

CHAPTER 8

Nuclear Awareness

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Abstract

Nuclear awareness means the critical assertion of the complex phenomenon of nuclear energy and its societal impact. Beyond academic enquiry, nuclear awareness aims to enhance critical societal assessment skills on nuclear energy-related issues in the context of sustainable development. In other words, nuclear awareness is a set of skills, related to nuclear knowledge, that is based on information or experience and triggers critical thinking on the nature of nuclear energy, nuclear agendas, and the opportunities and risks involved. This chapter argues that nuclear awareness is a multi-sided interpretation of national/global nuclear policy, the technological aspects of the nuclear industry, and the nuclear culture components. Using the narrative toolkit of the contemporary

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nuclear discourse, this chapter analyzes nuclear fiction by focusing on the Chernobyl nuclear disaster. It analyzes the apprehension of oppositional views on nuclear energy and societal responses to nuclear power challenges within the frame of the global environmental crisis and climate change.

Introduction

The study of nuclear awareness and nuclear humanities are in the heart of the humanities and social sciences aspects of sustainability studies because they study the history between humanity and nuclear energy as well as being concerned about energetic future scenarios. Similar to other important aspects of sustainability sciences, nuclear awareness studies aim to engage the public and create a discursive field about the social, political, and ethical issues related to nuclear energy and nuclear issues. Equally importantly, nuclear awareness studies aim to foster responsible decision making when it comes to nuclear energy in the context of sustainable development.

Nuclear energy has played a controversial role in recent human and environmental history, and societies' relationships with nuclear energy have been highly controversial. Over the past century, nuclear energy has created some of the most dramatic humanitarian and environmental crises, such as the Three Mile Island (1979), Chernobyl (1986) and Fukushima (2011) disasters. At the same time, nuclear energy has been incorporated into the energy mix of major industrialized nations. It is still unclear *whether* nuclear energy will contribute to sustainable development and, if so, *how* nuclear energy will be integrated with the Sustainable Development Goals. Today, one of the critical debates of the environmentally focused social sciences is how to interpret the role of nuclear energy in human cultures.

The UN 2030 Agenda for Sustainable Development is a global commitment to eradicate poverty and achieve sustainable development by 2030, and it contains 17 Sustainable Development Goals (SDGs). Several of the SDGs refer to nuclear energy and

nuclear issues. Generally speaking, the Agenda aims to generate a balanced and unbiased perspective on nuclear energy as one of the key elements in our energy-driven society (SDG 7, Affordable and Clean Energy). The Agenda also regards nuclear power as an alternative source of energy to achieve high-living standards and good health (SDG 3, Good Health and Well-Being), and to decrease greenhouse gas emissions and combat climate change (SDG 13, Climate Action). Although nuclear energy is an integral part of the SDGs and the global energy mix, it is highly contested and heavily criticized. According to the International Atomic Energy Agency (IAEA), ‘irrespective of the sustainability benefits of nuclear power, its contribution to sustainable development might be severely constrained in the absence of public support’ (Nuclear Power and Sustainable Development 2017). This is why nuclear energy and the related societal issues require critical reconsideration from the perspective of situating our energy dependence within sustainable futures.

The study of nuclear awareness aims to contribute to the essential debate about society and nuclear energy. To do so, it includes critical thinking on and understanding of nuclear technology, the nuclear industry, and nuclear politics. It studies the possible benefits, risks, and challenges of nuclear energy and contributes to a critical perception of nuclear energy issues. Nuclear awareness is a scientific tool to develop critical societal assessment skills on nuclear energy-related issues in the context of sustainable development.

The objective of this chapter is to map out a complex research field of nuclear awareness studies. This field aims to assemble knowledge on all aspects of nuclear power, such as the history of nuclear technology, lessons learned from nuclear disasters, the role of nuclear technology in sustainability, and nuclear waste management. This chapter provides an overview of the history of nuclear awareness and focuses on the role of nuclear fiction in the context of the sustainability debate. Lastly, it investigates one of the most devastating and frequently dramatized nuclear disasters in history: Chernobyl.

History of Nuclear Awareness

During the 1970s and the 1980s, a growing number of nuclear power plants were built globally, and societal debate swinging between rejection and acceptance of nuclear energy (Aref 2018) intensified in most industrialized countries. This discussion built on an already-existing societal fear and anxiety about a possible Cold War nuclear conflict between the post-World War II superpowers, the USA and the USSR. Soon, a wide array of societal actors responded to the perceived growing threat of nuclear power. Parallel to this growing societal discourse, the social sciences responded to analyze and interpret nuclear energy as a societal phenomenon via multidisciplinary discussions on a wide array of nuclear issues, including nuclear weapons, nuclear technology and nuclear energy policy (Blouin and Shipley 2014).

As part of the complex and escalating socio-scientific debate on nuclear issues, political and scientific actors emphasized the role of education in avoiding future nuclear conflicts, stressing that educational curricula should address rather than reinforce the fears that already existed, while opponents of the initiative expressed their fears that children would be exposed to leftist indoctrination and political fear-mongering. Speaking to the American Federation of Teachers in July 1983, President Ronald Reagan said the initiative seemed 'to be more aimed at frightening and brainwashing American schoolchildren than at fostering learning and stimulating balanced, intelligent debate' (Kreienkamp 2014).

The notion of 'nuclear awareness' was coined by the Durham Region community (the east of Toronto, Canada), where nuclear education was in the centre of the curriculum during the late 1980s and 90s. After the Chernobyl nuclear power plant explosion (26 April 1986), a group of activists responded to the need of the Durham Region community to discuss, learn, and share information about nuclear issues. Durham is home to the Darlington and Pickering nuclear generating stations, and this made the local community very sensitive to nuclear issues and keen on being informed about the nuclear situation in the region. Local conditions encouraged activists to raise awareness about nuclear

issues, particularly the risks faced by the communities of Durham Region as well as the possible risks to the entire Greater Toronto Area (Durham Nuclear Awareness n.d.).

The end of the Cold War and the demise of the Soviet Union changed the global rhetoric on nuclear weapons, changing the focus to nuclear technologies and nuclear energy policy. Nuclear anxieties shifted to nuclear geographies after the Chernobyl disaster in 1986, and so encompassed the experiences of nuclear accident survivors and the creation of exclusion zones. (Alexis-Martin and Davies 2017). With the dissolution of the USSR, the danger of nuclear weapons did not end completely. Although post-Cold War generations did not grow up in a hysterical climate about nuclear annihilation, the interconnection of security, disarmament, and nuclear weapons remained of importance for shaping the image of nuclear energy. Nuclear awareness and the ability to debate nuclear issues have been urgent because of the threats of nuclear weapons, the possible malfunctions of nuclear plants, and nuclear waste deposits. For example, in 1994, US Secretary of Defense William J. Perry made the reduction of the danger of nuclear weapons his top priority. Perry was especially concerned about the thousands of nuclear bombs still remaining in the area of the former Soviet Union (Perry 2013). Nuclear issues were at the core of the 2007 Nuclear Security Project, spearheaded by William J. Perry, George Shultz, Sam Nunn, and Henry Kissinger (Nuclear Security Project 2007). The goal of the project was to promote actions to reduce the number and the danger of nuclear weapons, with the ultimate goal of eliminating them. This initiative eventually contributed to the 'New START' treaty in which the US and Russia agreed to reduce the number of deployed nuclear weapons. Further this initiative was supported by two Nuclear Summits, designed to take better control of nuclear wastes. Under such circumstances, and in response to the growing threat, the emphasis was on a new initiative to raise the awareness of citizens about the nuclear dangers they face and what actions they could take to lower those dangers. Under the sponsorship of the Nuclear Threat Initiative (an NGO in Washington, DC), William J. Perry's project included a memoir, titled 'A Journey at the Nuclear Brink',

and the creation of education programmes specifically directed at younger generations, who had not personally experienced the nuclear crises of the Cold War generation (Perry 2013).

In the 2010s, as a result of the Fukushima Daiichi disaster (11 March 2011), the nuclear awareness concept attracted scholars and drew significant public attention again. While talking about the regulations of the Exclusion zones at a UN event in New York City (23 March 2013) and stating that ‘Evacuation zones/planning are inadequate all over the world’, Dr. Maureen McCue (MD, PhD, Physicians for Social Responsibility) spoke on nuclear awareness, referring to the activity of the Durham Region community about spreading the evacuation regulations in the case of a serious accident involving a large release of radioactivity. Thus, the initiative to raise nuclear awareness at both public and academic levels entered a new stage—referring to critical-thinking skills on nuclear-related issues through the means of risk communication and health communication while figuring out a new scenario of raising nuclear awareness in the digital world.

In 2013, Yuko Gulda, a musician and a peace ambassador—who, together with Friedrich Gulda, has been involved in the struggle against atomic weapons—launched the initiative of Nuclear Awareness Days to commemorate the victims of the nuclear bombing of Hiroshima (1945) and Nagasaki (1945) and to call for the prohibition of all nuclear weapons and other weapons of mass destruction. She explained the drive to launch the initiative as a need ‘to be aware of what we can and must do if we ever hope to live in a weapon-free world’, adding that neither economic nor political means have been able to achieve this (Genbaku No Hi website).

David P. Barash, an evolutionary biologist and a Professor of Psychology at the University of Washington, stated that:

Nuclear Awareness Days ... would give us an opportunity to meditate on not only the terrible reality of what transpired in 1945, but to condemn the world’s worst weapons before they are used again and even, with luck and perseverance, to generate momentum toward eventually eliminating them. Nuclear Awareness

Days is an opportunity to reflect not only on what has happened but also what might yet be achieved.

(Barash 2014)

As a continuation of the initiative, joining people around the world in celebrating the vision of a world free of nuclear weapons, raising awareness, and calling on their leaders to advance nuclear disarmament, the UN General Assembly established 26 September 2013 as the International Day for the Total Elimination of Nuclear Weapons (in commemoration of the night of 26 September 1983, when Stanislav Petrov disobeyed military protocol and probably prevented a nuclear holocaust) (Unfold Zero 2015).

Together with the UN General Assembly's first resolution (1946)—aiming to make proposals for controlling nuclear energy and eliminating atomic weapons—the International Day of Total Elimination of Nuclear Weapons was supposed to reaffirm the world's commitment to global nuclear disarmament as a high priority. This initiative was aimed at educating the public—and mainly, leaders—about the real benefits of eliminating such weapons, and the social and economic costs of perpetuating them. It was the right place to address one of humanity's greatest challenges: achieving the peace and security of a world without nuclear weapons (United Nations n.d.).

All these events emphasized the need for nuclear awareness, and enhanced public awareness and education about the threat posed to humanity by nuclear weapons and the need to reconsider the current and future-oriented nuclear and radiation related issues (Global Nuclear Awareness Program, 2021). Such steps can help to mobilize new international efforts toward achieving a nuclear-weapon-free world and using nuclear energy for a sustainable future.

Fiction in Shaping Nuclear Awareness

Nuclear fiction and nuclear narratives are critical elements of the nuclear awareness notion. Via these stories, a wide spectrum of

voices can be heard about nuclear accidents, disasters, and the human and natural drama associated with them. Nuclear fiction helps to access and deal with nuclear anxiety and to build society-wide nuclear awareness. According to Julie Williams, ‘the importance of narrative and how the stories we tell about our nuclear past and possible nuclear futures reveal how we as a society deal with the use of nuclear weapons’ (Williams 2014). The same statement is related to the narrative about the use of nuclear energy within the energetic history, where energy is the only universal currency (Smil 2017).

Regarding the semantic definition of the factual/fictional balance in any narrative, where ‘factual narrative is referential whereas fictional narrative has no reference’ (Schaeffer 2014), nuclear fiction, as a part of and a contributor to nuclear narrative, amalgamates both factual and fictional components. This amalgamation of the factual/fictional components distinguishes the nature of nuclear fiction as itself. The approach of combining factual and fictional components diminishes the distinction between ‘the fact’ and ‘the imagined event/virtual construction’ (Derrida 1984) by ‘factualizing’ nuclear fiction, which results in mistaking fiction on nuclear energy and nuclear-related issues for a factual narrative. This approach reflects the poststructuralist perspective on the fact/fiction dichotomy, where ‘every (narrative) representation is a human construction’ (Sugiman et al. 2008). According to Schaeffer, every narrative is ‘a model projected onto reality’—that is, being based on ontological realism, narrative discourse that does not disqualify ontological realism nor the distinction between fact and fiction (Schaeffer 2014).

In the case of the ‘nuclear energy’ narrative, the fictional and the factual components are so amalgamated that the factual component is the basis for making the nuclear narrative a fictional one, resulting in the process of fictionalizing facts, where the factual component is a background for storytelling (Banks and Banks 1998), but one that has the possible risk that the literary techniques may not convey the factual information (Murthy 2014).

On one hand, nuclear fiction, with its factual component as background, can be regarded as an archive of facts, based on memoirs and documents, but on the other, nuclear fiction can be a tool for providing basic nuclear literacy information (e.g., nuclear technology, nuclear policy, and nuclear risk behaviour).

Chernobyl is a symbol of nuclear annihilation and the end of humanity. This is a key notion within the global nuclear narrative because it is not only the nuclear explosion at the Chernobyl nuclear power plant (25 April 1986). Chernobyl created its own school of thought and its own field of nuclear awareness/literacy study associated with ‘the Chernobyl Syndrome’ (Novikau 2017). The disaster at Chernobyl gave birth to a nuclear narrative with a real impulse and allowed narratives to create ‘fabulously textual’ images of the nuclear correlations with a real event and a real area reference of its implementation: ‘With the cancerous proliferation of nuclear capacities, exacerbated by political rhetoric’, nuclear narrative amalgamated the fictional and factual components by making ‘the real world as its site of interrogation’ (Blouin and Shipley 2014).

The fictional writers of the post-Chernobyl Age mainly try to confirm the factual nature of nuclear events by weakening Derrida’s ‘fabulously textual’ nature (with its language coding and decoding) of nuclear narrative. They stress the commonly evident comprehension of the aftermath of the tragedy while focusing on human and societal transformations caused by the nuclear plant explosion, together with depicting the ecological problems of the region that suffered the nuclear disaster. Chernobyl fiction (Pavlyshyn 1991), where the issues of the Chernobyl accident were raised under a fictional storytelling cover, varies with the different levels of using memoirs, represented in the forms of eyewitnesses’ memoirs, reconsidered eyewitnesses’ memoirs and intergenerational trauma memory of the events (Welz 2016).

The factual component here is reconsidered by the writers covering the past event (the Chernobyl explosion and its aftermath) through the perspective of their present feelings and thoughts about the past, with an attempt to digest the contemporary ‘energy

narrative' concerning the political, social and ecological dimensions, from the position of such a traumatic experience. Used as a component of fiction, such factual inclusions are related to the eyewitness's memories, notes, and written evidence about the Chernobyl nuclear power plant (NPP) disaster and its short/long-term aftermath, represented by the writers themselves or based on rereading eyewitnesses' evidence. The distinguishing feature of such memoirs (eyewitness evidence) is the 'factual' component of a text, claiming the authenticity of narrating the past.

In the literary representation, these 'factual' components of the fictional writings depict protagonists' sympathy, fears, dreams, disappointment, uncertainty, and hopes when covering the factual information. The literary techniques allow writers to express the facts by creating a range of emotions related to nuclear energy issues. Fear and uncertainty, based on the lack of information and awareness and on the lack of crisis situational regulations ('*The invisible cloud was greeted with confusion and panic*' (Pohl 1988)), enlarged the unknown, uncontrolled danger ('*He wondered if anyone had told those firemen that it was not only heat and smoke and burns they faced, but the invisible, lethal storm of radiation that billowed up at them with the smoke*' (Pohl 1988)) and created the image of radiation as an invisible monster ('... *the invisible monster had slipped away, leaving them ignorant of its size and intensity. Their measurements revealed only its tail*' (Higginbotham 2019)).

In their amalgamation, such components of emotionally coloured 'factual' parts in a personal (even individual) perception not only represent the historical and material context of the events but also provide the coverage of social and cultural components and clarify public opinion on the nuclear accident while presenting a full picture of the event. At the same time, however, the uncritical approach to using the factual components of memoirs can be quite dangerous, although even the personalized and biased notes and comments in eyewitness memoirs can serve as a valuable source of information, revealing the premises and causes of a nuclear event, as well as the practices of shaping the false image of a nuclear event and revealing the truth. Such personal writing

practices helped to reveal what happened before, during, and after the accident at the Chernobyl NPP, despite the secrecy level of the nuclear energy sector. The nuclear fiction about this nuclear disaster is a result of amalgamating the fictional component with archives, memoirs, and interviews, which provide participants' names, pre-/post-explosion conversations, the numbers of the real death toll, the scale of the disaster's consequences, and potential health risks of radiation exposure, later followed by the nuclear phobia, distrust, and uncertainty that resulted in Chernobyl Syndrome (radiophobia, reluctance and opposition to nuclear energy stemmed from the disaster at Chernobyl NPP; Novikau, 2017). Such an amalgamation of facts, data, documents, archives, and fictional storytelling makes nuclear fiction a source of the nuclear disaster's details and its aftermath with further steps toward nuclear literacy. Accompanied by the emotionally coloured and biased storytelling about the nuclear event, this factual component makes readers believe in the factual nature of the fictional text by creating the so-called 'shared experience' of nuclear events.

This way of narrowing the factual component to the real places, dates, names, organizations—framing the 'realia' background of fictional—not only shapes the emotional and cognitive colouring of a factual nuclear narrative but also transforms fiction into non-fiction by erasing the border between them. Using a 'factual' component in nuclear fiction helps to reveal the geopolitical and ecological factors of energy policy at various levels as a step toward further rereading the energetic history of humanity. By providing the factual information, nuclear fiction on the Chernobyl NPP explosion not only frames the narrative tools to depict a landmark technological catastrophe but also allows humanity to reconsider the 'Atom for Peace' initiative against political, technological, ecological, and cultural agendas in its fictional implementation. This factual component of nuclear fiction transforms 'literary' Chernobyl into an intellectual, cultural, and international part of the world's energetic history. The spatio-temporal components of the novels shape the factual setting of the narrative—the nuclear one in this case. Including the details of the nuclear disaster and its

aftermath contribute to framing the nuclear history, fundamental knowledge of nuclear technology, and nuclear risk culture and, as a result, nuclear fiction (Chernobyl fiction, in our case) becomes not only a pool of archival data on the nuclear disaster but also contributes to shaping the readers' nuclear awareness.

On the other hand, amalgamating the fictional and factual components of nuclear narrative encourages the situation under which the narrative, framed by factual settings, needs fewer fictional details (represented by a narrator's or a protagonist's point of view) while making readers easily manipulated. However, such a subtle combination of factual and fabulous components about nuclear events is a distinguishing mark of nuclear fiction.

Conclusion

To sum up, nuclear awareness goes beyond the borders of traditional academia and reaches the public to enhance nuclear knowledge and narrate nuclear energy in its various controversial perspectives. It allows academic and societal actors to aim to be unbiased when considering nuclear power, as well as allowing the public to assemble knowledge on nuclear issues and sustainability. Subsequently, it contributes to a better understanding of global energy production and may help in reducing carbon emissions from fossil fuels by using alternative energy sources.

Understanding the narrative tools of nuclear awareness can enable critical thinking about the fictional and factual components of nuclear narratives as well as reconsideration of current nuclear agenda, and the opportunities and risks involved. The multidisciplinary approach that brings together 'nuclear knowledge' and fiction/non-fiction illustrates how narrative mechanisms and modes can contribute to shaping the system of values, preferences, behaviours, practices in energy-dependent and technology-driven societies on their way to achieving the SDGs. The focus on the literary implications of nuclear energy likewise helps to shape nuclear awareness and to understand the narrative perspective on the energetic history of humanity and future energy scenarios.

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