



Real, Reel and the Anthropocene: Eco-trauma Testimonies in the Film *Valiya Chirakulla Pakshikal*

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Abstract

The paper attempts to read the Endosulfan disaster in Kerala as an instance of the Anthropocene wherein the unscientific use of a pesticide resulted in the persistent misery of a population and the ecology in which they struggle to survive. The suffering is further presented to a larger audience through the film *Valiya Chirakulla Pakshikal* (2015, Dir. Dr Biju) by assimilating the reel and the real to bear testimony to their struggles amidst the toxicity of the chemical. The film, as the paper argues, becomes a representative text in the eco-trauma genre that on the one hand displays the disaster while on the other offers a cultural resistance against the unchecked use of chemicals around us. The film situates the Endosulfan disaster amongst the global movements against the pesticides and emphasises the need of a healthy environment.

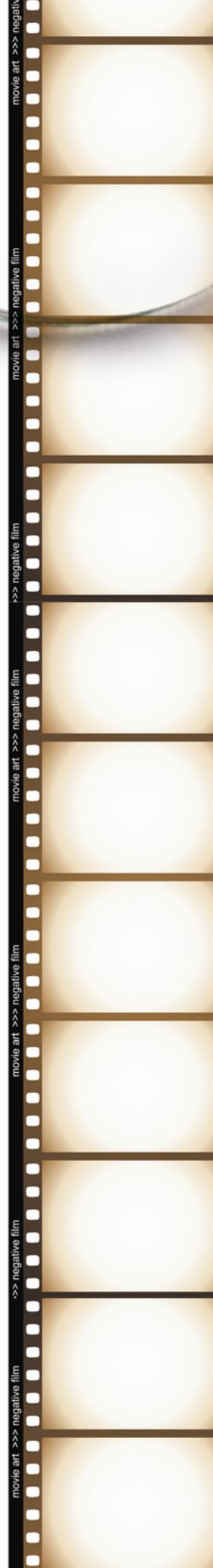
Keywords: Anthropocene; endosulfan; Kasargod; pesticide; testimony; eco-trauma; film; environment



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Real, Reel and the Anthropocene: Eco-trauma Testimonies in the Film *Valiya Chirakulla Pakshikal*

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The struggle of man against power is the struggle of memory against forgetting
-Milan Kundera, *The Book of Laughter and Forgetting*

1. Introduction

“For the past three centuries, the effects of humans on the global environment have escalated...it seems appropriate to assign the term ‘Anthropocene’ to the present, in many ways human-dominated, geological epoch” (Crutzen, 2002, p. 23). The scientific interventions of Paul J. Crutzen¹ with his famous exclamation that we are in the Anthropocene at the International Geosphere-Biosphere Programme (IGBP) conference in 2000 changed the outlook of the environmental studies henceforth. Role of human shifted, Crutzen argued, from mere a part to ‘a great force of nature’ (2000). Anthropocene, thus, points to an age shaped by human actions where we inhabit “terra incognita,” an unknown world. Gregory Bateson assigns an inherent awareness to the human interventions and insists that “conscious man, as a changer of his environment is now fully able to wreck himself and that environment – with the very best of conscious intentions” (*Steps to an Ecology of Mind*, 2000, p. 452). Crutzen and Bateson place industrialization and its effects to the fore in the discussions on the Anthropocene.

The 19th century or the Victorian era² paved way not only for modernism but also stood witness to major innovations on a global scale. Industrialization got the limelight as the central aspect of this era. Setting of new factories and industries in the urban centres resulted in migration of larger population from the rural areas to the towns and also became the stage for great leaps in the use of scientific technologies across the globe. The process of Industrialization that continued into the 20th and the 21st centuries was no different from its preceding era, but happened at a faster rate and form. Profit became the guiding motive in the industrial world and safety protocols became mere written documents for many. As a result, these centuries witnessed many gruesome industrial/chemical disasters like the Three Mile Island Accident³ (1979), Bhopal Gas Tragedy⁴ (1984), Chernobyl Disaster⁵ (1986), or the Fukushima Daiichi Nuclear Disaster⁶ (2011) whose effects are still prevailing in the nature and in several related spheres.

What is common in these industrial and related chemical disasters is apathy from the groups or organisations responsible and the respective governments. The sufferings of the victims get neglected here in the attempts to forget and move on. History is re-written, excluding the victim's experiences, and the event along with its effects get a new colouring, devoid of many realities and encounters. The fact-finding process of a traditional historian tends to avoid wider interpretations of the event and shrivel into one-sided narrative of figures and numbers.

It is here that the need for testimonies from the victims and its appropriate representation come to the fore. Testimonies, emerging out of the first-hand experiences and its prevailing memories redraw history to offer newer readings. These testimonies could be paralleled with projects of oral histories that try to overcome the promoted histories of a disaster while providing a personal account of the same. Nevertheless, these accounts cannot be dismissed as merely subjective as these “petits récits” (Lyotard, 1984, p. 60) or little narratives add on to the larger knowledge structure related to the disaster. The conspicuous absences and voids are filled in here with the victim speaking and the process of recalling offers newer insights into the history of the disaster.

Academic interests in Trauma Studies foreground memory and its manifestation through testimonies to be of prime importance. Shoshana Felman argues in *Testimony* that “a life testimony is not simply a testimony to a private life, but a point of conflation between text and life, a textual testimony that can penetrate us like an actual life” (1992, p. 2). Various representations, in form of fictional writings, documentaries or films that spur out of such testimonies offer a new life to such memories. These enhance the scope for wider recognition of one's trauma and may even generate favourable public opinion in the pursuit of justice. In the age of the ‘Anthropocene condition’ an interface with literary studies becomes pertinent to better understand and come in terms with the changing ecology. Fictional representations further the project with acumen into ‘the entanglement of nature and society and of life and geology’ (Vermeulen, 2020, p. 4, 19). The intricate relationship between human actions and its influence on the delicate ecology is laid bare in layman terms in such depictions.

The paper attempts to place the Endosulfan⁷ disaster of Kasargod district in Kerala, India amongst the discourses on the Anthropocene and read Dr Biju's⁸ cinematic representation of the same in the 2015 film *Valiya Chirakulla Pakshikal* (Birds with Large Wings), the National Film Award

winner for Best Film on Environment Conservation/Preservation, as an illustrative text in Eco-trauma film genre. The film traces a time span from the initial use of Endosulfan in the cashew plantations, the development of health issues among the residents, protests for banning the pesticide, the political game of indifference towards the victims and ultimately to the banning the pesticide in 2011 from the perspective of an unnamed photographer, a fictional representation of Madhuraj – the Mathrubhumi Press (a leading Malayalam daily) photojournalist whose photo exhibitions⁹ of the disaster were decisive in building a societal resistance against the pesticide. Biju, the director, blends reality and fiction in his attempt to portray the vicious side of pesticide usage. The characters and events in the film either have real life equivalents or are real victims of the disaster, which mars the lines of differences between the reel and real life.

2. Endosulfan: A Tale of Human and Environment Loss

Considered as one of the worst pesticide disasters to happen in a region and to its inhabitants, the Endosulfan disaster in Kasargod unwinds an account of unscientific agricultural practices, prolonged and persistent agony of the victims, apathy of the government and the pesticide industry, and an unwavering struggle by the public against a notorious chemical. The Plantation Corporation of Kerala (PCK) Ltd, the largest public sector plantation company in the state, was formed in 1962, during the era of Green Revolution¹⁰ to accelerate the agro - economic development of the state. PCK started the aerial spraying of pesticides in its cashew plantation spread over 2200 hectares in six gram panchayats of Padre village in Kasargod in the 1970s.

Initially, a pesticide named Endrin was used, which was later replaced in 1978 by Endosulfan, an organochloride pesticide, to combat tea mosquitoes and other pests. The aerial spraying of Endosulfan continued for 20 years till its usage was banned in 2003¹¹. The process of aerial spraying had violated the government norms on spraying of pesticides owing to the topography of the region and proximity to water sources. Mass deaths of bees, fishes, frogs, birds, foxes along with the emergence of congenital deformities in domestic animals like cows in the region indicated the beginning of health issues (Quijano, 2002; *Thanal*, 2009). The period that witnessed prolonged usage of the pesticide in a populated, water-rich area like Kasargod also saw a simultaneous rise in the cases of physical and mental deformities in new borne babies and adults. The commonly

noted diseases¹² were neurobehavioral disorders, congenital malformations in girls and abnormalities of the reproductive tract in boys.

Since 1974, the local population raised concerns regarding the deteriorating health conditions in the region. Pleas for a detailed medical study were submitted to the Indian Medical Association in 1994 by a local doctor Y. S. Mohankumar¹³ along with independent health findings regarding the rising cases of mental illness and congenital abnormalities in the district Leelakumariamamma¹⁴, a resident of Periya Panchayat (one of the affected Panchayats of the district) and a staff member of Krishi Bhavan (village level office of the Agricultural Department), approached the District Sub-Court in 1998 to gain a temporary ban on the aerial spraying of Endosulfan.

Multiple health and toxicology studies were conducted between 1998 and 2002 by various national and international organisations like Centre for Science and Environment (CSE)¹⁵, National Institute of Occupational Health (NIOH)¹⁶, and an Expert Committee¹⁷, appointed by the Government of Kerala, which identified a direct link between the health hazard in Kasargod and the spraying of Endosulfan. In 2002, the High Court of Kerala issued a state-wide ban on the use and sale of Endosulfan and the state government issued another ban in 2003. Efforts against the pesticide gained international recognition during the 2011 Stockholm Summit¹⁸ of the United Nations on Persistent Organic Pollutants (POP)¹⁹ that recommended a total ban on Endosulfan amongst the member nations. Interestingly, India, the largest manufacturer of Endosulfan at that time, remained the only country to oppose the decision. Along with several scientific reports, articles and features in various media, the story of the Endosulfan disaster of Kasargod was also brought closer to the public domain through various cultural representations like *Enmakaje* (a novel, 2009; translated to English as *Swarga*, 2017), *Jeevadayini* (an autobiography, 2011), *My Home is Green* (an animation film, 2012), *Swapnangal Vilkkannundu* (a play, 2013), *Valiya Chirakulla Pakshikal* (a film, 2015), *Oro Jeevanum Vilappettathanu* (a non-fiction, 2015), and the photo exhibitions by Madhuraj. These gave further impetus in strengthening the resistance against the pesticide through public awareness and support.

3. Eco-trauma and the Anthropocene

Sigmund Freud delineates trauma as “any excitations from outside which are powerful enough to break through the protective shield” of the self (*Beyond the Pleasure Principle*, 1920, p. 23). Freud

further highlights it as a ‘breach’ in an effective shield resultant of a stimulus. Judith Lewis Herman argues that traumatic events generally ‘involve threats to life or bodily integrity, or a close personal encounter with violence and death’ (*Trauma and Recovery*, 1997). The breach or the encounter need not be a direct experience to be traumatic. E. Ann Kaplan advances five levels of trauma depending on one’s subjectivity as a victim, a non-participant or a witness. Of these, two levels pertain to ‘visually and verbally mediated trauma, that is, viewing trauma on film or other media, or reading a trauma narrative and constructing visual images from semantic data’ (Kaplan, 2005). Through representations of traumatic events in the mass media in fictional narratives, one though not a direct witness to the event, may yet experience the trauma of the event as mediated by the visuals. It is this context that one can place the narratives of Eco-trauma that get impetus from various events of the Anthropocene. These narratives, be of climate change, natural or man-made ecological disaster, the sufferings of different species as a result of an environmental degradation, or the media representations of these, trigger a traumatic experience that overcomes the spatial and temporal distances between its consumers and the actual event.

Anil Narine elaborates on three responses that are encompassed in Eco-trauma: (1) Incapability induced by an awe for the magnitude of the traumatic event; (2) Renouncement; and (3) Learnings from the event as part of the ‘coping strategy’ (*Eco-trauma Cinema*, 2014). Literature in general and visual media in particular have contributed much to raising awareness among the public regarding the persistent environmental crisis. One cannot shelve James Cameron’s *Avatar*²⁰ (2009), for example, as a technologically brilliant Oscar winner alone, without comprehending on the environmental issues the film primarily addresses. Likewise, *WALL-E*²¹ (2008) permeates the screens and minds of the spectators with images of a looming wasteland if we do not mend our ways of treating the environment. Rachel Carson’s non-fiction work *Silent Spring*²² (1962), extolled as the foundational text in Eco-trauma genre, elaborates upon the pitfalls in pesticide usage leading to a possible spring sans bird, sans insects and by extension sans every image of a spring engrained in the psyche of America. The transformation from the “pastoral peace” to “catastrophic destruction” and from pictures of “essential changelessness” to a “rural idyll torn apart” (Garrard, 2004, p. 1) act as a stimulus of shock and resultant trauma about a possible world – a world in an epoch termed as the Anthropocene.

Visuals and cinema communicate effectively to a larger audience who may or may not spend time over verbal representations of the same. Creatively alarming visuals of an ecological disaster or a calamity combined with basic understanding of the rapidly changing ecology tends to be more instructive than scientific jargon in factual reports on environmental crisis and hence the popularity of Eco-trauma cinema. These visuals elevate the audience from mere spectators to partakers so much so that one may even feel responsible for the crisis and determine to mend the ways. “Creative cultural forms, in their best incarnations, prompt us to consider our quickly evolving subject positions, characterized by oscillating feelings of agency and helplessness in the face of contemporary ecological traumas” (Narine, 2014, p. 9).

Eco-trauma films deal with the destructive human actions on the environment and its resources, along with the repercussions such acts lead to. Eco-trauma cinema encompasses three universal forms: (1) accounts of people who are traumatised by the natural world, (2) accounts detailing the devastation of the environment and its resources by individuals or social practices, and (3) stories entailing an ecological cataclysm with ensuing human suffering and struggles for survival (9). The destruction of the environment could be triggered from a singular event or a series of related events. The films, here, draws attention not just to the beauty and existential peculiarity of the planet and its environment, but also emphasise its “contingent nature – of what we stand to lose if we don’t take care of our only home” (Nayar, 2019, p. 9). The attempts are to draw out the tenuous equilibrium between humans and the ecology and why the preservation of the latter is not an option but a necessity.

4. *Valiya Chirakulla Pakshikal: A Resistance and Testimony*

The trauma of the Endosulfan disaster is represented in multiple ways in *Valiya Chirakulla Pakshikal*. At the primary level, there is physical trauma of the direct victims, pictured as they were in their own living environments. The related mental agonies of their parents, relatives, teachers and acquaintances form the secondary level. The film, through its reel and real characters and situations holds true in these two respects. At the tertiary level, the trauma of witnessing is transferred to the viewers through the protagonist. The inability to act prolongs the mental agony of the viewers, as represented through various characters. Encompassing all these remain the ecological trauma –being violated under the slow violence against natural resources.

“We are accustomed to look for the gross and immediate effect and to ignore all else. Unless this appears promptly and in such obvious form that it cannot be ignored, we deny the existence of hazard” (Carson, 2000, p. 101). Similarly, the story of the Endosulfan disaster in Kasargod is one of initial ignorance and later indifference from the concerned authorities. Even after numerous studies and reports regarding the toxicity of the pesticide and the resultant health and environmental problems, little was done by the authorities to alleviate the gravity of the situation. Biju’s cinematic adaptation of the pesticide disaster pictures the milestones in the entire episode of negligence of public health and environment.

Valiya Chirakulla Pakshikal, in this respect, performs dual functions: (1) It attempts a realistic portrayal of an ecological disaster, with all its gruesome details and (2) It serves as a reminder of the ‘slow violence – violence that occurs gradually and out of sight’ (Nixon, 2011) done to the environment. The grisly frames in the film portray the traumatic victimhood on the one hand, while on the other raise questions on the apathy of the bureaucracy and the perpetrators of the disaster towards truth. As Kay Schaffer and Sidonie Smith rightly put in *Human Rights and Narrated Lives: The Ethics of Recognition* “These acts of remembering test the values that nations profess to live by against the actual experiences and perceptions of the storyteller as witness” (p. 3). The film, thus, becomes an act of resistance and testimony at the same time.

Biju eschews a dystopian setting, a common feature among the eco-trauma films that imagines the end of familiar landscapes into unliveable spaces, and brings to the screen a real incident to talk about environmental degradation. The unsystematic and unscientific spraying of pesticide in Kasargod is questioned through the memories of the victims. The film “de-territorialises memories” and places it amongst the global struggles for environment protection. The realistic portrayal of the affected enduring physical and mental trauma melds the genres of film and documentary for the larger screen and audience. This in turn helps in the “glocalization of memory” (Levy and Natan, 2006) as the cinematic representation opens more avenues for the former. The film employs a cultural strategy wherein victim’s experiences and demands for justice are given greater attention to counter the power game that focuses on profit instead of providing justice to the victims. This stance is made evident in ‘India’s opposition against the ban of Endosulfan in the Stockholm Summit’ (Mathew, 2010).

Linda Hajjar Leib argues for an urgent need to collaborate Rights to a Healthy Environment with existing Human Rights to create ‘Environmental Human Rights’. Leib reasons that existing Human Rights Charters have enough scope to absorb environmental claims. As a result, the participatory role of the public in the formulations and enactment of the laws increase, overcoming even the “sovereignty wall” raised by individual countries when an issue of environmental mismanagement is brought before international forums (*Human Rights and the Environment*, 2011). Leib’s argument is critical in the context of the Endosulfan disaster, as the unscientific use of the pesticide was sanctioned by a state-owned corporation itself. It was thus natural that the initial protests against the aerial spraying of Endosulfan, when early health issues were detected, was not taken seriously by the authorities. It is to this milieu that the director invites the viewer’s attention in *Valiya Chirakulla Pakshikal*. The title is a metaphor of the helicopters used for the aerial spraying. It also foreshadows an impending danger through these ‘birds’ with large wings. One may easily juxtapose this with the images of those large wings that dropped numerous bombs and consumed many lives and cities during World War II including those in the notorious events in Hiroshima and Nagasaki²³.

Valiya Chirakulla Pakshikal opens with a statement that “The film is based on a true incident of pesticide tragedy [that] happened in Kasargod district...most of the characters are real and some are inspired from real life” (Biju, 2009, 0:00:13-0:00:17). The convergence between the real and reel lives of the characters and incidents is established in the beginning itself by assimilating the viewers as fellow witnesses of the tragic events to follow. The first shot of a photographer clicking a picture establishes the narrator through whom the movie and its events unfold. The title credits shift to the voice-over of an approaching helicopter, which then transitions to the VFX of a copter spraying pesticide over the estate of the Plantation Corporation with a group of children watching it. This could be deduced as the initial spraying done by PCK, an irretrievable past as the following scenes depicts its ill effects in Kasargod. What makes the scene sinister is the depiction of the wonder, mystery and horror of the event clubbed into one. The present and future of the community are about to be changed forever and there is little that they can do, lest being spectators of the horrors to follow. The opening scenes of *Bhopal: A Prayer for Rain*²⁴ (2014), which depicts the story of Bhopal Gas Tragedy, renders a similar ominous idea of an impending doom. The prefiguration of the disaster thus gains an equal importance as the event itself. The copter scene

blurs itself to the present with a large-headed child, a victim of the Endosulfan, lying on the floor. If the helicopter scene warns about the looming disaster, the child represents its culmination.

The film fast forwards to the 2011 Stockholm Summit of UN round the corner and a group of activists, including the photographer, planning to raise a case against Endosulfan with adequate evidences. Viewers are then pulled back to the past where the photographer is given the assignment to prepare a photo story on Endosulfan disaster and his first visit to the place. After a brief meeting with Leelakumariamamma – a real life character (played by herself), the photographer passes by a river, on his way to meet other victims, and attempts to drink water from the water body. His local assistant, Jayakrishnan, stops him saying “Sir! Don’t take that water. It’s full of poison. The natives over here, they don’t use it even to wash clothes” (0:18:30-0:18:32). A journalist in the novel *Swarga* too speaks about the irreversible pollution of natural resources due to spraying as:

In Swarga- in Pedre village- alone ther’ are mor’ tha’ a thousan’ surangas...Thi’ abundance of water which’ made this place heaven is wha’s makin’ it hell now...Twenty-five yea’s, the poison’s been sprayed on those waterbodies! If it wer’ a well, you could cover it. Bu’ the poison tha’ falls on the hill, it gets int’ the surangas an’ reaches you’ home. Isn’ tha’ why this place is full of sick peopl’. (2017, pp. 126–127)

The destruction of natural resources is an important trope in the narratives related to any disaster. It extends the lingering disaster beyond the human realm to nature and its resources, underlining its multi-faceted disposition. Humans are just one of the many victims of a crisis. In eco-trauma narratives, the imbalance in nature and the frailty of ecosystems offer warnings against ecological mismanagement. The necessity of coexistence and respect for nature are further underlined in such narratives.

Several of these texts admittedly serve as modes of cultural training in appreciating Nature and its life forms. They also frequently call upon us to imagine the end of familiar landscapes and their transformation into the wilds, the unliveable (poisoned air, pathogens), the threatening. (Nayar, 2019)

What makes *Valiya Chirakulla Pakshikal* an intriguing text is the attempt to amalgamate the real with the reel, paving way for testimonials about the disaster by several characters. An interview with Leelakumariamamma, depicted as a part of the film narrative, facilitates her act of witnessing and speaking of the disaster as a first-hand victim.

We started living here since '93...On top of this house only they used to spray the poison...But the compatriots never knew what this poison was about...'Plantation Corporation' used to say they are spraying pesticides...While going to court only knew it was 'Endosulfan' which was spraying...All the natives out here knew that it was a pesticide, but no one knew it was poison...the poison was flowing into the wells. (0:11:23-0:12:14)

The meeting of the photographer with Dr Mohan, another real-life character representation, sheds further light on the apathy of the government towards the plight of the people. He talks about his attempts to direct the attention of the medical community and government, when he first detected unknown diseases in the people of his place. In a later meeting, after the publication of his report and the photo story by the journalist, Dr Mohan speaks about how the government continued to be indifferent to the cause.

In between many inquiry commissions came for evidences...A strange thing is, it was in 2004 central government's agriculture officer, a commission had come under the leadership of O.P. Dube...Committee had given a report in favour of Endosulfan...Many years back this Dube had worked at Kasargod...He is the one who instructed to spray Endosulfan on cashew estates for the first time...And then the Central government sends the same person to check whether there is any health hazards on Endosulfan at Kasargod. (1:18:47-1:19:31)

The scene merges with earlier scenes where the delegation of the Government of India at the Stockholm Convention demands to remove Endosulfan from the dangerous substance list, quoting reports that speak of its safety. A similar scene with a minister in the Government of Kerala rejecting the health concerns of people quoting a want of scientific proofs, too underlines the coldness of the bureaucracy towards the plight of the people. One of the climatic scenes of the film portrays the victims protesting against the non-dispersal of the promised compensations while hoping to meet the Chief Minister, who speeds past them without stopping. The indifference and mismanagement of the ruling class resulting in a disaster is a universal motif in eco-trauma

narratives. In his study of various narratives on the Bhopal Gas Tragedy, for instance, Pramod K Nayar connects the ‘apathy of those in power with the mystery and confusion of the disaster’ (2017, p. 1). The Union Carbide India Limited (UCIL) and the Madhya Pradesh government, in that instance, were always in complete denial to take responsibility of the disaster and had resorted to a blame-game.

Dr Biju employs multiple camera shots in the film but uses close-ups to focus on the physical sufferings of the pesticide victims. Every grunt, moan, cry and physical mobility and immobility of the victims are presented as if in a documentary. These help to bring the audience as close to the torments of the people as possible. The intention of the director to capture the sufferings of the people is enhanced by avoiding any plot deviations and sticking to the dire situations. One of the early scenes in the film contrasts between a cock fluttering its wings as the helicopters (‘birds with large wings’ as the film title connotes) fly past them. The director establishes the science vs nature binary wherein the former is going to affect the lives of the latter. Long shots and bird’s eye view shots are used to understand the geography of the place and its ecology that is later destroyed through pesticide spraying. These shots at various intervals in the film correspond to the changes happening in nature with regard to pesticide usage. Scenes from Stockholm use wide-angle shots, giving an impression of the universal significance of pesticide issue and highlighting that the disaster at Kasargod could be a reality for others too.

Valiya Chirakulla Pakshikal ends with a positive note with Dr Mohan commenting upon the return of frogs, fishes, dragon flies and fishes after decades, the nature still bears witness to the ill effects of the pesticide. The closing scene films the photographer clicking the photo of a victim with two imaginary rows of dead bodies in the background. It emphasizes the need for such representations, here a photograph, to etch the sufferings, despite the trauma that ensues.

Conclusion

Valiya Chirakulla Pakshikal remains the only feature film, in any language, to represent the Endosulfan disaster in Kasargod along with the plight of the people in all its magnitude. The director claims a year of intense research on the issue, through visits, interviews and reading, to be behind the venture. The research reciprocates on the big screen as a testimony of the disaster

offering through its frames a closer understanding of the events in question. Biju juxtaposes the sufferings of the environment and humans under the toxicity of Endosulfan. The film also intends to communicate to a larger audience, beyond the constraints of linguistic and geographical barriers as one could easily substitute Kasargod with any other place and Endosulfan with any other pesticide or violence against the environment. Hence the provinciality of the disaster does not negate its impact, but rather connects to broader concerns raised by models for environmental protection and progress beyond anthropocentrism. The film, thus, envisions new avenues of discussion on survival in the Anthropocene and wiser management of available resources. The film attempts to achieve this by assigning the viewers as witnesses of the disaster.

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ENDNOTES

¹ Paul Jozef Crutzen, a Dutch atmospheric chemist and Nobel Laureate in Chemistry in 1995, is known for his work on the ozone layer and climate change, and along with Eugene F. Stoermer for popularizing the term ‘Anthropocene’. For further reading on ‘Anthropocene’, see Ellis, Erle C. (2018). *Anthropocene: A Very Short Introduction*. Oxford University Press.,

<https://royalsocietypublishing.org/doi/10.1098/rsta.2010.0327>, and <https://pubs.acs.org/doi/10.1021/es903118j>.

² Victorian era is the period in British history between 1820 and 1914 when Queen Victoria was the ruler. The era is distinguished for its technological advances, industrialization, growing economy due to more revenue from the colonies and the country emerging as the most powerful empire in the world.

³ Three Mile Island Accident (28 March, 1979) is an important commercial nuclear power plant accident in the history of United States at Three Mile Island Nuclear Generating Station (TMI-2) in Dauphin County, Pennsylvania leading to a radiation leak. Rated as an "accident with wider consequences" by International Nuclear Event Scale of International Atomic Energy Agency (IAEA), the incident led to new nuclear industry regulations.

⁴ Bhopal Gas Tragedy (2-3 December, 1984) was India's first major industrial disaster with methyl isocyanate (MIC) gas leak at the Union Carbide India Limited (UCIL) pesticide plant in Bhopal, Madhya Pradesh, causing 2,259 immediate deaths and around 6 million non-fatal injuries as per official records. The side-effects of the leakage are still visible in local population and environment.

⁵ Chernobyl Disaster (25-26 April, 1986), considered as the worst nuclear disaster in history, occurred at the Chernobyl Nuclear Power Plant, Ukrainian SSR killing 4000 people and exposing thousands across Europe to nuclear radiations. With wider impacts on the ecology, the site of the plant is still maintained as an Exclusion Zone.

⁶ Fukushima Daiichi Nuclear Disaster (11 March, 2011) at the Fukushima Daiichi Nuclear Power Plant in Japan is considered as the most severe nuclear accident after Chernobyl. Resultant of the Tōhoku earthquake and tsunami, the disaster led to the evacuation of 154000 inhabitants were evacuated.

⁷ An organochlorine insecticide with two isomers, endo and exo, popularly known as I and II. The chemical leads to pesticide toxicity, endocrine disruption, reproductive and developmental health issues. More than 80 countries including the Australia, New Zealand, several West African nations, the United States, Brazil, Canada and former European Union countries have banned its use following the 2011 Stockholm Convention. For further reading, see <http://thanal.co.in/uploads/resource/document/Endosulphan-fact-sheets-60826963.pdf> and https://archive.epa.gov/pesticides/reregistration/web/html/endosulfan_fs.html

⁸ Dr Biju is an Indian Homeopathic doctor and National Film Awards winning film director, best known for his movies like *Saira* (2005), *Veetilekkulla Vazhi* (2010), *Akasathinte Niram* (2012), *Perariyathavar* (2013), *Valiya Chirakulla Pakshikal* (2016), *Sound of Silence* (2017), *Painting Life* (2018), and *Veyilmarangal* (2019). His films explore topics related to environment, self and lives of marginalised people.

⁹ Madhuraj, a photojournalist at Mathrubhumi daily in Kerala conducted many photo exhibitions in collaboration with many Human Rights organisations on the Endosulfan victims across the country and abroad. These exhibitions helped in building awareness among the public about the gravity of Kasargod's Endosulfan disaster. For photos from the exhibitions, see <https://www.madhurajsnaps.com/>

¹⁰ Green Revolution refers to an increased agricultural production worldwide in the late 1960s with the adoption of new technologies, including high-yielding varieties (HYVs) of crops, use of chemical fertilizers, agrochemicals, pesticides and newer methods of cultivation. It had environmental and health impact across the globe.

¹¹ The Government of Kerala banned the use of Endosulfan in the state in 2003 following a study conducted by National Institute of Occupational Health (NIOH), Ahmedabad. In 2011, the Supreme Court of India banned the manufacture, sale, use and export of Endosulfan throughout the country, citing its harmful health effects. See <https://cdn.downtoearth.org.in/dte/userfiles/images/endosulfan.pdf>

¹² For further reading on health problems by Endosulfan, see

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5753711/#:~:text=Between%201976%20and%202000%2C%20more.endosulfan%2C%20a%20persistent%20organochlorine%20pesticide.&text=The%20honourable%20High%20Court%20of, followed%20by%20the%20state%20government> and <https://ipen.org/sites/default/files/t/2011/05/Department-of-Community-Medicine-report-of-the-community-based-study-on-endosulfan.pdf>

¹³ Dr Y S Mohankumar, a local doctor in Padre, Kasargod brought national attention on the Endosulfan disaster through his individual findings on rising mental illness and congenital abnormalities and submitted pleas to the Kerala Medical Journal and Indian Medical Association for detailed study of the region.

¹⁴ Leelakumariamamma, a Senior Agriculture Assistant in the Department of Agriculture, and a victim submitted the first case at the Munsif Court, Hosdurg in 2001 against the spraying of Endosulfan the court temporarily stayed aerial spraying. In 2003, the High Court of Kerala upheld this decision and issued permanent ban on spraying. *Jeevadayini* (2001) is her autobiography that details the struggle against the pesticide and loss of her family members to Endosulfan.

¹⁵ See the CSE Report at http://www.indiaenvironmentportal.org.in/files/CSE_report.pdf

¹⁶ See the NIOH Report at <http://www.indiaenvironmentportal.org.in/files/NIOH-FinalReport.pdf>

¹⁷ See the Expert Committee Report at http://www.indiaenvironmentportal.org.in/files/KeralaGovt_FinalReport.pdf

¹⁸ Stockholm Convention on Persistent Organic Pollutants is an International Environmental Treaty, signed on May 22, 2001 to eliminate or curb the production and use of Persistent Organic Pollutants (POP) as per the report of Persistent Organic Pollutants Review Committee (POPRC). The chemicals were listed into three Annexes: A (Elimination), B (Restriction), and C (Unintentional Production). See https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg_no=XXVII-15&chapter=27&clang=en

¹⁹ Persistent Organic Pollutants (POP) are carbon-based chemical compounds and mixtures that result in nervous system damage, diseases of the immune system, reproductive and developmental disorders, and cancers.

²⁰ *Avatar* (2009, Dir. James Cameron) is an Academy Award winning film which depicts the colonization of an alien planet Pandora by humans and the resistance of Na'vis, the ingenious species of the planet. The plot highlights the environmental destruction activities of humans.

²¹ *WALL-E* (2008, Dir. Andrew Stanton) won the Academy Awards for the Best Animated Feature film and depicts a futuristic, uninhabitable Earth filled with garbage and waste from the perspective of a robot.

²² *Silent Spring* (1962) is a non-fiction environmental science book by Rachel Carson that documented the adverse environmental effects caused by the arbitrary use of pesticides. The book triggered a nationwide awareness against pesticides in the U.S., leading to a recheck on country's pesticide policies and ultimately to the ban on the use of DDT for agricultural practices.

²³ Hiroshima and Nagasaki are two Japanese cities that were bombed by The United States using two nuclear weapons on August 6 and 9, 1945, respectively. The two bombings that killed between 129,000 and 226,000 people remain the only incident to use nuclear weapons in an armed conflict. The two cities still have the effects of nuclear radiation.

²⁴ *Bhopal: A Prayer for Rain* (2014, Dir. Ravi Kumar) depicts the events that led to the Bhopal Gas Tragedy of 1984 along with the indifference from UCIL towards the disaster.