for the definition of personal action. They can also overlap in the context of social sustainability when Planetary characters are based on humans that belong to different socio-cultural groups.

4.3. Positioning of Empathy for the Planet in Post-Anthropocentric Thinking and a Preliminary Definition

The created stories position the nonhuman in constructions that are typical of Western thinking, namely nature and animals as vulnerable victims of human actions (for the first set of stories) or as the enlightened source of transcending experiences (for the second set of stories). While we did not encourage these constructions in the workshop, they emerged, a testimony of our engraved narratives. This type of narrative has been said to support a positioning of nature as distinct, and sometimes inferior, to the human realm [3,96]. Story archetypes that highlight the human-nonhuman antagonism, such as *overcoming the monster* have been criticized as feeding the psychological distance between the human and the nonhuman [3]. However, we observe that the process manages to go beyond this dualistic construction. The nonhuman world is given knowledge and agency in both sets of stories, through heroes, companions or teachers, which is a driver for shifting to a post-anthropocentric mindset [3,34]. The active projection of the story creators into

nonhuman characters engages with nonhuman interests and a reappraisal of nonhuman agency and human-nonhuman interactions [35]. Anthropomorphizing animals and trees invites a degree of empathy: as Nanson stresses, *“To enter the viewpoint not merely of another person but of another species, with its own ‘umwelt’, may seem an impossible feat, likely always to involve some degree of anthropomorphic projection. Contemplation of that gap of understanding creates a tension, a kind of desire, that can motivate the exercising of the imagination to reach across the gap and at the same time accepts as part of the richness of the universe the mystery of that which is beyond one’s comprehension and control”* [58]. The emotional projection into nonhuman characters is an attempt to bridge this gap. The self-reflection through human characters enlightened by the nonhuman world is a contemplation of this gap; contemplating the gap with the Planetary realm is already building a relationship with it.

Even if the stories are centered around individual characters’ struggles and motivations, sometimes divergent, the blending of the human and nonhuman through the stories makes a common goal emerge—the well-being of the Planetary ecosystem. This is similar to the positioning of eco-narratives by Donly, which *“explicitly foregrounds ecosystemic goals over individual ones”* [3]. The positive exchange dynamics with the other participants also contribute to building this shared goal in the human group.

Looking at the cognitive, emotional, and compassionate elements of empathy, we see that empathy for the Planet stimulated through participatory ecological storytelling has a significant affective component (projecting emotions onto and feeling emotions for the characters) and a compassionate component (creating interest for the characters and stimulating action). These have a role to play in driving design decisions and motivating action. Participants also bring into the process cognitive empathy for the other story creators, stimulated by the open perspective sharing: cognitive empathy within a team can act as a cognitive based “social sensitivity” [130]. However, the cognitive aspect of empathy for the Planet is limited by the little knowledge that the story creators had about the characters natural history, inner world, and environment. There are arguments that environmental knowledge is more decisive than empathy in determining pro-environmental attitudes and that environmental decisions should be guided by reason and science [131]. Others promote emotions and compassion as partners of reason in caring for the environment and in addressing the related ethical questions [26–28]; they stress the urgency of raising people’s empathic response to environmental problems [50]. In our view, empathy creation, as well as assigning agency to the nonhuman and acknowledging differences, is a motivator to seek environmental knowledge by making designers and stakeholders compassionate and curious. However, we recognize that more knowledge about the subjects of the story might be beneficial in building cognitive empathy and promoting a fairer inclusion of the Planetary characters.

To summarize, empathy for the planet stimulated through participatory ecological storytelling is a relationship with Planetary entities based on imagination of their emotions inspired by our own emotions, and of their reactions inspired by our desire for action, stirred by a shared compassionate ambition to care for the Planetary ecosystem. Empathy for the Planet is close to the concept of ‘entangled empathy’ explored by Gruen for animals, i.e., a caring perception focused on shared feelings and driving an improvement of the relationship with the other [132]. Stories create a space for sharing of the human and nonhuman emotions and hopes and for blurring the boundaries between entities in line with posthumanist thinking.

4.4. Limitations of This Study and Suggestions for Method Improvement

The designers who joined the ecological storytelling workshop were all already interested in the topic of sustainability and joined voluntarily. Hence, the sample group was favorably disposed. People interested in and acting on solving environmental issues generally display stronger altruistic traits [24], which may have facilitated the application of the method and the creation of empathy for the Planet. Applying the method to less engaged participants might require a modified approach and give different results. Furthermore, in

the persona-focused workshops, we only gathered responses from half the participants, meaning that we may miss out on different experiences and opinions.

We have not looked at the consequences of the process on participants' personal or professional decisions and actions. It is known that storytelling has a short-term impact on beliefs, concerns, and attitudes about climate change but a limited impact on efficacy and action [31,133]. To improve the desire and sense of ability to take action, we should consider strategies that develop participants' understanding of tangible and accessible ways to act, of the specific outcome of individual actions, and of the link between individual and collective action [31]. This could be done, for example, through follow-up workshops where participants reflect on their personal stories of change and commitments, such as in the transformative story making method developed by IDeaLs [134].

Finally, the creation of the characters and their world was mostly subjected to imagination. Even though the act of imagining how a different entity might experience the world is key in opening to other perspectives [135], there is a risk with our method to build 'false empathy'. To properly take the affective perspective of another and build cognitive empathy, it may be beneficial to have knowledge about the subjects that inspire the characters [2,63] and to use imagery, names of individual species and land features to create a more immersive story world [58]. Other options to stimulate knowledge or connection to the subject and the world of the story could be to take the bodily perspective of the other e.g., through role playing [63] or virtual reality experiences, or to build sensory awareness for the natural world through holding the workshop outdoor and using present natural entities to build the stories [58]. The potential of participatory ecological storytelling where the participants are more knowledgeable about the needs and context of their character subject should be investigated.

4.5. Applications of Participatory Ecological Storytelling and Empathy for the Planet in Sustainable Design Practice

Systemic design competences: Developing empathy for Planetary stakeholders is a first step towards understanding and integrating their needs when designing for sustainable solutions with a systemic approach. Additionally, a mindset shift where one appraises the value of relationships and is comfortable with uncertainty is necessary to approaching complex system design [136] and is stimulated by the method. Participatory storytelling stimulates humbleness, openness to the unknown, overcoming prejudices and mental barriers through the play-like creative process and discovery of the other (the other participants or the characters of the story). All these factors help reassigning one's position in the ecosystem and accepting forces that are out of our control and knowledge. Participatory ecological storytelling can be a powerful tool to create systemic awareness, that can be used for example at the beginning of a systems analysis process to create the right mindset or as an introductory tool to systems thinking.

Community building: The creative, collaborative and team-building benefits of the story co-creation process expressed by most participants are in line with the previous work on participatory storytelling [3,49,83,94]. The reported link between engagement, fun and creativity—the "creative magic" [51]—is important to elicit a positive dynamic in discussions around environmental challenges and sustainability. Groups and communities play an important role in promoting actions that help to mitigate environmental problems [137,138], and it has been shown that individual pro-environmental engagement becomes stronger when the individuals belong to a group endorsing pro-environmental values [139]. Participatory storytelling can become a powerful tool for organizations to build communities sharing co-constructed pro-environmental values that drives the sustainability transformation.

Communication competences: Many designers and students expressed the intention to use more storytelling elements in their work to create awareness for different (including nonhuman) perspectives, create an emotional connection and foster a mindshift. Storytelling skills will be key in designing engaging and effective environmental communication to promote action, material and social change within organizations and for general audiences [29,30,105]. By learning to make stories, designers gain the capacity to deal with complex information, to articulate difficult emotions, to manage feelings of overwhelm and helplessness, and to elicit goal-oriented action and solidarity—for themselves or for the audience of the stories [50,110,140,141]. Participatory ecological storytelling is a hands-on learning tool to start developing such skills.

Design research competences: Storytelling can be an interesting tool to understand how people interpret environmental challenges and construct their perspective. Storytelling is used as an inquiry tool in design research to provide access to rich and nuanced information about users' emotions and frames that may not be available via other means of research [110,142]. These insights can be used to design positive experiences around sustainable solutions, effective behavior change and communication strategies. It is good to keep in mind that stories inherently carry ambiguity and their analysis should be treated with caution [117], and that the stories created by the participants are not per se the best way to approach people when communicating about environmental challenges. Rather, these stories can be the basis for understanding how to design narratives and solutions aligned with a certain target group values and worldviews.

Behavior change: This study was not aimed at looking at behavior change, however the results suggest that participatory ecological storytelling could be a tool to stimulate pro-environmental awareness and action through compassionate empathy, processing of negative emotions and expression of hope. Participants, by trying to understand Planetary stakeholders, also develop more understanding about themselves and may build emotional literacy. This can lead to a value shift relevant for sustainable design as indicated by the intention of change of some participants in this study. Further studies are needed to evaluate if the method can durably influence the engagement and mindset of the participants.

In this study we focus on the impact of storytelling for design, yet we also see benefits for a larger set of stakeholders such as in business and marketing. The engagement power of storytelling is universal, and this method is a good starting point to make difficult environmental topics more approachable and engaging for varied audiences—e.g., general public, innovation, business, political stakeholders, with different interest levels in sustainability. It would be interesting to study and optimize the method for different generations, professional and socio-cultural target groups.

5. Conclusions

Participatory ecological storytelling is a promising approach to create empathy for the Planet through imagination of the perspectives, emotions, and experiences of Planetary characters and through creating and sharing between story makers. Empathy for the planet initiates new relationships and reunites the human and the nonhuman through a common goal—that is to serve the well-being of the Planetary ecosystem, a fundamental building stone in creating a healthy a sustaining future.

The method is highly applicable in a design context across several competences, and beyond—for example in a business or marketing context. It provides a bridge to inclusive design approaches and to new ethics to designing with the human and nonhuman in mind. On one hand, the methodology shifts participants' mindsets towards appreciation of the nonhuman and may stimulate inclusion of the needs of the whole ecosystem in sustainable design processes. On the other hand, it makes participants' emotions and desire for transformation and action regarding environmental challenges explicit and processable.

Participatory ecological storytelling and the notion of empathy for the Planet opens an emotional and intuitive way to approach sustainable design, complementary to the factual and material approaches such as circular design and circular business model creation. It

enriches design competences like systemic design, communication design, design research, behavioral design and in community building. Last, but not least, it could be a strong contributor to organizations' sustainable transformation, whether an organization needs to take its first sustainable steps or to accelerate ongoing progress.

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Appendix A. A Selection of Illustrative Personas and Stories

Finding Plastic.

Nemo has just been rescued from the dental business by his father. Nemo no longer wants to do nothing and wants to go on an adventure. His father goes with him, he now understands that the ocean is big and still so much to explore. After a few years, Nemo and his father return home. They wanted to see their friends again and see how Dory was doing.

When they arrive home, nothing of their hometown is left. All the plants are gone and the sand is black. Oil tanks lie on the ground and oil droplets float above them. There is nothing left of their house. The plant is completely dead. All their friends are gone. Nemo decides to go to the residence of his old school friends to see if they are still there. He sees a fish skeleton. Suddenly a fish comes towards him. "Nemo, where have you been all this time?" It is the ray, the teacher at his school. He has a plastic band around his neck, Nemo doesn't know what it is exactly. "Our house is broken. The people. They did this." The ray falls to the ground and does not get up again. "Daddy, what happened while we were gone?" "I don't know, son." "What is that sound?" says Nemo. Nemo and his father swim up and see numerous oil ships on the water. They see a man throwing an old oil tank into the water. And another one. Only waste floats on the water. "Daddy, it's so dirty. I can't swim anymore." The boat next to Nemo and his father sails away; because of the current a huge wave comes at them, full of garbage and plastic. Nemo's father is dragged along. "Daddy, no!" Nemo goes after his father and tries to save him. It is completely wrapped in a plastic bag. The same plastic bag Nemo was in when he was going to be given to Darla. "I can't breathe." says the father. "Nemo, save yourself!"

Nemo's father is dragged away and Nemo is alone. "What the people have done cannot be undone. See what they're doing to the underwater world. Look who they kill with their actions. No. I will stop the people and rid the oceans of this plastic soup. A fish should swim in the sea, not drown in men's waste."

The Cunning Monkey Enlightening the Naive Girl.

There was once a girl living in her own bubble and quite spoiled by her own family. She was very influenced by social media and had the ambition to explore the world to take nice pictures for her social media account. For her next trip she went to Malaysia.

She arrived at Kuala Lumpur and planned a trip through the center of the city with a canoe. Halfway through the boat trip, a tropical rain started. She started a whole mantra about how things weren't to her expectations. However, while she was complaining about being all wet, cold, and other smaller problems, a monkey jumped out of a tree on the boat. The monkey didn't want to stay in the tree due to all the rain and the possibility of being electrocuted by the storm. Thus, he jumped in the boat. The girl got shocked when seeing the monkey and the monkey started talking to her. He said to stop complaining about the weather and look around for a second. So she did. She started to see all the plastic that was thrown into the river and how little birds or other small creatures were stuck in plastics and garbage. She realized how there were far more important things going on than her small problems. She realized how good her conditions were relative to what was happening in Malaysia.

This trip to Malaysia really opened her eyes and back into her own bubble she became more aware what needed to change. Instead of looking at social influencers she started to look at greener organizations. She wanted to change the conditions all over the world but needed to start with herself first. The monkey started to trust people more when he saw that the spoiled girl could change as well and started to approach more tourists to see what the state of the planet actually was.

Daisy the Wind Turbine.

I am Daisy. I used to be a God. I could touch the clouds and see far and wide and look down on the ants on the ground. I want to tell you about how I was supposed to save the world. I was here to help. I did good.

I was standing around when I was visited by Windy; Windy is my friend and tells me stories from all the places they visit. I love when Windy visits and tells me about the lives of birds and ants! That day, however, she told me about how others of my kind are doing more harm than good. How can that be? We're here to do good! I promised Windy that I would never do something like that.

The next few times Windy visited things were different between us. I felt like she was judging me. At first, I could not believe how she was acting. But then my world turned upside down when I killed a bird. I killed it because I am metal and wires. Because I was stuck. I didn't want to kill the bird, I didn't want the forest to be destroyed, so that I could be here. But Windy didn't know ... listen ... care ...

Windy left that day, and never came back. When she's not here I cannot move.

The ants dismantled me. Took away my wings and took me down from the clouds. Now I am in boxes, separated in parts. I still wait for Windy to visit me one last time.

The Great White Ocean.

What you can see:

(1) *Their physical appearance: their shape/body, the way they move/walk, the way they dress/transform.*

I am big, wonky, out of shape. Whenever I move, everyone notices it. It is impossible for me to be invisible which, on the other hand, gives me power and visibility.

(2) *The sounds they make or their way of talking. Their silences.*

I am always in motion, even when I am asleep or apparently quiet. And I create a soothing sound which can be soothing or scary depending on how powerfully I move.

What's happening inside:

(3) *Their character: the way they think and feel.*

I get frustrated when it is too windy. I feel like a connector of many parts. This comes with both an opportunity and responsibility. I feel beautiful, but old and run down. I used

to be in a better shape but got a bit carried away and am struggling to get back on track. Sometimes I wish I had an extreme makeover.

(4) *Their past: an important memory, a trauma, a learning experience.*

There was this one time when everyone vanished all of a sudden and I was left alone. That is when I developed attachment issues. I mean nothing when everyone is gone.

(5) *What they love and dislike.*

I love depth, colors, diversity and inclusion. I dislike lack of respect, bullies, and being taken advantage of.

Their world:

(6) *Who/what is around: family, friends, animals, plants, natural elements, enemies . . .*

Around me are seaweeds, plants, fishes, bacteria, humans, cruise ships, boats . . .

(7) *How they make those around feel (good and bad).*

They are pretty small when I wake up. They better not mess with me!

Their story:

Dear little humans,

I'm the Great White Ocean. I used to feel beautiful and now pollution is making me sick. I am struggling to get back into shape. I gave it my all, my best years. But I feel I am getting lonely, and I am afraid. I am nothing if I end up alone.

I have asked you help many times but now I have made a decision to join forces with the Sun and remove you, humans, from the equation of our existence.

Goodbye, The Great White Ocean.

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