


Narrating climate futures: shared socioeconomic pathways and literary fiction

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Abstract In parallel with five new scientific scenarios of alternative societal developments (shared socioeconomic pathways, SSPs), a wide range of literary representations of a future world in which climate change comes to matter have emerged in the last decade. Both kinds of narrative are important forms of “world-making.” This article initiates a conversation between science and literature through situating, relating, and comparing contemporary climate change fiction to the five SSPs. A parallel reading of the SSPs and the novels provides the means to make links between larger societal trends and personal accounts of climate change. The article shows how literary fiction creates engagement with climate change through particular accounts of agency and focalized perspectives in a different way than how the factors important to challenges of mitigation and adaptation are narrated in the SSPs. Through identification with the protagonists in literary fiction, climate futures become close and personal rather than distant and abstract.

1 Introduction

Scenarios have been at the heart of climate change assessment for many years (IPCC SRES 2000; UNEP (United Nations Environment Programme) 2007; International Energy Agency 2008; Hulme et al. 2002) and bring shape to a range of debates around science and policy issues (Parson 2008). Scenarios are widespread in the development of national climate policy, EU policies, and in the work of the Intergovernmental Panel on Climate Change. While there are many different kinds of scenarios, exploratory scenarios attempt to construct plausible representations of the future (Alcamo and Heinrichs 2008) and often use both qualitative (e.g. storylines, narratives) and quantitative elements to create alternative “future worlds” within which a wide variety of actors can situate themselves (de Jouvenel 1967; van der Heijden 1996). Exploratory scenarios are not predictions of the future, but they help to envision

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alternative future contexts against which current strategies could be articulated. They are, then, not “truth machines” but “learning machines,” thought-experiments that provide a means of asking “what if” questions (Berkhout et al. 2002) in order to develop the robustness of different climate policy strategies.

In parallel with the modelling community’s narratives for alternative futures of societal development, a wide range of literary representations of a future world in which climate change comes to matter have emerged in the last decade (Trexler and Johns-Putra 2011; Trexler 2015; Johns-Putra 2016; Kaplan 2016). There is now a wealth of literary fiction addressing various topics in multiple genres, from post-apocalyptic narratives of highly unequal societies and dystopian visions of a bio-based economy to intimate stories of daily life in a warming and carbon-constrained world. While scientific and literary scenarios differ significantly in terms of means, methods, practices, functions, and effects, *they both rely on forms of narrative*: of telling compelling stories about the nature of the world and the means through which climate change can be mitigated or adapted to.

The aim of this article is to initiate a conversation between scientific and literary scenarios through relating contemporary literary climate change fiction to five scientific scenarios. These scientific scenarios are attempts to “portray worlds that have varying challenges to mitigation and adaptation” (O’Neill et al. 2017a, b: 3), describing factors and trends that would affect such challenges. Bert de Vries (a senior scientist at the Netherlands Environmental Assessment Agency), when he talked in public about the SRES scenarios, used key books at the time to make people better grasp different scenarios.¹ In a similar fashion, we exemplify how literary fiction can open up our imagination to what it might mean to act on climate change in a set of alternative futures. Our approach shares Michael Hulme’s (2015) call for a cultural appraisal of climate change. The climate, Hulme notes, takes shape *in* cultures and can therefore be changed *by* cultures. There are different ways of knowing the climate, and these have to come into dialogue. For this, the world needs the arts. As Bill McKibben phrases it, “we can register what is happening with satellites and scientific instruments, but can we register it in our imaginations, the most sensitive of all our devices?” (McKibben 2005). In this paper, we explore two of what literary scenarios might do in relation to SSPs: (1) how they affect the understanding of challenges to mitigation and adaptation and (2) how they affect engagement with climate change as an issue.

2 Rationale

To initiate the conversation between scientific and literary scenarios, we will contrast five novels with a new generation of scenarios that is currently being developed, the shared socioeconomic pathways (SSPs) (Moss et al. 2010). The SSP scenarios are developed as part of a larger set of scenarios together with representative concentration pathways (RCPs) and shared policy assumptions (SPAs). This work was initiated at a workshop in Aspen in 2006, and two recent special issues have reported on the progress so far (O’Neill et al. 2014; van Vuuren et al. 2017a, b). While the RCPs are time- and space-dependent trajectories of global greenhouse gas (GHG) concentrations resulting from human activities, they do not contain

¹ We are thankful to Detlef van Vuuren for pointing this out. In the SRES report, B1 was connected to *Our Common Future* (Brundtland), A2 was connected to *Clash of Civilisations* (Huntington), A1 was connected to the *End of History* (Fukuyama), and B2 would be connected to *No Logo* (Klein).

fixed assumptions about the kinds of society (e.g. population growth, level of economic development, forms of technology) that generate these GHG emissions. Each of the four main RCPs could occur under several different socioeconomic conditions. The concept of SSPs, on the other hand, emerged to describe plausible alternative trends in the evolution of society over the twenty-first century. SSPs are articulated at a world regional level and consist of a narrative storyline and a set of quantified measures of development (O'Neill et al. 2014: 389). The SSP narratives are intended as descriptions of plausible future conditions that can provide the basis for a range of different scenarios to emerge. The SSPs could thus be seen as possible “contexts,” “scenes,” or “settings” for the present century, in which future stories about the challenges to mitigation and adaptation can take shape. The narrative features of the SSPs make them comparable with climate fiction, while their ability to produce general models offers a constructive method to systematize and categorize the fictional worlds.

Unlike the SSPs, literary narratives seldom elaborate on general societal factors of future worlds. Novels are always situated: their stories are told from the perspective of specific places, specific moments in time, and from the point of view of specific characters. In literature, general societal conditions are often presupposed rather than described, and when they are addressed, fundamental conditions are depicted via specific events, actions, thoughts, and emotions, unsystematically and subjectively. In order to make sense of what kind of society the fictional characters are faced with, the reader must interpret the text—add what is not directly described and draw conclusions from fragmented and biased information. In contrast to the SSPs, then, climate fiction does not directly display general conditions for adaptation and mitigation in the future worlds depicted. These factors need to be extracted in a process of interpretation, which, in turn, requires a framework. The SSP narratives provide such a framework.

From a large set of literature in which climate change is a theme (Trexler and Johns-Putra 2011), we have selected five literary works that narrate particular challenges to act on climate change. These were all published before the SSPs. The first book, *Solar*, written by the renowned British author Ian McEwan and published in 2010 by Jonathan Cape (imprint of Random House publishing) is a satirical account on the shortcomings of our dealings with climate change. *Solar* was awarded the Bollinger Everyman Wodehouse Prize and has been translated into several languages. Kim Stanley Robinson's trilogy *Science in the Capital* is a series of science fiction novels (published in 2004, 2005, and 2007 by science fiction publisher Bantam Spectra). Robinson has published science fiction novels since 1984 and his *Science in the Capital* trilogy has been followed by more novels on the climate change theme (e.g. the newly published *New York 2140*). Saci Lloyd's *The Carbon Diaries 2017* is a sequel to her *The Carbon Diaries 2015*, a young adult story about teenage life when carbon rationing has been implemented. It was published in 2009 at Hodder Children's Books and the rights to make a movie out of the two books were sold to Company Pictures. The two books have been translated into 15 languages. *Flight Behavior*, by renowned American author Barbara Kingsolver, was published in 2012 at Harper. The novel was a national success in the US and listed as a New York Times Bestseller. Lastly, Liz Jensen's *The Rapture* is a climate thriller published in 2009 at Bloomsbury Publishing. Due to their different genres, these narratives are addressed to a variety of different audiences, illustrating the large scope of climate change fiction. Even so, all novels are written by established authors and distributed by well-known publishers. Their visibility and accessibility have been generally very high.

Because the SSPs are supposed to be plausible, they do not deviate too much from present societal conditions, and we have thus chosen novels which are placed in a time and reality

which rather closely resembles the Earth in the twenty-first century. For the same reason of comparability, our selection of novels is culturally narrow: all five novels are originally published in the UK or the USA. The issue of climate change appears in fiction from many parts of the world written in many different languages. Some climate fiction thus challenges the predominantly Western outlook in the modelling community. This article, however, does not raise the issue of greatly diverse cultural perspectives on climate change, but rather that of different narrative approaches within a common cultural realm.

3 Understanding climate fiction through the SSPs

The SSP narratives of five futures worlds (O'Neill et al. 2014, 2017a; van Vuuren et al. 2017a, b) are developed as general descriptions of the kind of social, economic, and political conditions that policies for mitigation and adaption will have to manage. SSP1 (“sustainability”) is characterized by inclusive development and reduced inequality, international collaboration, a shift in societal goals from economic growth to well-being, and a less resource intensive lifestyle with a larger use of renewable energy sources. This scenario is concluded to have low challenges to both mitigation and adaptation. SSP2 (“middle of the road”) does not see any breakthroughs in technological development and can be understood at large as a “business-as-usual” scenario with high societal stratification and continued use of fossil resources, including unconventional ones. SSP3 (“regional rivalry”) is the opposite of SSP1, with a growing nationalism and concerns about competitiveness and security, paired with material-intensive consumption, fossil fuel dependency, and slow technological change. Challenges to mitigation are high, and so are challenges to adaptation due to persisting inequalities and slow economic development. SSP4 (“inequality”) is characterized by increasing inequalities and uneven technological and economic development. As low carbon technologies are available, among international elite in some parts of the world, challenges to mitigation are low, but as inequality and stratification are growing, challenges to adaptation are high. In SSP5 (“fossil-fueled development”), lastly, technology development is stimulated by increasingly integrated global markets and high economic growth, and there is a strong investment in health and education. Challenges to adaptation are thus low, but because of a low global environmental concern and a continued reliance on fossil fuels, challenges to mitigation are high (O'Neill et al. 2017a).

In the following, the SSPs are used to understand what kinds of future conditions are being depicted in the five literary works, whereby each novel is positioned in relation to the five SSPs.

3.1 Solar

Ian McEwan's novel depicts the life of Nobel laureate Michael Beard during the early twenty-first century. Having been a passive (but sceptical) supporter of mitigating climate change, Beard becomes an advocate of large-scale investment in renewable energy technologies. We follow this progression alongside the obsession with his fifth wife, the death of his post-doc, and Beard becoming a father against his will. The story takes place mainly in London, but includes a minor excursion to Svalbard and ends in New Mexico, where Beard is to demonstrate a new technology using artificial photosynthesis.

Just like in SSP5, climate mitigation is to take place only through new technology. *Solar* describes a world which shares many characteristics with the SSP5, such as an “increasing

faith in competitive markets, innovation, and participatory societies” (O’Neill et al. 2017a: 6). Another factor which points to high challenges to mitigation is that people do not really care about climate change, something which should be interpreted as fully natural for “human nature.” Major breakthroughs in renewable energy technologies are delayed because of personal greed and pride, as well as the lack of economic incentives to invest in renewable energy, and few investors are convinced to shift away from lucrative fossil fuels. *Solar* does not tell us much about the challenges to adaptation, but based on the general setting of the story (it is placed in the UK during the first decade of the twenty-first century), a guess is that challenges are medium, about as high as today. *Solar* could thus be placed between SSP5 and SSP3, with high challenges to mitigation and low to moderate challenges to adaptation.

3.2 The Rapture

Liz Jensen’s thriller is set in the UK in a not very distant future. A teenage girl, institutionalized after having murdered her mother, starts to have visions of future natural disasters due to climate change, predicting exact dates and locations. When these predictions, one by one, turn out to be correct, her therapist needs to take action, especially since the foreseen catastrophes keep getting worse and closer to home.

The world in *The Rapture* must be placed in SSP3. It is a world full of conflict: suicide bombings are frequent, the war in the Middle East is spreading, large nations quarrel about emissions, and people fear the use of biological weapons. The most troublesome conflict, however, has to do with the significance of climate change. The emerging catastrophe is interpreted in a variety of ways—as a meaningless and destructive result of human exploitation, as a long-awaited religious apocalypse, and as a benign ecological development getting rid of the human species—making any collective response practically impossible. International cooperation is thus low, just like in SSP3 (O’Neill et al. 2017a). The problem is, furthermore, seen as too vast and too profound: the facts of climate change are said to be “so appalling we turn the other way politely” (p. 23). The situation is generally interpreted as being beyond human control, and the only way to deal with it is that of passive acceptance. Jensen describes a shattered world without hope, a world “increasingly full of distressed people” (p. 37). Challenges to both mitigation and adaptation are thus very high, and the inability to cooperate determines political attitudes both within and between nations.

3.3 Flight behaviour

In Barbara Kingsolver’s novel, the issue of climate change is addressed through a story on social relations and personal growth. The reader follows a stay-at-home wife in rural Tennessee and her discovery of an enormous community of monarch butterflies, whose migration pattern has been disturbed by global warming. Through this discovery, the protagonist encounters science and ends up leaving her husband to begin an education elsewhere. In this novel, the world is determined by inequality—economically as well as in matters of education, experiences, and opportunities. A socially, geographically, and culturally immobile local community is strongly contrasted with an educated and mobile social sphere of scientists. These differences determine the ways in which climate change is understood, conditioning the ability to mitigate and adapt. However, the impression is not that of “increasing inequalities” as in SSP4, but rather of a stable, non-decreasing inequality. Therefore, the world of the novel should be placed in the SSP2, with moderate challenges to mitigation and adaptation.

3.4 The Carbon Diaries 2017

Saci Lloyd's sequel to *The Carbon Diaries 2015* is set in an unequal world moving towards collapse. Laura is a student in London, plays in a music band, and lives through her teenage years with friends and boyfriends, and with an increasing frustration with a government that limits her freedom and stands in the way of social change. In the first book, UK introduces a system of carbon dioxide rationing, and Laura's family life is put under pressure to not overspend their allocation, and increasingly to adapt to climate change impacts (flooding) within a dysfunctional emergency system. In the sequel, the UK is still under carbon rationing and London is flooded, but the whole society is now not just dysfunctional, but rapidly moving towards collapse due to scarce resources, economic crises, African drought, fights over water access, a delegitimised authoritarian government, and brutal police crackdowns of demonstrations. An increasingly authoritarian ruling elite controls the citizens and restricts basic liberal freedoms of speech and movement. The novel captures how the dreams and aspirations of the people are different from those in power. The trends are accentuating during the novel, with civil war and breakdown of law and order towards the end, when radical groups channel people's feelings of distrust.

The world in *The Carbon Diaries 2017* resembles SSP4 with increasing cleavages between a small political and business elite and vulnerable groups that lack voice and representation in national institutions. It is a setting in which "social cohesion degrades and conflict and unrest become increasingly common" (O'Neill et al. 2017a, b: 5). While SSP4 imagines low challenges to mitigation through a well-integrated international class capable of acting quickly and decisively, *The Carbon Diaries 2017* narrates how precarious society could be, how the support for government action could evaporate when politics becomes too polarized. But the novel also illustrates how distrust in government incentivizes self-sufficiency and organization on the community level to take control over water, energy, and food. In this sense, community mobilization can enable mitigation.

3.5 Science in the Capital

Kim Stanley Robinson's trilogy—*Forty Signs of Rain*, *Fifty Degrees Below*, and *Sixty Days and Counting*—follows the personal development of Frank Vandervaal while he struggles to find ways of mitigating the effects and causes of rising temperatures. Frank, who is almost obsessed with scientific findings of global warming and climate change, experiences a growing frustration that nothing is being *done* about it. As his emotional and practical engagement with mitigating climate change grows, he also begins a personal exploration of his inner and outer "wilderness"—his contact with nature.

The story is located mainly in Washington, DC, and its characters are the city's scientific and political elite, struggling against the resistance among (republican) politicians and industry leaders to introduce renewable energy and emission targets. The ultimate reason for their final success in this struggle is the fact that the US public is getting fed up with the recurring extreme weather events caused by climate change, and so demands political change. This change does not come easy, however, as secret service agents try to rig the election in favour of the republic candidate, and as an attempt to murder the new "green" president follows shortly after the election.

The *Science in the Capital* trilogy is set in a world where economic growth is the primary target of politics and society. As the story begins, there is no general concern for climate change and it is almost impossible to get climate bills through in the US Congress. There is

also strong resistance from industry to any sort of climate legislation, and investment in fossils is continuously large. This world largely resembles SSP5 with high challenges to mitigation and a strong “faith in the ability to effectively manage social and ecological systems, including by geoengineering if necessary” (O’Neill et al. 2017b: 13). While capacities to adapt are unevenly distributed across the globe, international collaboration is swift when the threats become alarming enough. This shows that challenges to adaptation are manageable. This trilogy offers a glimpse of an SSP5 world, but with a pro-mitigation US president being elected at the end of the second book, the third book shows the start of a transformation towards an SSP1 world, or possibly towards a totally different economical system (Fig. 1).

While the SSPs provide possible worlds full of factors conditioning the possibilities of mitigating or adapting to climate change, the novels portray what these factors might mean in a specific series of events, or how they came about. In *Solar* a lack of engagement with climate change is not something which should be hard to understand as greed and pride are part of what it is to be human, while *The Rapture* points to fear as a numbing factor. *The Carbon Diaries 2017* illustrates that the large trends might be underlain by several different trends at the same time, leading to political conflict and decreasing support for local government. This novel tells us about how such conflicts and social dynamics also can lead to new kinds of solutions, something which also resonates with the story of *Science in the Capital*.

4 Engaging climate change through literary fiction

While the SSPs focus on trends and trajectories, the novels are full of agents with specific interests, motives, emotions, and ethical considerations. The fundamental characteristics of the



Fig. 1 Graphic illustration of how the novels relate to the SSPs. As the story unfolds, challenges to mitigation and adaptation might grow or decrease, so that the placement of the novels might change, which is indicated by the arrows

modern novel were developed in the eighteenth century as a middle-class literature, showing the psychological and social development of one human individual, giving voice to his or her perspectives on the world, and describing his or her conditions for change. The normative structure of the novel thus entails the experiences of one individual dealing with societal and existential conditions and confronting the ambitions and perspectives of other human agents. The ambiguities, paradoxes, and uncertainties of human life are thus at the very centre of the literary narratives. This means that conflict is inherent in the novels while the broad societal trends develop smoothly in the SSPs. The smooth process is underlined with the use of passive constructions to describe these trends: inequality “is reduced,” global markets “are increasingly integrated,” development “is coupled with the exploitation of abundant fossil fuel resources,” local environmental impacts “are addressed effectively,” mobility “is increased,” and so on (O’Neill et al. 2014). Who is reducing, increasing, coupling, and addressing is not articulated. Action is always taken by non-human agents like “management,” “development,” “investments,” “policies,” or “the world.” This rhetoric is most evident in the anthropomorphic constructions, i.e. where the non-human agents take on human-like characteristics, for example when “environmental systems” are said to “experience degradation,” or when the “world places increasing faith in competitive markets.”

Among the trends described in the SSPs are “motivational forces,” describing the general attitude towards climate change and related issues. The shattered world of SSP3 is the result of “[g]rowing concerns with respect to international competitiveness and national security, aided by renewed interest in regional identity and culture ...” (O’Neill et al. 2017b: 7). In Liz Jensen’s *The Rapture*, we get a glimpse of possible underlying motives of such a trend. The most distinct addition to the SSP challenges is human psychology in general, and, more specifically, how different persons deal with trauma and expectations of future traumatic events. The different ways in which the novel’s characters deal with evidence of a rapidly changing climate show the profound impact of human belief-systems. The novel’s display of beliefs includes religious fundamentalism, parapsychology, radical post-humanism, and science, suggesting that in every given place and time, human beings will conceptualize the fate of the planet from strongly diverging perspectives. The narrative thus implies that the ability to deal with different kinds of faith and trust—and its opposites disbelief, mistrust, doubt, and apathy—is a key factor in the future world’s ability to mitigate and adapt.

This impression is made effective through a combined set of narrative devices. First of all, the novel contains three parallel storylines: a changing climate, a protagonist recovering from a car accident, and the therapeutic treatment of a murderer. These storylines share not only the theme of trauma but also a common notion of fuzzy boundaries between a distinct catastrophe having taken place and an ongoing traumatic situation. Secondly, different belief-systems are contrasted and merged through the characters’ encounters: the protagonist is a psychologist who is handed the task of treating a psychic murderer and then meets and falls in love with a physicist. Psychology, parapsychology, and science are thus successively merged when the plot unfolds. Furthermore, it is crucial that the story is told from the psychologist’s rather than the psychic’s or the physicist’s point of view. The protagonist’s position between two contrasting belief-systems makes it possible for Jensen to include many points of view, and, of course, to keep a psychologically inclined eye on the views included. Equally important is the fact that the protagonist is also the novel’s narrator, which makes not only the perspective but also the very language of the novel subjective. Throughout the novel, thus, climate change is conceptualized by a fictional individual with a specific background and a specific outlook. Furthermore, the narrator’s language reveals that her world-view is religiously coded. The

connection between climate change and religion is made in the very first sentence and is then strongly confirmed several times on the following pages: “That summer,” the novel begins, “the summer all the rules began to change, June seemed to last for a thousand years. The temperatures were merciless [...]” (3)

In Barbara Kingsolver’s *Flight Behavior*, the engagement with climate change is embedded in a depiction of different kinds of personal restrictions—geographical, economic, educational, and social. This story highlights what inequality means, beyond it being a vehicle to “slow population growth” (O’Neill et al. 2017a, b: 5). The local community of Feathertown is distinctly immobile and stable. The protagonist and her husband have, for example, never been on an airplane—in this rural town “steadfast lives” (1) are lived in a “small place in the world” (121). Strong economic restrictions and threats to their humble resources give the locals too many problems on their own private plates to engage in larger affairs, let alone global crises. Having to stay at home to attend her small children, living in a house owned by her in-laws, and being part of a small community where everybody knows each other, the protagonist is first and foremost socially restricted. When the scientists arrive from a New Mexico university, “two worlds” clash, “practically without a common language” (152): the educated world of internationally mobile people with a firm belief in the devastating effects of global warming and the uneducated local community fundamentally sceptical to the reports of climate change. Awareness of climate change and willingness to do something about it are thus conditioned not solely by differences in world-views, as in *The Rapture*, but predominantly, and more fundamentally, by the strongly uneven distribution of personal opportunities.

Whereas the SSPs must avoid a specific focus in order to be generally valid, the novels lay out individually focused views on climate change, its causes and effects, offering understandings of why the issue matters and what there is to do about it. Frequently, the protagonists in these novels also serve as the narratives’ focalizers, i.e. the subjects via whose minds and senses the world is seen (Bal and van Boheemen 2009: 145–163). Focalization is a powerful tool for creating reader identification, in which the reader’s own experience is merged with the experience of the protagonist (Holland 1975; Bleich 1978). Through identification, the reader adopts an alternative outlook: climate change is viewed from the perspective of someone else. Whereas the aim for neutrality and objectivity makes the writers of the SSPs strive for non-focalized narratives, the novels offer nothing more—and nothing less—than a fictitious world filtered through the mind of one particular, fictitious person.

Ian McEwan’s *Solar* exemplifies focalization through a satirical exploration of human behaviour in which Michael Beard is representing the worst of humanity: he is a greedy, self-centred, easily distracted person who cannot complete almost any task he has set for himself. His actions and his life serve as metaphor for the folly of humanity, an exploration of why we cannot seem to do anything to mitigate climate change. With the satirical tone of the book, McEwan creates an ambiguous relationship between the reader and the protagonist. Beard is the worst kind of person one could think of but at the same time he is pitiable, and there is room for sympathy as he personifies all of our shortcomings, including greed, sloppiness, and jealousy. Through the course of the novel, Beard’s health deteriorates, and he has to be rescued twice in the Arctic because of the pride that stops him from showing how inexperienced he is. Despite being a genius (he has won the Nobel Prize in physics), he is shown to be fully human, and when he is attacked by his antagonists, one cannot help but to be (at least partially) on his side. This sympathy with Beard is enhanced as we only see things through his eyes. He is not the narrator, but the story is told through his encounters. We only see what he sees, and we only know what he knows about the actions, thoughts, and whereabouts of others.

Saci Lloyd's *The Carbon Diaries 2017* offers a closer identification as it is centred on the everyday effects of climate change, from relatively familiar, though radical, terrains of climate mitigation (quotas, taxes, regulations) to experiences of living with weather-related catastrophes. It is a first person narrative, written as Laura's diary, about an everyday life where the imprint of climate change is everywhere. It describes how life's basic parameters are changing, in terms of how we live, travel, eat, consume, but perhaps more importantly, how we feel about living with climate change, and growing frustration and radicalisation that spur when governmental authorities lose legitimacy. The diary form makes *The Carbon Diaries 2017* the most subjective of the novels. The reader's insight into Laura's future world is distinctly restricted to her perspective, emotions, thoughts, and words.

Another way in which literary fiction engages with climate change differently than do the SSPs is that it allows debate on the desirability of possible solutions, ways to mitigate climate change. As these solutions are tested in a fictional environment, their necessity and impact can be depicted both through deliberation between characters in the story and through specific events as the story unfolds. In *Science in the Capital*, the protagonists belong to the scientific and political elite of the USA. They are already highly informed on climate change, and their attitude is that of impatience rather than growing interest. Frank, the protagonist, wants grand and rapid solutions, he wants action. High-tech solutions are thus favoured, because climate change is experienced as acute *and* because the protagonists have the capacity to suggest such measures and push them through. We are thus taken through experiments of putting large amounts of salt in the Atlantic Ocean to prevent the stalling of the Gulf Stream and the introduction of a new kind of lichen which would enable trees an increased uptake of carbon in the Siberian forests. These measures, their outcomes being uncertain, are being questioned and the need of their implementation debated among the characters in the novels.

At the same time as geoen지니어ing and large-scale management of ecosystems is favoured, Frank is experiencing an inner journey which change his engagement with nature. He moves from an excessively "rational" approach to life to a more spiritual or emotional relationship to nature and our fellow humans. When Frank finds himself without a home after the flooding of Washington, DC, he gets a chance to explore other, simpler ways of living, making friends with the homeless in the park and the fregans, squatters who only cooks that which has been thrown out by restaurants and stores. From being lonely, grumpy, and selfish, Frank turns into a man at peace with himself, living among friends. This transformation tells the reader that doing something about climate change could be the start of exploring new ways of organizing a society and other ways of being human.

5 Conclusions

In the philosophical classic *Ways of Worldmaking*, Goodman (1978) argues that both the sciences and the arts are involved in "making worlds" through the use of different symbolic systems (e.g. numerical modelling, remote sensing images, economics, or literal descriptions). Recent scholarly work has begun to explore different climate change worlds, how they come to matter for people and societies and how they condition the possibilities to act politically (e.g. Hulme 2009; Luke 2015; Callison 2014). One key strand here is about the tension between scientific imaginaries and personal encounters (e.g. Jasanoff 2010; Norgaard 2011), another concerns how consensus around carbon markets marginalize other ways of reducing emissions (e.g. Swyngedouw 2010; Kenis and Mathijs 2014; Bryant 2016). A third strand is about how climate futures, problematised

as being indeterminate and uncertain, generate a proliferation of anticipatory action (Anderson 2010). Political life in an increasingly violent, climate-changed world consequently turns into being about embracing insecurity as the new normal (e.g. Oels 2014; Reid 2012).

The new SSP and RCP scenario developments (intended to capture different climate futures) combine different symbolic systems, from numerical modelling to literal descriptions. Goodman's argument was that these imagined worlds were not reducible to each other. It was a matter of choice to select one world as the reference world. In the last years, quantitative work has expanded on the SSP narratives and increased their precision in various ways. Less focus has been on how the creative industries, from Hollywood and West End to the music scene and literary fiction, might help us to imagine particular climate futures. In this paper, we have explored what literary fiction might do in relation to the SSPs. We show how literary fiction brings the worlds imagined by SSPs to life through its particular accounts of agency and focalized perspectives. Based on this, four main insights can be identified.

First, basic features of the SSPs resonate with contemporary climate change fiction. Socioeconomic drivers and trends feature, and are expressed, in and through the novels. The five SSPs provide a useful heuristic to worlds in which the fictional stories are set and how they sometimes move from one "world" to another as the narrative unravels. This shows that many different scenarios can fit within the same SSP, something which is confirmed by an additional comparison between the novels and the quantified scenarios of the SSPs (Calvin et al. 2017; Fricko et al. 2017; Fujimoro et al. 2017; van Vuuren et al. 2017a, b; Krieglner et al. 2017). Second, while some of the basic features of the SSPs resonate with the novels, works of fiction also tell somewhat different stories about the factors that facilitate or hinder climate mitigation and adaptation. Because literary fiction gives accounts of peoples' motivations, these can be included among these factors. But there is also room in the novels to pay attention to structural conditions that are not mentioned in the SSPs, for example the socioeconomic system. The scientific context in which the SSPs are created puts limitations to what can be included or not, limitations that do not restrict the novels to the same extent. Third, the novels can also indicate and elaborate on solutions that do not easily fit into the framework of the SSPs. The fictional character of a novel can thus provide ways for the reader to imagine pathways to totally different kinds of future societies and personal transformations.

Fourth, the involvement of different characters in these stories shows how different understandings of climate change, its significance and solutions, can clash or work together. Literary scenarios can also show how people may be differently affected by climate change and its (lack of) solutions. Through identification with the protagonists in literary fiction, climate change moves from being distant and abstract to close and personal. Literary scenarios may thus affect engagement with climate change as an issue through those subjective encounters and create space for personal reflections; why should I (or we) care about climate change, how does it affect me, and what should be done about it? SSPs are designed to give an account of socioeconomic developments that shape our possibilities for acting on climate change but they do not explicitly engage with the question of *why* society should mitigate and adapt. Literary scenarios, by contrast, often combine an account of the context (the "how") with an engagement with the *reasons* for acting (the "why"). Through literary devices like narrative voice and situatedness, the reader can engage with these reasons from different perspectives, either as sympathetic follower of the protagonist or as critical examiner of the protagonist's view. Novels often excel in excavating the difficulties in pursuing the actions that are deemed necessary and desirable. A reading of the SSPs and the novels in parallel enable links to be made between the global and the local, the personal and the social.

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