Chapter 4
Literature and the Cli-Fi Imagination

> In a world permeated by insidious, yet unseen or imperceptible violence, imaginative writing can help make the unapparent appear, making it accessible and tangible by humanizing drawn-out threats inaccessible to the immediate senses.
>
> Rob Nixon (2011, p. 13)

> Fiction is how we organize our knowledge into plots that suggest how to behave in the real world. We decide what to do based on the stories we tell ourselves, so we very much need to be telling stories about our responses to climate change and the associated massive problems bearing down on us and our descendants.
>
> Kim Stanley Robinson (Milkoreit, Martinez, & Eschrich, 2016, p. xi)

What will happen to the Earth and to human beings in a future shaped by global warming? Scientists are typically very careful about making specific predictions about future events, and, both by attitude and training, they rarely speculate on how changes in the natural environment will impact human societies. This is where fiction writers, knowledgeable about climate research, make an enormous contribution.

English teachers know about the power of literature and the imagination. This chapter shows you how to harness that power to address the topic of climate change.

CLIMATE CHANGE (CLI-FI) LITERATURE

A new kind of literature has emerged called "climate fiction" or "cli-fi" (like "sci-fi") that portrays the *human* experiences of coping with climate change. Cli-fi has been called the "hottest new literary genre" (Stankorb, 2016). Familiarity with cli-fi provides resources and ideas for teaching our students about climate change, fostering their imagination, and encouraging them to take action. As we shall see in this chapter, cli-fi also offers interesting ideas for changing the way we might teach almost any literary work.

Literature provides readers vicarious experiences as they imaginatively perceive the thoughts and actions of characters. Narratives create scenarios in the storyworld for coping with issues, challenges, and conflicts, and engaging in actions. Literature brings the reader in on an emotional level to shape and develop beliefs and attitudes.

Cli-fi literature fosters imagination about future climate change effects that might, one day, actually take place and/or it shows us future worlds that help us better understand our own.

Climate fiction foregrounds the impacts of climate change on individuals and societies in ways that are meaningful to readers. It supplements factual/scientific information to create richer and more balanced understanding of the future. Through climate fiction, readers can see multiple natural and human systems interacting and consider the consequences. For example, it can help students think carefully about capitalism and consumerism. Manjana Milkoreit (2016) explains:

> Cli-fi places the reader in plausible, emotionally wrought, complex situations in which social, technological, and natural systems condition one's experience. All of a sudden, climate change becomes viscerally more "real" than it appears in a scientific discourse. With this deeper, more intuitive understanding, different kinds of questions can be asked, for example, concerning a community's coping mechanisms in periods of disruptive change, or the ability of the international system to maintain its functionality if and when globalization goes into reverse.
>
> Milkoreit (2016, p. 179)

Milkoreit argues that climate fiction fosters "complex systems thinking" as readers imaginatively participate with characters in complex situations (p. 188).

Cli-fi is an engaging literature for the classroom. As we saw in Chapter 2, the students in Allen's class found that climate change short stories allowed them to identify with characters and imaginatively place themselves into a world different from their own, a world where the consequences of climate change could be experienced in the present. Cli-fi short stories made the issue personal, led to writing, research, and critical inquiry—and stimulated a sense of urgency.

Climate fiction can help students to think ecologically, to better understand the complex and dynamic relationship between organisms and their environment, and to care about their relationship to nature. It can be combined with more traditional nature writing. Any work of climate change fiction is ripe for student inquiry and research: are the "predictions" real possibilities? Teachers know that young people enjoy research which lets them question/challenge the books they are reading; we recommend such questions be explored with any cli-fi work. If and when students discover, by their own investigation, that seemingly fictional events are, in fact, based on probable scientific knowledge, then they are more likely to take seriously acting soon to avoid a projected dystopic future (Beach, 2015).

As you are teaching cli-fi now and in the future, there are and will be, disturbing global warming occurrences taking place. Alas, you can count on changing weather patterns, increasing heat, droughts, fires, extreme storms and rain, floods, melting ice, rising sea levels, species extinction, human migration, national and international political debate and conflict, and an increasing sense of crisis taking place while you are teaching. In this sense, cli-fi literature is relevant right now. Students can bring in information about current events in the world and talk about them in the context of the cli-fi they are reading in their ELA classes.

Climate fiction can provide a vehicle for students to think about climate justice. Cli-fi typically illustrates global warming's unequal effects, that certain populations are more vulnerable, and that economic and social inequality shapes events and outcomes. Frequently in cli-fi, the people who experience the consequences of climate change are not the same people who brought it about or failed to address it. Milkoreit points out that cli-fi fosters "exploring values and ethical dimensions of climate change" (p. 188) and lets students imagine characters' underlying, conflicted values and ethical perspectives. Cli-fi typically, in some dimension, takes on a global perspective and thus helps us discuss the responsibility of wealthy countries—whose wealth was accrued through burning carbon—to developing nations that have not established extravagant carbon-

based lifestyles. Some cli-fi can help students better understand indigenous or postcolonial perspectives. These questions of climate justice are important to explore in English language arts.

Cli-fi emphasizes the dangerous consequences of ignorance, denial, and inaction. Cli-fi clarifies that something needs to be done now, in the present, to forestall what might happen in the future. It typically shows characters engaging in future adaptation and mitigation efforts, thus providing examples, models, and a sense of urgency for how society can address climate change (Whiteley, Chiang, & Einsiedel, 2016).

Cli-fi "involves the ways in which people imagine their collective social life, 'how they fit together with others, how things go on between them and their fellows, the expectations that are normally met, and the deeper normative notions and images that underlie these expectations (Taylor, 2002, p. 106)'" (Whiteley, Chiang, & Einsiedel, 2016, p. 30).

Cli-fi creates opportunities for important discussion about questions such as: What is the role of government in addressing climate change? What cultural or social habits do we now need to stop/control to preserve the planet? What can individuals or groups do to bring about a different future from that portrayed in climate fiction?

Research on the impact of environmental literature suggests that cli-fi also can make a difference. A large-scale analysis of 7,379 people sought to determine the degree to which reading three books on the environment, *Walden* (Thoreau, 1854/2016), *A Sand County Almanac* (Leopold, 1949/1986), and *Silent Spring* (Carson, 1962) influenced their willingness to engage in certain environmental behaviors (Mobley, Vagias, & DeWard, 2010). The results indicated that reading one or more of these texts did predict increased awareness and propensity to take action, even when participants' general attitudes were factored into the analysis.

The cli-fi author, Kim Stanley Robinson (2015) describes the value of cli-fi literature in changing perspectives:

> Reading fiction is a very powerful experience. So I believe that if it's done right it can change one's view. You come back to reality and you have a kind of double vision. You have your normal daily vision and then you have your science-fiction vision, the future, interposed on it or behind it, so you get a kind of 3D in time. And it helps you to make decisions about what do I do today to help the situation for my grandchildren. So the science-fiction double vision, the temporal 3D, the 4D vision is really a useful tool for figuring out what to do now. It's a philosophical tool.

While cli-fi literature can portray a bleak future for our planet, it ideally will also give readers a sense of hope for the future. As Ursula Kluwick (2014) notes, "The greatest challenge for climate change stories is how to transport the message that climate change is inevitable and already happening without crippling our power to imagine a future worth changing for" (p. 510).

CLI-FI IN A TIME OF CONSTRAINED RESOURCES

This chapter introduces you to many climate change works appropriate for the wide range of today's secondary students. We know it is often difficult to purchase new materials and fit them into already crowded curricula.

We begin with ideas about how to bring cli-fi perspectives to the literary works you are already teaching, thus repurposing texts in your curriculum to address issues of climate change. Next, we describe using picture books where only one copy, read aloud and perhaps projected with a document camera, can easily be integrated into most curriculum. From picture books we move to cli-fi poetry, short stories, and film—all easy to bring to your teaching. Next, we describe young

adult literature, then novels. Lastly we draw your attention to climate testimony, sobering real-world accounts of climate change events already taking place.

You can include longer works described in this chapter in ways that minimize expense and maximize student understanding and motivation. Choice reading or reading workshops can be focused on climate change—since students typically draw from school or classroom libraries this approach is also economical. Literature circles (Daniels, 2002), where a class is divided into groups that choose books and discuss them over several class periods can include library books, or, for the price of one set of class texts, a teacher can obtain smaller sets of several different works.

With either choice reading or literature circles, students can report back via "book talks" to the class, or share video responses or recommendations using tools such as Flipgrid https://info.flipgrid.com or VoiceThread https://voicethread.com about what they have read and how their work portrays climate change. Students with diverse abilities and interests reading different texts on the same theme can share ideas and participate in common discussions. Informational text, film, and common reads of shorter works can be combined with choice reading to provide additional basis for inquiry, writing, and action taking.

Since cli-fi is a new literary field engaging a vital topic, there is a case to be made that libraries and school administrations should support purchasing these texts. Climate fiction is a potential focus for grant appeals to local or national groups, Gofundme, or other fundraising efforts. Proposing interdisciplinary study with science or social studies may also generate administrative support and resources.

BRINGING THE CLI-FI IMAGINATION TO YOUR EXISTING LITERATURE CURRICULUM

Many works we already teach have explicit climate change themes. Emerging from the 1930s Dust Bowl, *The Grapes of Wrath* (Steinbeck, 2004) is certainly a novel about the effects of climate change, destruction of agriculture, forced migration, and the struggle to reconstruct society. Nature literature from Wordsworth to *Hatchet*, from *Walden* to *Dune*, already addresses the human relationship with the environment and can be the basis for climate change research, discussion, and writing. Post-apocalyptic *Lord of the Flies* describes a loss of civil discourse and collaboration leading to the destruction of nature and burning up the island. Even classics have potential climate change themes. As mentioned earlier, *Frankenstein* (Shelley, 2003) is a study of how human's use of science can go out of control. One theme of Shakespeare's play *Macbeth* is how human behavior breaks the great chain of being impacting the natural world. Links could be made with human-caused climate change in our own day. *The Tempest* is about a human-orchestrated natural event (the storm) that disorients, upends, and reconstructs the social order. Voltaire's (1991) *Candide* can provide an excellent opportunity for thinking about how the optimistic perspective that all is for the best in this best of all possible worlds, perhaps because of a benign God or universe, profoundly and dangerously ignores what is happening with climate change.

How else might an English class bring the topic of climate change to traditional literature?

One of the most interesting books about teaching literature is Rob Pope's (1994) *Textual Intervention: Critical and Creative Strategies for Literary Studies*. Pope describes a strategy of textual intervention where students creatively "intervene" in class texts they are reading to make changes, changes that often end up illuminating aspects of the texts or society. Students might "intervene" by writing letters between characters, writing from the perspective of marginal characters, adding a missing scene, changing the gender of a character, changing the location or

time period—and then discussing and writing about how their "intervention" helps them see the original text or the society it portrays differently. This kind of intervention is all the easier in the age of digital texts as classic works found in online literary archives can easily be cut and pasted into student word processing programs (Rozema & Webb, 2008). Of course, texts do not need to be digitized for students to come up with creative interventions.

We believe textual intervention is a powerful tool to allow teachers to bring the cli-fi imagination and climate change inquiry to all kinds of texts already in the curriculum. After learning about climate change from research, short essays, or documentaries, students can then intervene in traditional works. Intervention can take the form of actually rewriting or adding to an existing text, or writing ideas about how that text might be changed. Students can work individually or in groups to come up with ideas and to discuss and debate different interventions.

Students can take commonly taught texts and intervene in them by setting them in the future, a future where climate change is evident. Or they could anachronistically bring climate change to the past to explore characters' thoughts, reactions, and strategies.

Climate change fiction sometimes involves climate change events happening while characters, at least at first, are not taking adequate action to avert them. Students could intervene in works by inserting various climate change events and explore characters' thoughts as they react, or fail to react. As Huck and Jim move down the river they come upon Pap's house floating along, broken loose by a flood. Students could intervene by imagining and writing up increasing evidence of floods and climate change, and characters like The Duke and the King, Tom Sawyer, Aunt Sally, the Widow Douglass, or even Pap, could be explored/contrasted for their reactions. Holden Caulfield could learn about climate change and be frustrated with other characters in his world that hold what he considers superficial attitudes about it, perhaps until finally he and Phoebe decide to take some action. *Their Eyes Were Watching God* (Hurston, 1998) might trace a series of increasingly dramatic and realistic (to our present) climate change events impacting Janie's life in Central and Southern Florida, including her stay in the Everglades.

Climate change fiction often looks at the events of climate change and how they impact different people or groups. Students reading *Of Mice and Men* (Steinbeck, 1993) can focus on how climate change might impact farm workers like George and Lenny. Climate change events could start happening in *Animal Farm* (Orwell, 2013) with different consequences for different animals (some are more equal than others). Who knows, maybe the pigs would insist on their privileges at any cost or maybe they could join together with other farm animals to demand changes in the agricultural system that would address causes of climate change. *The Outsiders* (Hinton, 1967/2006) might be set in a distant future climate dystopia where the greasers and the socs are competing over depleted resources.

Cli-fi can also portray groups of characters banding together to do something about climate change. They could intervene in texts to explore characters acting in this way. The younger generation in *Romeo and Juliet* might come together to try to alert the adults about pending ecological disaster. Macbeth's crime could be failing to address climate change and Banquo, Macduff, and other thanes might unite to force action. Students reading *To Kill a Mockingbird* (Lee, 1988) could write or imagine future chapters where Atticus, with the help of Scout, Jem, and Dill, anxious about their future, takes on environmental legal cases or advocates for laws to address climate change against powerful people with entrenched ideas. Or students reading *Fahrenheit 451* (Bradbury, 2012) could introduce climate change events and perhaps have Montag, Clarisse, and/or Granger attempt to educate and organize other characters like Mildred and Captain Beatty about dangers and harms of climate change by creatively using some of the new technologies or form a renegade group determined to draw their society's attention to it.

Randall Seltz, Jordan High School, Sandy, Utah:

> Movies often take a story and change elements of the setting to make it more relevant or interesting to contemporary audiences. What if students reimagined different canonical texts set in an environment that has been ravaged by climate change? Reimagining *Lord of the Flies* on an island that is sinking or on fire changes how the boys would interact, possibly causing them to unite despite their differences. What if *A Midsummer Night's Dream* didn't have a forest to take place in because it had been mowed down to make things we threw away?

The possibilities for using intervention strategies to link climate change with existing literary works are clearly limited only by the imagination. Students engaging in this kind of literary study would find themselves adopting interesting and fresh perspectives on the source literary works and could discuss and write about what their interventions taught them about the original characters, societies, and settings. They would have engaging reasons for doing various kinds of specific climate change research related to the interventions they were developing. Their intervention might generate lots of creative possibilities and ideas they could play and experiment with that would require careful thinking and important imaginative work about climate change, social reactions, and what needs to be done in our present world.

PICTURE BOOKS

While some consider picture books appropriate only in the primary grades, we suggest that choice picture books can be fabulous tools for engaging students at all levels, even university. A high-quality picture book is one in which thought-provoking images and a few well-chosen words tell a meaningful story visually and with language that stimulates the imagination. Picture books offer the advantage that they can be read out loud to an entire class in just a few minutes or they can be read closely. Their brevity and aesthetic power make them ideal for encouraging personal connections and generating meaningful discussions about complex issues.

The following are a handful of examples of picture books that address environmental topics through combining fantasy, cli-fi, environmental history, indigenous oral tradition, and biography. Dr. Seuss' (1999) classic book, *The Lorax*, describes deforestation in a personal and passionate way. Since deforestation is one of the main causes of climate change, students can read *The Lorax* to open an investigation of the global deforestation crisis, the role of trees as carbon dioxide "sinks," the effects of climate stress on forests, and the impacts of over-consumption and corporate greed. Another starting point to address deforestation and species loss is Lynne Cherry's (2010) *The Great Kapok Tree*, focused on the Amazon. Cherry's (1992) *A River Ran Wild* explores the history of a river transformed by ensuing groups of humans, from Native Americans to colonial settlers, industrialists, and eventually young twenty-first-century environmentalists. It is a story that adopts an indigenous perspective and is a hopeful starting point for researching the impact of humans on a given location over time as well as efforts to reverse environmental destruction.

In *Just A Dream*, Chris Van Allsburg (1990) takes the audience on a flying bed to a dystopian future of environmental catastrophes. Combined with study of climate change, it would be a great mentor text for students writing their own cli-fi children's book. In *Brother Eagle, Sister*

Sky, Susan Jeffers' (1991) paintings accompany an adaptation of a speech by Chief Seattle from the 1850s that poetically delivers an indigenous perspective about humans' relationship to the natural world. A true story of courage and resistance from Africa, Jeanette Winter (2008) describes the life of Nobel Peace Prize recipient Wangari Maathai in *Wangari's Trees of Peace*. *Please Don't Paint Our Planet Pink* by Gregg Kleiner (2014) tells a story about what would happen if CO_2 were colored pink and people could actually see the gas that is causing climate change; it teaches about the carbon cycle as well as carpooling and community.

POETRY AND CLIMATE CHANGE

As we described in Chapter 3, there is a long history of poets responding to nature that teachers can draw on to teach ecocritically. While poets tend not to write "cli-fi," there are poets that write specifically about global warming and its impacts. Four poems to recommend are "Global Warming" by Jane Hirshfield (we include it at the end of Chapter 1), "Hurry Up Please It's Time" by John Powell Ward, "One World Down the Drain" by Simon Rae, and "The State of the Planet" by Robert Haas. All of these can be found online and used in English classes.

There are terrific poetic resources addressing global warming from authors of color. One is "Trees" by the prolific and eccentric rapper Keith Kool, aka Dr. Octopus. This rap takes an alternative approach to the usual story of climate change, starting with the loss of trees, having African American children as scientists acting to address the problem; showing connections between nature destruction, deforestation, white "civilization" or domination; cars behaving like cows; older people uncaring; and so on. Students love to talk about it; the music video of the rap is here: http://tinyurl.com/ls3se35. Lyrics are here: http://tinyurl.com/zz2k77j. Richard Williams aka Prince Ea is another rapper and spoken word artist whose work has much to tell all of us about climate change. You can find his inspiring slam poems "Dear Future Generations: Sorry" at http://tinyurl.com/oruj7ob and "Man vs Earth" at http://tinyurl.com/za3c2og.

One option for shifting the focus from only the individual experience of nature to a concern with the effects of climate change is for students to adopt the perspective of the nonhuman species or objects being affected by climate change. Based on his visit to the Arctic and experiencing the melting of glaciers, poet Nick Drake (2012):

> realized that parts of the nonhuman world could also talk back from their perspectives: I could find voices for creatures and elements as well as people; they also have stories, they have life stories, they have stories of love and survival and tragedy [fostering an] awareness of what we've done and awareness that we are the people who've changed nature, which is a phrase that, I gather, the Inuit say about us.
>
> Drake (2012, p. 74)

This led to his writing poems for his *The Farewell Glacier* poetry collection (Drake, 2012) that adopts the perspective of the Arctic ice itself:

> The idea is that ice, at least ancient ice, is like an enormous library of all the winters that have ever happened on the planet. Each winter is a page in a book in the library, and it contains the story of that year: it contains what was in the atmosphere, it contains secrets and wonders.
>
> Drake (2012, p. 84)

In the following excerpt, "I Am a Long Story," from *The Farewell Glacier*, the ice itself becomes the speaker of the poem describing how it holds a history of stories:

I am a long story,
Ten thousand feet long,
A hundred thousand years old,
A chronicle of lost time,
Back to the first dark,
Too dark for telling;
I am every winter's fall;
I am the keeper of the air
Of all the vanished summers;
I honour the shadows of sorrows
That come to lie
Between my pages;
I distil lost atmospheres
Pressed into ghosts
Kept close to my cold heart.
And as for you—
What story would you like to hear?
On your two feet, tracking the snow
Two by two, two by two, two by two;
Here is the dust and music
Of your brief cities;
Here is the ash and smoke;
Here are your traffic jams
And vapour trails;
Here are your holidays in the sun
And your masterpieces
And your pop songs.
Here are your first cries
And last whispers;
Here are your long sighs
Of disappointment.
Here is where it went right,
And where it went wrong.
Easy come. Easy go.

(Nick Drake, "I Am A Long Story," from *The Farewell Glacier*. Copyright 2012 by Nick Drake. Reprinted with the permission of Bloodaxe Books www.bloodaxebooks.com)

Students could also respond to poets' dramatic descriptions of events similar to those produced by climate change. For example, they could respond to a Gary Snyder (2003) poem, "Mid-August at Sourdough Mountain Lookout," told from the perspective of a firefighter viewing the results of a deliberately set forest fire, as portrayed in these initial lines: "Down valley a smoke haze/Three days heat, after five days rain/Pitch glows on the fir-cones/Across rocks and meadows/Swarms of new flies" (p. 3). A classic poem like Wordsworth's "The World is Too Much With Us" (1807) can help students use their imaginations to think beyond the "getting and spending" related to climate change.

CLI-FI SHORT STORIES

Cli-fi short stories are a terrific way to teach about global warming. In Chapter 2 we have described teaching four stories from two different collections, *I'm With the Bears* (Martin, 2011) and *Winds of Change* (Woodbury, 2015). These stories and others have been made available to teachers, as explained in Chapter 2.

There are other excellent short story resources. We recommend *Everything Change: An Anthology of Climate Fiction* edited by Milkoreit, Martinez, and Eschrich (2016), a collection that includes many stories with teenage protagonists or characters. These diverse stories are set in locations around the world including North America, England, Venice, China, Malaysia, and Madagascar. The stories would be useful stimuli for student research into climate change effects in other countries. One story, "The Grandchild Paradox," explores the perspective of teens in a drowning world angry at the older generation for not stopping climate change, leading to important discussion in today's classrooms. A story that raises questions about the political fallout from climate change is "Into the Storm," about a coup d'etat in Canada over the failure to address climate change. A story in this collection that young people would enjoy is "LOSD and Fount"—told from the point of view of an artificially intelligent robot about the last man on an island shrinking due to rising sea levels. This story can inspire creative writing about climate change from unusual perspectives. The collection includes a fine foreword and a good interview by/with two leading climate fiction writers, Kim Stanley Robinson and Paolo Bacigalupi. It is available in full text for free at http://climateimagination.asu.edu/everything-change.

The collection *Drowned Worlds: Tales from the Anthropocene and Beyond* (Strahan, 2016) has imaginative stories from well-known authors about impacts of sea-level rise. *Under the Weather: Stories about Climate Change* (Bradman, 2012) is written for upper elementary and middle-school students and focuses on stories of young people who are making a difference in their communities.

CLI-FI FILM

Film has the ability, perhaps beyond any other form, to transport us into other worlds. Every year there are more and more films portraying a climate-impacted future. Whether viewed by a whole class, by student groups, or individually, many are engaging starting points to imagine and research the future implications of global warming as described by Allen's students.

The Day After Tomorrow (Emmerich, 2004) is the iconic Hollywood cli-fi thriller. Scientists ignored unseasonable weather and dramatic storms; global warming leads to ice shelf collapse, sudden ocean cooling, collapse of ocean currents, superstorm, arctic conditions in North America, surviving Americans fleeing to Mexico. While popular, at the time, the film's portrayal of science was ridiculed. It is ridiculed no more. James Hansen, the world's leading climate scientist, and a team of others, published a paper "Ice Melt, Sea Level Rise, and Superstorms" in March of 2016 that describes possible events not so distant from those in the film. Students can listen to a 15-minute video of Hansen explaining the implications of his research in lay terms http://tinyurl.com/h5ae22b. Kaitlin suggests students research the question, "What are the worst storms that have affected the world? Explain the damage that was inflicted."

Chloe and Theo (Sands, 2015) tells the contemporary story of an Inuit from the Arctic who travels to New York City where he teams up with a homeless teenager (Dakota Johnson) to tell leaders about the dangers of global warming. Jessica says, "This movie is relatively short, and would be a great resource for teachers looking to discuss climate change in their classrooms but are tired of using statistics and raw data."

In *Age of Stupid* (Armstrong, 2009) climate change is explored from the perspective of one of the last humans alive in the year 2055. This unusual film uses video clips of news shows, interviews, and documentary footage to show the escalation of climate change. Maddie says the film is appropriate for all ages above a seventh-grade level.

Interstellar (Nolan, 2014) is set in a future where Earth is increasingly uninhabitable due to an increase in population and temperature. Space exploration becomes an option to save the human species. Brandon suggests students do extensive research on the climate change events throughout the movie, proving them possible or impossible.

Odyssey 2050 (Bermejo, 2012) is an animated film that would appeal to middle-school students. Aliens visiting Earth in the future are shocked to see that humans have devastated their planet. Tom believes, this film is "about getting the youth involved in the climate change movement."

Snowpiercer (Bong, 2013) is set in a post-apocalyptic future where geoengineering attempts to stall global warming have resulted in an ice age. A violent struggle for survival takes place on a train that circles the world. Angelo says, the film mocks complacency about climate change and "presents the consequences of altering the climate by extreme measures" (rated R).

Take Shelter (Nichols, 2011) is about a man who becomes obsessed by a fear of a coming storm. Cece says, "*Take Shelter* can be seen as an allegory for climate change. Curtis is constantly warning the people around him and no one listens to him or believes him; however by the end of the story when the disaster arrives people finally see it for what it is, but it's too late" (rated R).

Resources to support English teachers using the films discussed above are available at: http://ourplaceinnature.wikispaces.com/Cli-Fi+Film. For a list of movies from 2004 to 2017: http://tinyw.in/dRsR) (for films organized by topics: http://tinyw.in/igy3. More titles can be found on this book's website: http://tinyurl.com/glflxg2.

YOUNG ADULT CLI-FI LITERATURE

Young adult cli-fi portrays adolescent characters coping with climate change and typically taking action in inspiring ways. Given ecofeminist concerns about how studies of climate change often ignore the disproportionate impacts on women, it is significant that most of the protagonists in the following novels are female.

The super popular books in the young adult series *The Hunger Games* (Collins, 2008) and *The Uglies* (Westerfeld, 2006) draw on a narrative of climate change to establish their story lines. *The Hunger Games* portrays,

> the history of Panem, the country that rose up out of the ashes of a place that was once called North America. He lists the disasters, the droughts, the storms, the fires, the encroaching seas that swallowed up so much of the land, the brutal war for what little sustenance remained. The result was Panem, a shining Capitol ringed by thirteen districts, which brought peace and prosperity to its citizens.
>
> Collins, (2008, p. 18)

Teachers can help students reading these works to connect understanding climate change to the future realities the novels depict by researching claims about climate change impacts (tying the focus on food in *The Hunger Games* to climate change is described in Chapter 3). In both series we find a stark contrast between heroines and heroes who authentically care about others, and a mass of privileged, superficial, and effectively brainwashed people who accept the status quo. These books invite readers to imagine themselves understanding complex realities, adopting

communal values, and taking stances to fight for others and a just social order—just what young people need to begin to address climate change today.

Another climate change young adult novel is *The Carbon Diaries, 2015* (Lloyd, 2015). 16-year-old Laura keeps a diary about living with the United Kingdom's mandatory carbon rationing. Climate events cause blackouts, water shortages, and the flooding of London from storm surge and higher sea levels. In responding to this novel, students could examine their own carbon footprint and the possible impacts of carbon rationing, or imagine daily life in their own locations in a future world similar to that portrayed in the novel.

In the young adult novel, *Love in the Time of Global Warming* (Block, 2013), the main character Penelope undertakes a quest with three companions, with allusions to Homer's *The Odyssey*, to find her family after much of Los Angeles has been destroyed by an earthquake and tidal wave. Students could contrast other quest/adventure narratives and movies with Penelope's struggles.

In *Exodus* (Bertagna, 2008) the inhabitants of Wing, a small island community in the North Atlantic Ocean, can no longer hold back the rising seas. Fifteen-year-old Mara discovers another floating city and leads members of the island to find a new home. The novel addresses deforestation and sea-level rise; based on comparisons to actual examples.

Ship Breaker (Bacigalupi, 2010) portrays a world where society has stratified, fossil fuels have been consumed, and the seas have risen and drowned coastal cities. The main character, a 17-year-old boy, scavenges beached tankers for scrap metals on the Gulf Coast. He saves a girl from a crashed tanker and attempts to reunite her with her wealthy, industrialist father who makes money by refining tar that generates large quantities of greenhouse gases.

Several YA novels focus on the very real danger of drought in a climate-impacted future. *Memory of Water* (Itaranta, 2014) portrays a young girl, Noria, who assumes the role as guardian of a secret fresh water supply for her village, which, when the secret is revealed, is then challenged by the military and local wealthy people, resulting in conflicts. *Water Wars* (Stracher, 2011) is a fast-paced novel set in a time when the ice caps have melted, rivers dried up, and water is controlled by a small elite. *Birthmarked* (O'Brian, 2014) is set in an enclave on the shores of Lake Superior, whose water has been drained by pipelines carrying it to areas in drought from climate change.

A couple more YA titles Allen's students enjoyed include *Nature's Confession* (Morin, 2014), a tale of two teens trying to save a warming planet, and *White Horse Trick* (Thompson, 2010) set in Ireland and combining magic and fantasy with drastic climate-induced storms and rainfall.

CLI-FI NOVELS

The novel is the preeminent form of climate fiction. The extended treatment of the impacts of climate change in the novel allows students to go deep into imaginative inquiry about what our future may hold—and emphasizes the importance of taking action in the present. Many cli-fi novels are long; some have mature content that may make it difficult to assign as a text to the whole class. Here we describe a number of novels which Allen's students have reviewed, that could work in high schools, most likely at the junior or senior level. Certainly, more cli-fi novels are soon to be written.

Cli-fi novels can be set in the near term, creating an emphasis on imminent climate impacts and choices that people today are making to address, or not address, climate change. Or, cli-fi novels may be set in the more distant future that emphasize the implications of climate inaction. Some cli-fi is a subgenre of highly popular post-apocalyptic fiction.

Many cli-fi texts describe forced migration due to rising sea levels or intolerably high temperatures and involve conflicts over lack of safety, food, and water. They often portray failed states or an authoritarian world in which characters have lost their basic rights and therefore must fight for resources controlled by governments and corporations whose push for economic growth and urbanization has resulted in environmental destruction (Pirzadeh, 2015).

In *Odds Against Tomorrow* (Rich, 2013), a young mathematician working in Manhattan believes that he can calculate worst-case scenarios for future ecological risks allowing corporations to avoid responsibility. However, when Manhattan is flooded due to rising sea levels and a storm surge, he finds that even the remote countryside is not a safe haven. Eventually he manages to live in a wrecked urban neighborhood and develop a different set of values.

In *The Rapture* (Jensen, 2009), heat and freak weather patterns in England influence a psychologist's work with a deeply troubled teenager able to predict future events. In a suspenseful race against time, climate scientists attempt to tell the world about a predicted apocalyptic eruption of methane hydrates caused by corporate seabed fracking. Allen's student Brandon believes, "This novel is great for getting students interested in climate change."

In Robinson's The Capital Trilogy: *Forty Signs of Rain* (2004), *Fifty Degrees Below* (2005), and *Sixty Days and Counting* (2007), scientists at the National Science Foundation, the President, and a Senate staffer seek to formulate climate change policies when storms and sea rise are impacting daily life in Washington, DC.

In Margaret Atwood's (2013) world of the *MaddAddam* trilogy, characters are coping with epidemics and floods; corporations control humans through genetics and corruption. The first novel *Oryx and Crake* (Atwood, 2004) portrays a warming post-apocalyptic world where traditional humans have been destroyed by a genetically engineered plague. The novel questions the values of corporations that use science without concern for the consequential effects on humans.

Barbara Kingsolver's (2013) *Flight Behavior* features a young wife and mother on a failing farm in rural Tennessee who encounters an incredible kaleidoscope (swarm) of Monarch butterflies. Her discovery engages religious leaders, environmentalists, and climate scientists—and changes her world. Allen's student Jessica, "would definitely recommend this book to anyone looking for a sophisticated, well-written piece of literature."

In *The Water Knife* (Bacigalupi, 2015), the entire Southwest region of the United States is coping with drought, leading to graphic violence and conflicts over access to the Colorado River. The main characters struggle to stop a corporate conspiracy from eliminating water rights for Phoenix.

In *The Admiral* (Gilbert, 2014), the majority of the planet is covered in water leaving only small bodies of land and desolation. In this adventure novel, Allen's student Angelo says that Gilbert "clearly advocates for wind power."

Another cli-fi adventure novel is *Arctic Drift* (Cussler, 2009), full of narrow escapes and running fights against trained hit-men and hired thugs in a struggle over opening up the Arctic to mining. Allen's student Lucas says that Cussler "not only discusses many factual causes and concerns about global warming, but also [tells] a tale that is packed full of suspense and adventure."

In *Arctic Rising* (Bucknell, 2012), countries are attempting to claim the oil and dump waste under the newly accessible Arctic oceans. The Gaia Corporation is attempting to reduce warming through use of sunshade mirrors to redirect sunbeams back into space, while other corporations and governments are attempting to stop the Gaia Corporation's project. While Allen's student Blair points out that the novel contains profanity and adult themes, it "does a good job addressing climate change and would be a good resource for class discussion."

Polar City Red (Laughter, 2012) is a short novel about a family that flees northward to a secret sanctuary city above the Arctic Circle. Allen's student Cece says, "*Polar City Red* brings to light the moral and physical challenges brought on by climate change."

The Sea and the Summer (Turner, 2013) is set in Australia in 2044. Characters struggle against climate change which has impacted all aspects of their life. Allen's student Rebecca describes the book as "focused on income inequality and distinctions between social classes . . . and an all-powerful government."

Ultimatum (Glass, 2009) is set in America in 2032 when sea-level rise is happening much faster than expected. The novel explores tensions and United States' negotiations with China to reduce emissions. Allen's student Shane says the book would appeal to students interested in politics.

The short dystopian work, as much essay as novel, *The Collapse of Western Civilization: A View from the Future* (Oreskes & Conway, 2014), is narrated by a senior Chinese historian in the year 2393 recounting the failures of humans to take decisive action during the decades leading up to the Great Collapse of 2093. That year witnesses the final melting of the West Antarctic Ice Sheet leading to mass migrations and wars, particularly in North/South America and Europe, and the collapse of most Western governments. Because China had actually done a better job preparing for climate change, it remains relatively stable. Students could discuss governmental, business, and community inaction and resistance to change from politicians, businesses, and community organizations.

(For a list of other recommended cli-fi novels see http://tinyw.in/zvbD.)

BEYOND CLI-FI: TODAY'S TESTIMONIALS

Cli-fi helps us imagine the future impacts of climate change. But climate change is already happening and the stories, images, and testimonials of the survivors of storms, flooding, drought, fires, and heat waves are powerful texts for teaching about the present and the future.

Testimonial accounts of climate-change-related events are often mis-presented as stories of "natural disasters." In our Anthropocene era, students need to come to see that these so-called "natural" disasters are significantly the result of *human-caused* global warming. George Marshall (2015) interviewed survivors of the 2011 Bastrop fire in Texas and 2012 Hurricane Sandy in New Jersey—both events consistent with the expected impacts of climate change—and found that while survivors wanted to share stories of pride in their communities' response, they did not want to talk about or even acknowledge climate change. Yet, our teaching needs to help our students recognize the relationship of global warming and climate-related disasters.

A powerful narrative of climate disaster and the necessity to address climate change is the testimony of Yeb Sano, Filipino representative at the 2013 UN climate talks speaking while Typhoon Haiyan was ravaging his hometown (the entire 17-minute speech is at https://vimeo.com/79117298, a written version at http://tinyurl.com/jp4n3ls, and the 7-minute version Allen shows his students at http://tinyurl.com/hnol24x).

The graphic novel *Zeitoun* (2010) by Dave Eggers is a true story about a Muslim family living in New Orleans during Hurricane Katrina. Allen's student Clara points out that, the book is "a jumping off point to further address the effect climate change has on social unrest and inequality."

Right to be Cold (2016) is a compelling memoir showing how climate change is disproportionately affecting the Arctic and what a courageous Inuit woman, Sheila Watt-Cloutier, is trying to do about it. The author was nominated for the Nobel Peace Prize. A climate change memoir about an upper middle class person learning to reduce her carbon footprint is *The Big Swim* by Carrie Saxifrage (2015). *When Glaciers Slept: Being Human in a Time of Climate Change* (Jackson,

2015) tells a story from a young man's life both about the loss of his parents and about climate change challenges and solutions.

Following the news about so-called "natural" disasters provides troubling stories, images, and videos that illuminate human-caused global warming and fit right in with the study of climate fiction.

MAGICAL THINKING

In this chapter we describe both a young adult and an adult cli-fi novel written by prize-winning author Paolo Bacigalupi. In an interview Bacigalupi talks about different information, both scientific and human, that inspires him to write. He adds, "And then you also have this other piece of data that says our leadership is completely disengaged, that they are engaged in magical thinking" (Milkoreit, 2016, p. 215). Bacigalupi's observation raises a question for us: who is more engaged in "magical thinking," the authors of cli-fi who are exploring imagined future worlds impacted by climate change, or many of our current political leaders who deny that climate change is even happening?

When it comes to magical thinking, recent climate engineering ideas also come to mind. Some people think that since humans have employed technological advances to address problems in the past, there may also be a technological fix for climate change. But the geoengineering approaches that have been put forward are fantastical, and, frankly, highly dangerous. Mann and Toles (2016) (http://tinyw.in/8SsL) describe:

- placing trillions of small mirrors into the atmosphere to reflect away sunlight;
- shooting reflective sulfate particulars into the stratosphere to mimic how volcanic eruptions cool the Earth;
- fertilizing the oceans with iron dust to create algae or "phytoplankton" to absorb more CO_2;
- creating synthetic trees to absorb CO_2 at the cost of $500.00 for each ton of carbon.

And if these truths aren't stranger than fiction, Mann and Toles note that, of course, this kind of geoengineering would be absurdly expensive, carbon intensive, and likely cause still greater problems. For example, adding sulfate particulars to the stratosphere will increase the amount of acid rain and alter the ozone hole, and fertilizing the oceans with iron dust can enhance growth of harmful algae blooms responsible for dead ocean zones. As a result:

> The proposed cure could well be worse than the disease. Indeed, it could prove fatal. Although the threat the planet is facing is huge in scale, its cause is profoundly simple: an unhealthy dose of carbon dioxide. The simplest and safest solution is to address the problem at its root cause.
>
> Mann & Toles (2016, p. 129)

These kind of geoengineering solutions to climate change are, in fact, a form of "science-based" denial: we don't have to change our ways now, we can wait for science to save us.

So there is an urgent need for teaching that does away with magical thinking, and for the truths that cli-fi has to tell about how we need to change our world in the present. Climate fiction can make the not yet real become believable. It can help our students develop their imaginations so that they will be able to bridge the gap between knowledge and beliefs described by Slavoj Žižek, "we *know* the (ecological) catastrophe is possible, probable even, yet we do not believe it will really happen" (Žižek, 2011, p. 328).

In the next chapter, we describe activities for writing about climate change, for ways you can foster your students' voices and the truths they have to tell about what is and will really happen, both through fact-based argument and imaginative creative writing.

For additional resources, activities, and readings related to this chapter, go to http://tinyw.in/YjZG on the book's website.

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